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HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 8 AIR QUALITY

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8 AIR QUALITY

8.1 Introduction

This chapter of the EIAR assesses the potential impacts to air quality arising from or associated with the Project. It should be read in conjunction with the site layout plans (please refer to EIAR Volume III for figures and plans) and project description (Chapter 4). Potential effects to air quality may arise during the construction phase, such as from the generation of construction dusts and emissions from construction traffic/machinery. The construction activities have been examined to identify those that have the potential for air emissions. The operational development will give rise to potential emissions from road traffic and operational emissions from plant combustion systems. Each of these potential sources has been identified and emissions have been evaluated using standard procedures. Considerations extend beyond construction and operational activities and included in this section are factors that are vulnerable to unplanned events that have the potential to cause significant sudden environmental effects. The measures to reduce, avoid and prevent these likely significant effects are proposed, where they are necessary. Thereafter, the likely significant residual effects of the Project on air quality are predicted.

A number of commercially available dispersion models are able to predict ground level concentrations arising from emissions to atmosphere from elevated point sources. Modelling for this study has been undertaken using ADMS, a version of the ADMS (Atmospheric Dispersion Modelling System) developed by Cambridge Environmental Research Consultants (CERC) that models a wide range of buoyant and passive releases to atmosphere either individually or in combination. The model calculates the mean concentration over flat terrain and also allows for the effect of plume rise, complex terrain, buildings and deposition. Dispersion models predict atmospheric concentrations within a set level of confidence and there can be variations in results between models under certain conditions; the ADMS model has been formally validated and is widely used in Ireland and internationally for regulatory purposes.

The dispersion modelling study consisted of the following components:

- Review of emissions data and other relevant information needed for the modelling study;
- Review of background ambient air quality in the vicinity of the facility;
- Air dispersion modelling of significant substances released from the site;
- Identification of predicted concentrations of released substances beyond the site boundary;
- Evaluation of the environmental significance of these predicted concentrations, including consideration of whether these concentrations are likely to exceed relevant ambient air quality standards and guidelines.

This chapter has been prepared in accordance with the following guidance documents:

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- The European Commission Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).
- The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (2022).
- The DHPLG published the revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).

The assessment was carried out to ensure that the air emissions would not lead to levels of pollutants which would exceed the air quality guideline levels. The assessment determined the ambient impact at the boundary of the site, closest receptor and beyond to ensure that ambient air quality guideline values are not exceeded.

8.2 Methodology

8.2.1 Air Quality Legislation and Guidance

8.2.1.1 The 2008 Ambient Air Quality Directive (2008/50/EC)

The 2008 Ambient Air Quality Directive (2008/50/EC) aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants; it sets legally binding concentration-based limit values, as well as target values. There are also information and alert thresholds for reporting purposes. These are to be achieved for the main air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. This Directive replaced most of the previous EU air quality legislation and in England was transposed into domestic law by the Air Quality Standards Regulations 2010, which in addition incorporates the 4th Air Quality Daughter Directive (2004/107/EC) that sets targets for ambient air concentrations of certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). Member states must comply with the limit values and the Government operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

8.2.1.2 Ambient Air Quality Standards Regulations 2022 (SI No. 739/2022)

To reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (Please refer to Table 8.1).

Air quality significance criteria are assessed based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Ambient Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants NO_2, PM10 and PM2.5 (Please refer to Table 8.1). Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$.

These limits as specified in these Regulations are presented in Table 8.1 and represent the main assessment criteria for the operation phase of the Project. The 2022 Regulations specify limit values in ambient air for sulphur dioxide (SO_2), lead, benzene, particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2) and oxides of nitrogen (NO_x). These limits are mainly for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. In addition, there are limits that apply to the protection of the wider environment (ecosystems and vegetation). All predicted concentrations from the operation of the Project are compared to the air quality limits to determine the extent of any impact on human or ecological receptors.

Table 8.1: Air Quality Standards Regulations 2022 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation[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/m³
	2008/50/EC	Annual protection of human health	40 μg/m³
	2008/50/EC	Annual limit for protection of vegetation	30 μg/m³
Particulate Matter PM_{10}	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 35 times/year	50 μg/m³
	2008/50/EC	Annual limit for protection of human health	40 μg/m³
Stage 1 - Particulate Matter $PM_{2.5}$	2008/50/EC	Annual target value for the protection of human health	25 μg/m³

[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*

Stage 2[2] - Particulate Matter $PM_{2.5}$	2008/50/EC	Annual target value for the protection of human health	20 µg/m^3

Operationally, the pollutants of concern in this Project are Nitrogen Dioxide (for the gas turbines). Particulate Matter, both PM_{10} and $PM_{2.5}$, are associated with the demolition and construction phase of the Project from exhaust emissions of vehicles and any construction associated machinery.

8.2.1.3 World Health Organisation (WHO)

Previous 2005 WHO Guidelines

In addition to the statutory limits for the protection of human health listed in SI No. 739/2022 Ambient Air Quality Standards Regulations 2022 (the “2022 Regulations”), the World Health Organisation (WHO) has published a set of air quality guidelines for the protection of human health.

The key publication is the “WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide, Global update 2005 Summary of risk assessment”. The WHO guidelines are based on reducing the risk to human health and in some cases the levels differ from the EU statutory limits as these limits are based on balancing health risks with technological feasibility, economic considerations and various other political and social factors in the EU.

The 2005 WHO guidelines are presented in Table 8.2 and illustrate that while the NO_2 levels are analogous to those in SI No. 739/2022 (excluding the tolerance levels for the 1-hour averages), the annual average PM_{10} and $PM_{2.5}$ levels specified by the WHO are half those specified in the legislation. The WHO note that these are the lowest levels at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to $PM_{2.5}$. The EPA has called for movement towards the adoption of these stricter WHO guidelines as the legal standards across Europe and in Ireland.

Table 8.2: Previous WHO 2005 Air Quality Guidelines

Pollutant	Criteria	Value
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health	200 µg/m^3
	Annual protection of human health	40 µg/m^3
Sulphur Dioxide (SO_2)	10-minute level for protection of human health	500 µg/m^3
	Daily level for protection of human health	20 µg/m^3
Particulate Matter (PM_{10})	24-hour level for protection of human health	50 µg/m^3
	Annual level for protection of human health	20 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-hour level for protection of human health	25 µg/m^3
	Annual level for protection of human health	10 µg/m^3

WHO Global Air Quality Guidelines September 2021

The World Health Organization (WHO) published revised air quality guidelines (AQGs) for pollutants in ambient air in September 2021. The new AQGs for particulate matter (PM) and nitrogen dioxide (NO_2) are substantially lower than the previous (2005) guidelines. In response to the publication of the AQGs. The updated long-term (annual average) AQG for PM_{10} is 15µg/m^3, for $PM_{2.5}$ is 5µg/m^3 and for NO_2 is 10µg/m^3. For particulate matter (PM), nitrogen dioxide (NO_2) and ozone (O_3), long-term AQGs were developed based on evidence from studies of spatial variation in long-term average concentrations of air pollutants.

Short-term (24-hour average) AQGs for particulate matter (PM), nitrogen dioxide (NO_2) and ozone (O_3), were derived from the long-term AQGs for these pollutants: as the 99th percentiles of daily concentrations observed in distributions with a mean equal to the long-term AQG. This is a different approach from that used for most of the previous (2005) short-term AQGs, which were based on a consideration of evidence of effects following short-term exposures, such as time-series studies or studies of controlled exposures.

[2] *Stage 2 indicative limit value for $PM_{2.5}$ to be applied from 1 January 2020 after review by the European Commission*

For sulphur dioxide (SO_2) and carbon monoxide (CO), for which long-term AQGs were not derived, short-term AQGs were developed which posed a similar level of risk to short-term AQGs recommended for the other pollutants. Previous (2005) AQGs for averaging times shorter than 24-hours were not covered by the 2021 update, and remain valid.

8.2.1.4 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in Section 8.2.1.2 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$ for protection of human health. Larger dust particles can give rise to dust that causes a nuisance, in Ireland there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development.

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. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2/day) to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Project.

Construction dust has the potential to cause local impacts through dust nuisance at the nearest sensitive receptors and also to sensitive ecosystems. The potential for dust generation from the construction activities associated with the Project will be assessed on the basis of a review of the proposed methodologies and the proximity of these activities to sensitive receptors. Construction activities such as stone importation, excavation, earth moving and backfilling may generate quantities of dust, particularly in dry weather conditions. 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.

A risk assessment of dust emissions arising from construction activities was completed in accordance with the Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction 2023 (IAQM, 2023). As outlined in (IAQM, 2023), an assessment for the potential impact of dust associated with the construction phase is required when there is:

- A receptor within 350m of the boundary of the Site; and/or 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the Site entrance(s); and,
- An ecological receptor is within 50m of the boundary of the Site and/or 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the Site entrance(s).

8.2.2 Assessment Methodology

8.2.2.1 Construction Stage Air Quality Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2023) outlines an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of the Project in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. Transport Infrastructure Ireland (TII) recommends the use of the IAQM guidance (2023) in the TII guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a).

The major dust generating activities are divided into four types within the IAQM guidance (2023) to reflect their different potential impacts. These are:

- Demolition
- Earthworks
- Construction
- Trackout (movement of heavy vehicles)

The magnitude of each of the four categories is divided into large, medium or small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

Construction phase traffic also has the potential to impact air quality. The TII guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022a) states that road links meeting one or more of the following criteria can be defined as being 'affected' by a Project and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

The forecast for these busiest construction months (months 7 and 30) an estimated maximum of 1100 construction staff will require to travel to and from the site per day. Based on all construction staff travelling by car, with an average of 1.5 staff to each car. This will result in 733 car trips to and from the site per day, with estimated 40% (293 car trips) travelling to and from the site during the traditional peak hours that is usually between 07:00-09:30 and 16:00- 19:00 of the week. It is estimated that site staff will generate 425 car trips on an average day, with 175 travelling during the traditional peak hours. HGV - During the peak months 7 and 30 of construction, approximately 1221 construction vehicles (not staff) will access the site. This equates to 47 vehicles per day and 7 in the peak hour assuming 15% of vehicles arrive during the peak.

All Detailed Dispersion Model Inputs and Outputs are presented in Volume III, Appendix 8.1.

8.2.2.2 Operational Stage Air Quality Assessment - Traffic

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Project. The TII scoping criteria detailed in Section 8.2.2.1 were used to determine if any road links are affected by the Project and require inclusion in a detailed air dispersion modelling assessment.

Access to the development for all vehicles will be taken from a new priority junction on R409, which provides access to Naas Town Centre to the east of the site and towards the villages of Caragh and Blackwood to the west. A secondary, emergency access will also be provided at the south-eastern corner of the site, accessed through the M7 Business Park via the Newbridge Road / M7 Business Park roundabout.

Based on the bespoke operational requirements of the Data Centre, it is proposed to provide 30 car parking spaces at each of the six Data Centre buildings, with an additional 30 car parking spaces located at the administration / management building. This equates to a total of 210 car parking spaces across the Project, which is well within the maximum parking level set out by the 'Office Park' standards within the current Kildare County Development Plan. '

The Traffic Impact Assessment for the Project (Volume I Chapter 12 Traffic and Transportation), determined that the Project will not result in the operational phase traffic increasing by more than 1,000 AADT. Total expected number of operational staff and customers / visitors related to the entire Project would be between 350 and 400. Forecast trip generation for arrivals and departures during peak traffic hours is based on figures from similar Data Centres, with the total dedicated staff and personnel arriving during the AM peak period and departing during the PM peak expected to be 56. However, this may vary based upon the Tenant demand, with customer and visitor arrivals dependent on the type of campus facility. Therefore, to provide a robust estimate of peak hour trips at the Data Centre, it has been assumed that up to an additional 50 persons could arrive and depart the site during peak hours. This totals 106 two-way trips during both the AM and PM peak periods.

Once operational, it is estimated that each of the Data Centre buildings would generate 2 HGV trips per day (4 two-way trips), with the administration building generating 1 HGV trip per day (2 two-way trips). This would equate to 26 daily two-way HGV trips being generated by the Project once operational.

Therefore, in accordance with the TII scoping criteria a detailed air dispersion modelling assessment of operational phase traffic emissions was scoped out.

8.2.2.3 Operational Stage Air Quality Assessment – Data Centre Emissions

The EPA document *Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)* was used in the assessment of industrial emissions from the Project. The EPA guidance outlines general principles and suitable methods for air dispersion modelling which can then be used to assess and report on the effect of air emissions from EPA licensed facilities. The guidance is aimed at practitioners of Air Dispersion Modelling (ADM).

ADM is used to assess the air quality of an emission source within a defined modelling domain by performing a mathematical approximation of dispersion and estimating ambient pollutant concentrations at a given location rather than replicating atmospheric processes in detail. The guidance note has several aims as follows:

- To outline a set of minimum standards which should be adhered to when carrying out an ADM assessment;
- To provide a best practice guide for modellers;
- To ensure that modelling studies are undertaken with satisfactory accuracy and reliability and that the report details the methodology and results clearly;
- To ensure that assessments are conservative, to prioritise the protection of human health and the environment;
- To ensure there is a sound scientific basis to the methodology;
- To ensure there is a consistent procedure for choosing screening versus advanced methods;
- To identify a consistent methodology that may be used by the modeller to select the most appropriate advanced air dispersion model;
- To ensure that the risk of adverse effects from an installation is consistent with the complexity of the ADM assessment;
- To ensure that there is sufficient consistency in the model application and scope that the assessments are of uniform quality and, therefore, professional differences are minimal;
- To reduce errors in model set-up, application, interpretation and reporting.

Atmospheric Dispersion Modelling of Pollutant Concentrations

Pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is used as a practical way to simulate these complex processes; such a model requires a range of input data, which can include emissions rates, meteorological data and local topographical information.

The atmospheric pollutant concentrations in a study areas depend not only on local sources at a street scale, but also on the background pollutant level made up of the local background, together with regional pollution and pollution from more remote sources brought in on the incoming air mass. This background contribution needs to be added to the fraction from the modelled sources and is usually obtained from measurements or estimates of urban background concentrations for the area in locations that are not directly affected by local emissions sources.

Emissions of total NOx from combustion sources comprise nitric oxide (NO) and NO_2. The NO oxidises in the atmosphere to form NO_2. The assessment of operational impacts therefore focuses on changes in NO_2 concentrations at ground level receptors. An air quality impact for emissions from operational industrial emissions will be included as part of the assessment. All model inputs and outputs are presented in Volume III, Appendix 8.1.

8.2.2.4 Ecological Sites

The Project, at the operational stage, will be spatially separated from all designated sites of natural heritage importance. The site is hydrologically connected to a number of European sites within Dublin Bay, via the Bluebell Stream and the River Liffey, including the South Dublin Bay SAC and North Dublin Bay SAC and the South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. The Project is located at a distance of 34.7km from each of these European sites (straight-line distance) and is linked to them by a hydrological pathway approximately 58km in length.

Due to the separation distance, the Project will therefore have no potential to give rise to likely significant operational phase effects upon the South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA, or any further sites designated on account of their natural heritage interests. Due to the separation distance, the effects from atmospheric pollution on designated sites is predicted to be negligible and not significant.

8.3 Characteristics of the Project

8.3.1 Introduction

Fundamentally, Data Centres must be designed and built for resilience, efficiency and security. To ensure security of power to the facility, a relatively small area of the site will be allocated to onsite emergency back-up power generation. Typically, these back-up generators will be fuelled by Hydrotreated Vegetable Oil (HVO) and their installation will trigger the need for an air quality assessment to accompany a planning application or an environmental permit.

The overall Data Centre development includes two main elements, namely:

(a) The Data Centre, comprising 6 no. two storey Data Centre buildings, an administration/management building, car parking, landscaping, energy infrastructure and other associated works. These elements are the subject of the planning application submitted to KCC, and that application is referred to hereafter as "the Data Centre Application".

(b) The substation, comprising a grid substation and 110kV transmission connection. These elements are subject of the SID application to An Bord Pleanála, and that application is referred to hereafter as "the Substation Application".

8.3.2 Turbine Engines

Large capacity turbine plant will provide the primary power source for each Data Centre. The turbines will operate on gas fuel sourced from the local gas supply network. A backup liquid fuel source will be provided to each Data Centre with 24hrs capacity in the event the gas supply is unavailable.

The turbine plant will operate on a 24/7 basis and will be coupled with battery systems to provide conditioned and resilient power to all building loads. All large turbine systems are to be located at ground floor level of the external plant yard at the rear of the Data Centre.

Mains (Gas Networks Ireland [GNI]) connected, on-site natural gas turbines are the proposed primary energy source for the Project. Generation of electricity is proposed using highly efficient gas turbines, located within a dedicated, adjoined plant area, to the rear of each Data Centre building. Each Data Centre building will comprise of 8no. turbines.

This is in line with recent EU and Irish Government direction on the use of gas for generation as a transition fuel. It also avoids any negative impact from the Project on the public electricity distribution system and allows for any excess power to be exported to the grid to aid Eirgrid in their supply of electricity. The on-site power generation capacity will be in excess of that required for the operation of the Data Centre and will provide an opportunity for the export of energy to the national grid if and when required.

The gas supply from Gas Networks Ireland (GNI) will be sourced to provide the primary energy supply to the gas turbines. Gas Networks Ireland as set out in the Vision 2050 publication aim to decarbonise their gas network by 2050 by injecting renewables gas (biomethane), abated natural gas, and hydrogen into the gas network over time. A biomethane gas injection point is proposed to allow sustainable gas to be inputted for use in the turbines and more broadly in the wider network.

In the unlikely event that gas supply to the turbines is interrupted or becomes unavailable, the turbines can operate on hydrotreated vegetable oil (HVO).

8.3.3 Back Up Generators

The gas turbines are supported by smaller, reciprocating gas engines which provide a backup for various running scenarios to include for maintenance and demand requirements. In the unlikely event that gas supply to the turbines is interrupted or becomes unavailable, the reciprocating gas engines can operate either on piped gas supply or on stored on-site natural gas.

8.3.4 Substation and 110kV Transmission Connection

The potential impacts associated with the construction phase of this portion of the application are:

- The generation of dust and particulates (e.g., from construction phase) potentially having an adverse impact on dust sensitive ecological receptors, effects on human health and nuisance caused by dust soiling of surfaces at residential properties; and,
- Exhaust emissions from construction traffic and NRMM[3] (plant and equipment) having the potential to increase local ambient concentrations of NOx and particulate matter (PM_{10} and $PM_{2.5}$) and impact human health.

Effects during demolition and construction can often be more significant than those that arise during the operational life of a project. For the construction phase it is important to define the physical characteristics of the whole project, including, where relevant, demolition works, the land-use requirements during construction and operation as well as other works that are integral to the project. Dust emissions can lead to elevated PM_{10} and $PM_{2.5}$ concentrations and may also cause dust soiling. The significance of impacts due to vehicle emissions during the construction phase will be dependent on the number of additional vehicle movements, the proportion of HGVs and the proximity of sensitive receptors to site access routes. It is not likely that construction traffic would lead to a significant change (> 10%) in Average Annual Daily Traffic (AADT) flows near to sensitive receptors, then concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ will be predicted.

Dust and emissions mitigations are included in this chapter and will be adopted in the CEMP that will set out management and mitigation measures for atmospheric emissions during construction phase.

The operational phase of the substation and transmission connector will not have a significant impact on atmospheric emissions and does not meet any assessment criteria. The operational phase assessment of the substation and 110kV transmission connection are therefore scoped out of the assessment presented in this chapter.

8.4 Baseline Environment

8.4.1 Introduction

The site area of the Project is 38.64 ha and is located on the western side of the M7 motorway, positioned between Junctions 9a and 10. The site is bound to the north by the R409 road which provides a direct link to the centre of Naas, c.2.5km to the east.

There has been significant development in the locality in recent years, particularly light industry, logistics and services. The site is located between the existing ‘M7 Business Park’ and ‘Osberstown Business Park’. The Osberstown Wastewater Treatment Plant is located nearby to the north. The site is bounded to the east by the M7 motorway and to the west by agricultural lands. The ‘Newhall Retail Park’ is located to the south of the site, on the east side of the M7 motorway.

The site boundaries are approximately 730m (northern), 380m (western), 780m (southern) and 630m (eastern) respectively.

[3] *Non-Road Mobile Machinery (NRMM) is a broad category which includes mobile machines, and transportable industrial equipment or vehicles which are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads.*

The site is currently in agricultural use and comprises a number of fields which are bounded by hedgerows, mature and semi-mature trees. A watercourse, the Bluebell Stream, is located to and bounds the southern boundary of the site.

8.4.2 Primary Atmospheric Pollutants

Atmospheric pollution in the vicinity of the Project is largely dominated by road traffic exhaust fumes, commercial and residential emissions. Therefore, the primary contaminants of concern identified were Nitrogen Oxides (NO_X) and Particulate Matter (PM_{10} and $PM_{2.5}$). NO_X is primarily produced during combustion at high temperatures with contributions from traffic, residential heating, and industry. PM_{10} are particles in air with diameters of 10µm (microns) or less. These particles can consist of direct emission from combustion engines and burning solid fuels, while natural sources can be windblown salt, plant spores, and pollens. $PM_{2.5}$ or fine particulate matter is composed of varying components depending on its source but can include nitrates, sulphates, volatile organic compounds (VOCs), metals and soil or dust particles.

8.4.3 EPA Air Quality Zone

The EPA is the authority with responsibility for ambient air quality monitoring in Ireland and measures the levels of a number of atmospheric pollutants. Ambient air quality monitoring is carried out in accordance with the requirements of the CAFE Directive which has been transposed into Irish national legislation by the Ambient Air Quality Standards Regulations 2022 (the “2022 Regulations”). For the purposes of detailing ambient air quality in Ireland, it is divided into four zones: Zone A: Dublin, Zone B: Cork, Zone C: Other cities and large towns, Zone D: Rural Ireland. In Ireland, the network is managed by the EPA in partnership with Local Authorities and other public/semi-state bodies. A series of monitoring stations are located across the country, these stations collect air quality data for public information. EU legislation on air quality requires that all Member States divide their territory into zones for the assessment and management of air quality. The current trends in air quality in Ireland are reported in the EPA publication Air Quality in Ireland – 2022 (EPA, 2023) which is the most up to date report on air quality in Ireland. For ambient air quality management and monitoring in Ireland, four zones, A, B, C and D are defined in the AQS Regulations (SI No. 739/2022) and are defined as follows:

- **Zone A**: Dublin Conurbation;
- **Zone B**: Cork Conurbation;
- **Zone C**: 24 cities and large towns. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Newbridge, Mullingar, Letterkenny, Celbridge and Balbriggan, Portlaoise, Greystones and Leixlip; and,
- **Zone D**: Rural Ireland, i.e. the remainder of the State excluding Zones A, B & C.

According to the above classification, the Project is located within **Zone C**.

8.4.4 EPA Air Quality Monitoring

8.4.4.1 County Kildare

There are two monitoring locations relevant to the Project site:

- Naas, Co. Kildare (Station 83); and
- Newbridge, Co. Kildare (TNO3953).

It should be noted that on 3rd May 2023, the Newbridge, Co. Kildare station is offline, with its last upload 10 months ago from the state date in May.

The locations of the EPA monitoring sites are highlighted in Figure 8.1 below. Monitoring results are shown in Figure 8.2.

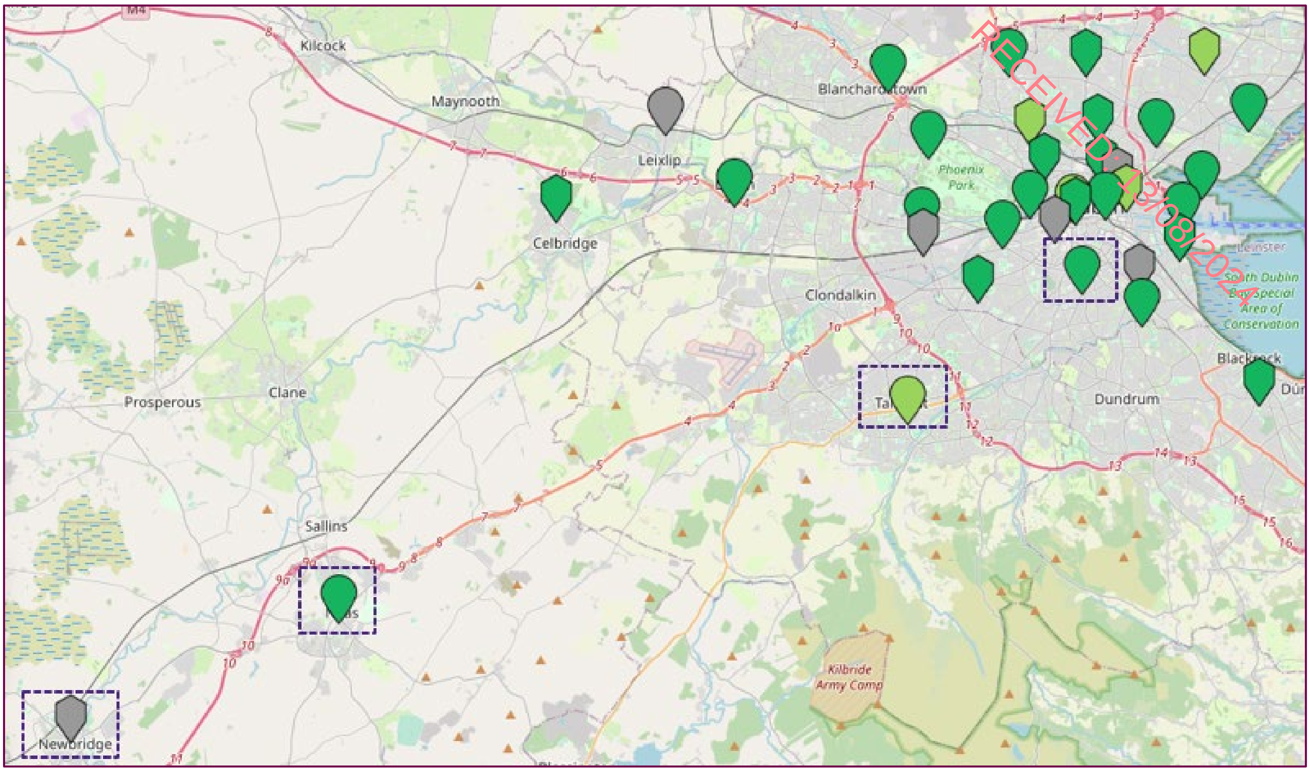

Figure 8.1: EPA Monitoring Sites (EPA, 2023)

The EPA reports real-time results of localised monitoring, providing the public with indicative data on current ambient air quality throughout the country.

The air quality station in Naas was commissioned in April 2021. Automatic, provisional results are available here for particulate matter (PM_{10} and $PM_{2.5}$). Figure 8.2 outlines the ambient PM_{10} and $PM_{2.5}$ concentrations recorded between 1st February 2023 to 1st May 2023 recorded at the Naas monitoring station.

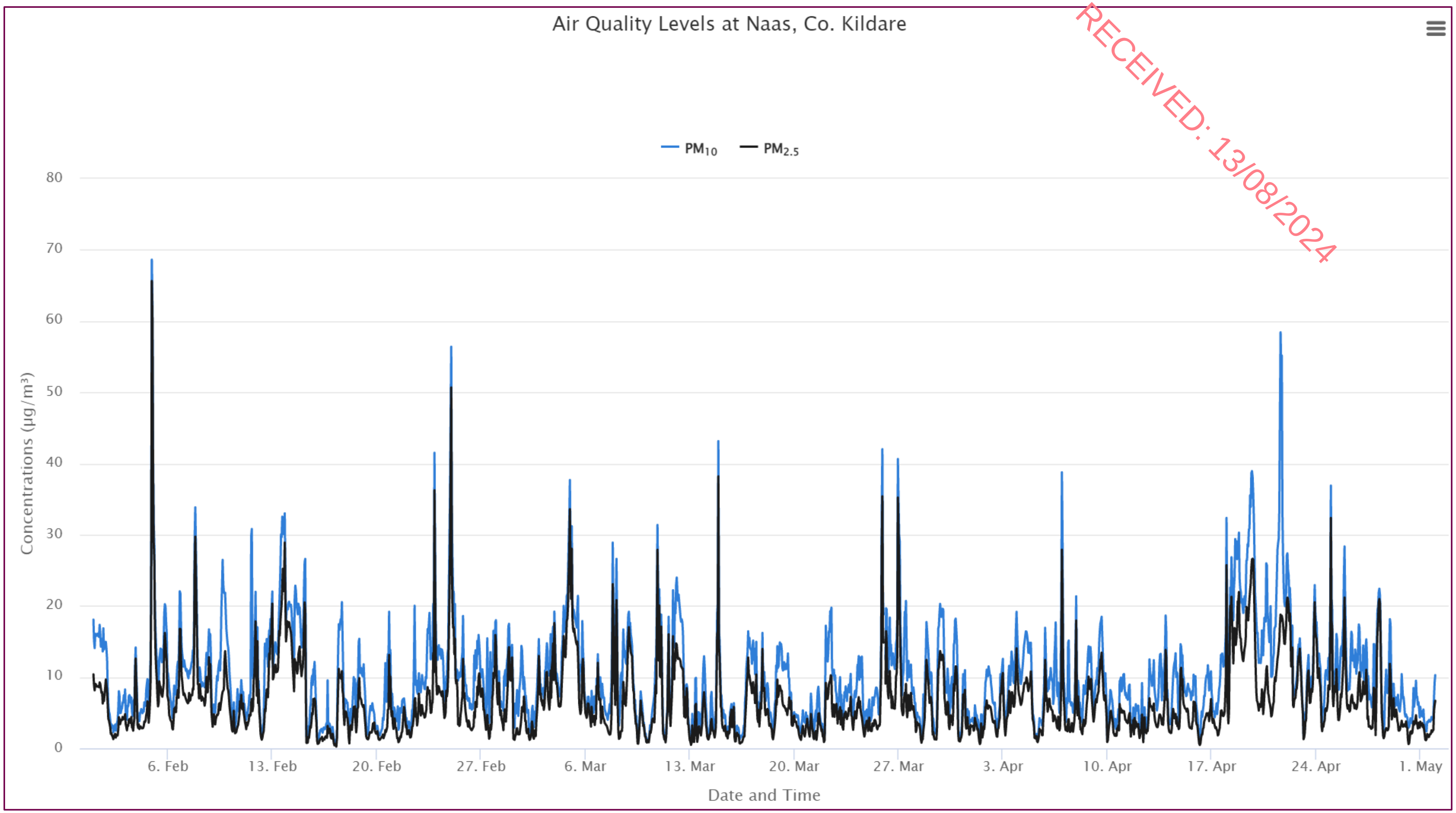

Figure 8.2: Air Quality Levels at Naas, Co. Kildare

8.4.4.2 County Dublin

The EPA air quality monitoring network for Zone A has also been reviewed and suitable representative data is presented to identify the background air quality in Dublin Conurbation as a worst-case scenario.

The two monitoring locations that have been reviewed in relation to the Project site are detailed below:

- National Network – Tallaght, Dublin 24 (Station 44); and
- National Network – Rathmines, Dublin 6 (Station 22).

The Tallaght site is located on the Old Bawn Road. This site is operated by South Dublin County Council. Monitoring is done using continuous monitors for Nitrogen Dioxide and Particulate Matter (PM_{10} and $PM_{2.5}$). Figure 8.3 outlines the ambient NO_2, PM_{10} and $PM_{2.5}$ concentrations recorded between 1st February 2023 to 1st May 2023 recorded at the Tallaght monitoring station.

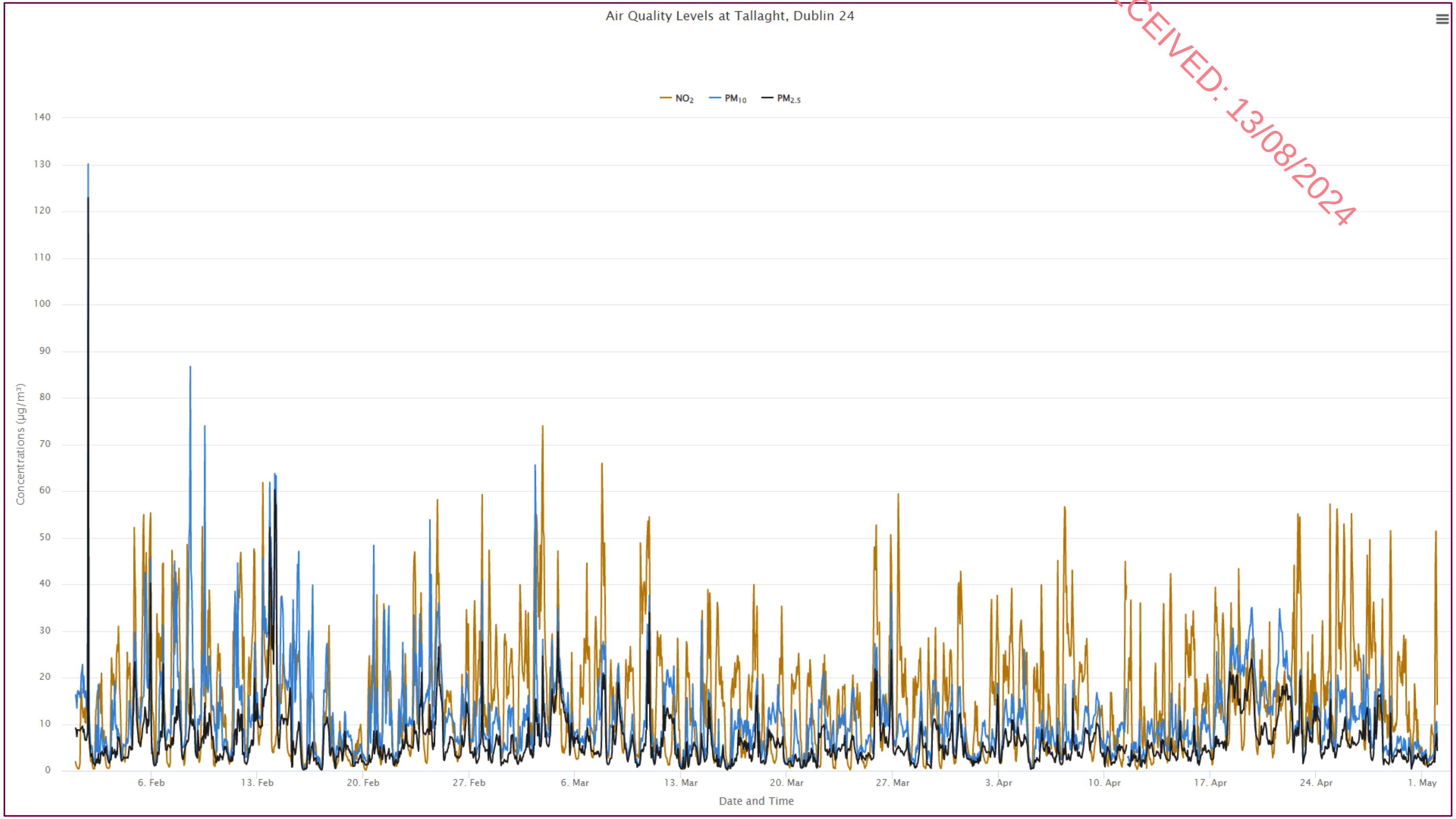

Figure 8.3: Air Quality Levels at Tallaght, Co. Dublin

The Rathmines site is located in Wynnefield Road in the southern suburb of Rathmines, about 3 kilometres from the city centre. Monitoring is done using continuous monitors for sulphur dioxide, nitrogen oxides, ozone, benzene and ozone precursor compounds, PM_{10} and $PM_{2.5}$. Figure 8.4 outlines the ambient NO_2, O_3, SO_2, PM_{10} and $PM_{2.5}$ concentrations recorded between 1st February 2023 to 1st May 2023 recorded at the Rathmines monitoring station.

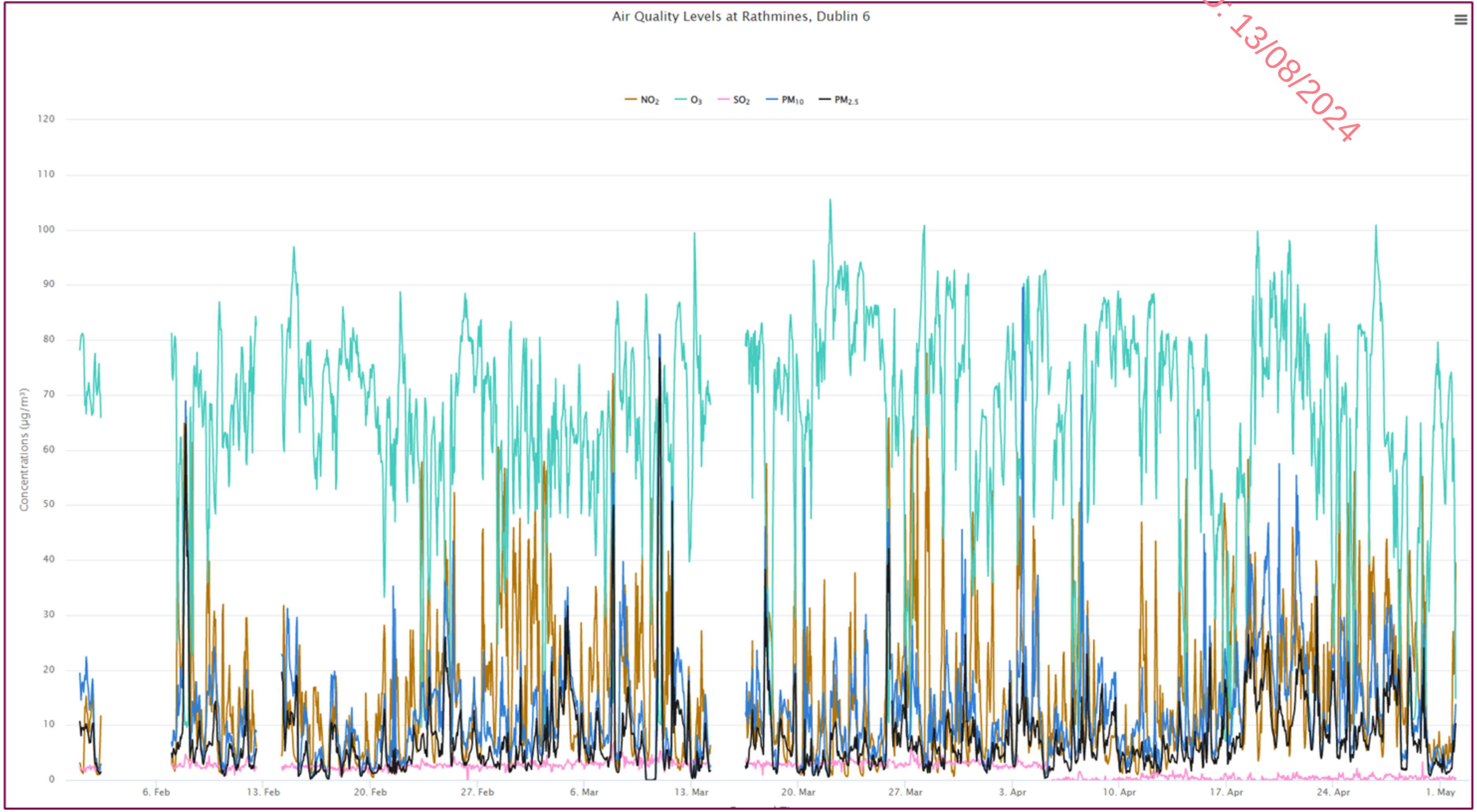

Figure 8.4: Air Quality Levels at Rathmines, Co. Dublin

8.4.5 Sensitive Receptors

8.4.5.1 Nature Conservation Sites

Air quality impacts are not just a problem for people living nearby. An increase in pollutant concentrations and/or deposition of pollutants onto surfaces of the plants or the ground surrounding plants can affect the biodiversity of habitats in nature conservation sites.

The relevant critical levels in this case are for total nitrogen oxides (known as NO_X) and SO_2. The United Nations Economic Commission for Europe sets out critical loads which refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. The relevant critical loads in this case are for nutrient nitrogen deposition and acid deposition.

Complying with the critical levels and critical loads is usually an easier task for Data Centres than meeting limit values and objectives for human exposure. This is because most critical levels and loads are measured over the period of a year so impacts from short, intermittent usage are less likely to be severe. The one pollutant which can be problematic is NO_X which has a critical level expressed as a maximum daily-mean of 75 $\mu g.m^{-3}$. This can be an issue if there is a sensitive habitat immediately downwind of the site. In exceptional cases, it may be necessary to use statistical tools to establish the probability that the back-up generators will ever be required to operate for a full day of use and the probability that if a day is randomly selected that it coincides with meteorological conditions that give rise to the highest daily concentrations.

8.4.5.2 Human Receptors

LAQM.TG (16) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes. Examples of locations for averaging periods are detailed in Table 8.3 below.

Table 8.3: Example of Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily mean	All locations where the annual-mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building's façade), or any other location where public exposure is expected to be short-term
Hourly-mean	All locations where the annual and 24-hour mean would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and bus stations etc which were not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer	Kerbside sites where the public would not be expected to have regular access

8.5 Impact Assessment

The potential impacts from the Project were assessed under the following stages:

- Construction Phase (including demolition); and,
- Operational Phase.

8.5.1 Construction Phase

The construction works will require groundworks for the installation of road infrastructure, such as drainage and utilities pipework. Furthermore, Site works will require removal, regrading, and re-establishment of surfaces, to develop the desired elevation changes on the finished design. Such construction related activities have the potential to impact receptors through:

- Dust deposition, resulting in soiling of surfaces and impacting ecological receptors from exposed soils due to surface run-off.
- Elevated particulate matter concentrations in ambient air because of dust generating activities on Site potentially impacting local human health.
- Nitrogen dioxide and particulate matter emissions due to vehicle movements to, from and within the Site.

8.5.1.1 Construction Dust Risk Assessment

8.5.1.1.1 Construction Activities

Construction activities can be divided into four types (demolition, earthworks, construction and track-out) to reflect their potential impacts. These activities are rated by their potential dust emission magnitude (small, medium and large) (IAQM, 2016).

Table 8.4 below presents the construction activities proposed as part of this development and their respective dust emission magnitude in accordance with methodology (Please refer to Volume III Technical Appendices, Appendix 8.1 for details).

Table 8.4: Potential Dust Emission Magnitude Classification

Activity	Project – Construction Activities	Dust Emission Magnitude Category
Demolition	Project demolition activities will primarily include: • Cutting and lifting concrete & hardstand. • Building demolition • Crushing and screening of concrete may also occur at the Site.	**Small**
Earthworks	Project earthwork activities will primarily include: • Landscaping area • Unlikely to be >10 earth moving vehicles active at any one time; • Earth bunds will be <8m in height	**Large**
Construction	Project construction activities will primarily include: • Majority of works to be completed at ground level; • Installation of granite paving, concrete surfacing	**Large**

	with aggregate, • Development of paths, urban fabric and roads.	
Track-out	Project track-out activities will primarily include • Estimated that between 10-50 HDV outward movements in any one day; and, • Estimated that unpaved road length will not exceed 100m at any one time.	**Large**

8.5.1.2 Define Sensitivity of the Area

The sensitivity (high, medium and low sensitivity) of receptors was assessed based on the following effects:

- Sensitivity of people to dust soiling effects;
- Sensitivity of people to the human health effects of PM_{10}; and
- Sensitivity of receptors to ecological effects.

Please refer to Volume III Technical Appendices, Appendix 8.1 Table B for details of determining the sensitivity of people to dust soiling, IAQM give indicative examples of high, medium and low sensitive receptors. Please refer to Volume III Technical Appendices, Appendix 8.1 Table E - H for assigning the level of risk for each activity.. The sensitivity of these receptors are outlined in Table 8.5.

Table 8.5: Receptors in Distance Bandings

Phase	0-20m	20-50m	50-100m	100-200m	200-350m
Phase 1	1	2	7	6	6
Phase 2	0	0	0	0	10
Phase 3	0	0	1	0	3
Total	1	2	8	6	19

In brief, the criteria is based on whether a receptor is likely to be exposed to elevated concentrations of PM_{10} over a 24 hour period and utilises background concentrations of PM_{10} as part of the assessment. The sensitivity of the receptors has been defined with due recognition to the criteria outlined by the IAQM. The results are outlined in Table 8.6 below.

Table 8.6: Sensitivity of Receptors to the Effects of PM_{10}

ID	Annual Mean PM_{10} Concentration	Number of Receptors	Distance to Site Boundary (m)	Receptor Sensitivity
Phase 1	*12.5 μg/m³*	3	50	High
Phase 2	*12.5 μg/m³*	0	50	High
Phase 3	*12.5 μg/m³*	0	50	High

Please refer to Volume III Technical Appendices, Appendix 8.1 Table C for details on determining the sensitivity of receptors to ecological effects, IAQM give indicative examples of high, medium and low sensitive receptors. According to the IAQM, dust can have two types of effects on vegetation (chemical and physical). Direct physical effects are from smothering, which reduces the plants capacity to photosynthesise, complete respiration and transpiration. Direct chemical effects can include the altering of pH in soil and watercourses through the deposition of alkali rich particles. Indirect effects can include increased susceptibility to pathogens and air quality (IAQM, 2016).

In terms of ecological receptors, there have been one identified. The sensitivity of these receptors has been defined taking cognizance of the criteria outlined by the IAQM. The results are outlined in Table 8.7 below.

Table 8.7: Sensitivity of Receptors to Ecological Impacts

ID	Distance to Site Boundary (m)	Receptor Sensitivity	Reason for Sensitivity Rating
Grand Canal pNHA [002104]	630	Low	Man-made watercourse with associated riparian habitats, smooth newt *Lissotriton vulgaris* populations, importance for otter and populations of opposite-leaved pondweed *Groenlandia densa.*

8.5.1.3 Defining the Risk of Impacts

To identify the risk of impact from dust emissions with no mitigation measures applied, the dust emission magnitude determined was combined with the sensitivity of the receptors defined for each construction activity (Demolition, Earthworks, Construction and Track-out). Following this method the risk of impact on the following receptors was defined as follows:

- Sensitivity of people to dust soiling effects;
- Sensitivity of people to the human health effects of PM_{10}; and,
- Sensitivity of receptors to ecological effects.

As the potential risks to all receptors were consistent across all construction activity stages during the risk assessment, they are summarised in Table 8.8 below. Please refer to Volume III Technical Appendices, Appendix 8.1 (Tables A – H) for details on the full risk impact assessment.

Table 8.8: Risk of Impact from Dust Soiling, Human Health (PM_{10}) and Ecological Receptors

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Low risk	Low risk	Low risk
Human health - PM_{10}	Medium risk	Low risk	Low risk	Low risk
Ecological	Negligible	Negligible	Negligible	Negligible

It should be noted that the risks associated with impacts are short-term in nature. The level of risk identified for each activity outlined determines the level of mitigation required (IAQM, 2023). The mitigation measures are outlined in this chapter.

8.5.2 Operational Phase - Impact Assessment & Result Analysis

8.5.2.1 Assessing the Impacts

Pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is used as a practical way to simulate these complex processes and is often used to assess the air quality impact of emissions from a Data Centre on the surrounding area. The model requires a range of input data, which can include emissions rates, meteorological data, building dimensions and local topographical information.

The atmospheric pollutant concentrations in an urban area depend not only on local sources at a street scale, but also on the ambient pollutant level made up of the local urban-wide background, together with regional pollution and pollution from more remote sources brought in on the incoming air mass. This ambient contribution needs to be added to the fraction from the modelled sources. It is usually obtained from local authority measurements, site specific measurements and/or EPA mapped concentration estimates.

One of the main ways to mitigate air quality impacts from a Data Centre is to make sure that the stack or flue from which emissions are released is high enough to provide adequate dispersion/dilution and to overcome local building wake effects. This is usually determined by running the dispersion model and predicting concentrations for a range of possible stack heights. The movement of air over and around buildings generates areas of flow circulation, which can lead to increased ground level concentrations in the building wakes. Where building heights are greater than about 30 – 40% of the stack height, downwash effects can be significant and the dominant structures (i.e. with the greatest dimensions likely to promote turbulence) are normally included within a dispersion model. The modelling needs to consider a wide range of potential meteorological conditions and it is good practice to model between three and five years of meteorological data collected at a nearby representative station. That is calculated as between approximately 26,280 and 43,800 hours of different meteorological conditions.

8.5.2.2 Approach

This air quality assessment covers the key elements listed below:

- Establishing the background Ambient Concentration (AC) from consideration of Air Quality Review & Assessment findings and assessment of existing local air quality through a review of available air quality monitoring background map data in the vicinity of the proposed site.
- Quantitative assessment of the operational effects on local air quality from stack emissions utilising a “new generation” Gaussian dispersion model, ADMS. Assessment of Process Contributions (PC) from the facility in isolation, and assessment of resultant Predicted Environmental Concentrations (PEC), taking into account cumulative impacts through incorporation of the AC.

Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising this deliverable has over 15 years’ experience.

8.5.2.2.1 ADMS (Atmospheric Dispersion Modelling System)

A number of commercially available dispersion models are able to predict ground level concentrations arising from emissions to atmosphere from elevated point sources. Modelling for this study[4] has been undertaken using ADMS, a version of the ADMS (Atmospheric DispersionModelling System) developed by Cambridge Environmental Research Consultants (CERC) that models a wide range of buoyant and passive releases to atmosphere either individually or in combination. The model calculates the mean concentration over flat terrain and also allows for the effect of plume rise, complex terrain, buildings and deposition. Dispersion models predict atmospheric concentrations within a set level of confidence and there can be variations in results between models under certain conditions; the ADMS model has been formally validated and iswidely used in the UK and internationally for regulatory purposes.

ADMS comprises a number of individual modules each representing one of the processes contributing to dispersion or an aspect of data input and output. Amongst the features of ADMS are:

- An up-to-date dispersion model in which the boundary layer structure is characterised by theheight of the boundary layer and the Monin-Obukhov length, a length scale dependent on the friction velocity and the heat flux at the surface. This approach allows the vertical structure of the boundary layer, and hence concentrations, to be calculated more accuratelythan does the use of Pasquill-Gifford stability categories, which were used in many previousmodels (e.g. ISCST3). The restriction implied by the Pasquill-Gifford approach that the dispersion parameters are independent of height is avoided. In ADMS the concentration distribution is Gaussian in stable and neutral conditions, but the vertical distribution is non- Gaussian in convective conditions, to take account of the skewed structure of the vertical component of turbulence;
- A number of complex modules including the effects of plume rise, complex terrain, coastlines, concentration fluctuations and buildings; and
- A facility to calculate long-term averages of hourly mean concentration, dry and wetdeposition fluxes and radioactivity, and percentiles of hourly mean concentrations, from either statistical meteorological data or hourly average data.

[4] The study area encompasses the entire footprint of the Project and also incorporates representative receptors beyond the boundary to ensure all potential sensitive receptors are included in the assessment presented in this chapter.

8.5.3 Model Inputs

8.5.3.1 Meteorological Data

The most important meteorological parameters governing the atmospheric dispersion of pollutants are wind direction, wind speed and atmospheric stability as described below:

- Wind direction determines the sector of the compass into which the plume is dispersed;
- Wind speed affects the distance that the plume travels over time and can affect plume dispersion by increasing the initial dilution of pollutants and inhibiting plume rise; and
- Atmospheric stability is a measure of the turbulence of the air, and particularly of its verticalmotion. It therefore affects the spread of the plume as it travels away from the source. Newgeneration dispersion models, including ADMS, use a parameter known as the Monin - Obukhov length that, together with the wind speed, describes the stability of the atmosphere.

For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. These parameters includewind speed, wind direction, cloud cover and temperature. There are only a limited number of siteswhere the required meteorological measurements are made.

The year of meteorological data that is used for a modelling assessment can have a significant effect on source contribution concentrations. Dispersion model simulations have been performedusing three years of data from Dublin Airport, between 2016 and 2020.

Wind roses have been produced for each of the years of meteorological data used in this assessment and are presented in the Figures section.

8.5.3.2 Time Varying Emissions

For the purposes of assessing the air quality impacts, modelling has been undertaken for a worst-case scenario assuming that the gas engine operate for non-stop hours per year which represents the largest total number of operational hours considered as part of this assessment.

8.5.3.3 Surface Roughness

A length scale parameter called the surface roughness length is used in the model to characterise the study area in terms of the effects it will have on wind speed and turbulence, which are key factors in the modelling. The roughness of the terrain over which a plume passes can have a significant effect on dispersion by altering the velocity profile with height, and the degree of atmospheric turbulence. This is accounted for by a parameter called the surface roughness length. A surface roughness length of 0.5 m has been used within the model to represent the average surface characteristics across the study area.

8.5.3.4 Building Wake Effects

The movement of air over and around buildings generates areas of flow circulation, which can lead to increased ground level concentrations in the building wakes. Where building heights are greater than about 30 - 40% of the stack height, downwash effects can be significant. Table 8.9 presents modelling building structures. .

Table 8.9: Dimensions of Buildings Included Within the Dispersion Model

Building	OS - X	OS - Y	Height (m)	Length (m)	Width (m)	Angle (º) to North
DC1	286229	219624	18	152	92	147
DC2	286341	219693	18	152	92	147
DC3	286452	219763	18	152	92	147

DC4	286680	219703	18	152	92	147
DC5	286512	219562	18	152	92	237
DC6	286554	219429	18	152	92	237

8.5.3.5 Stack Height Determination

Gas is a clean-burning fuel; nevertheless, there is a need to discharge the flue gases through an elevated stack to allow dispersion and dilution of the residual combustion emissions. The stack needs to be of sufficient height to ensure that pollutant concentrations are acceptable by the time they reach ground level. The stack also needs to be high enough to ensure that releases are not within the aerodynamic influence of nearby buildings, or else wake effects can quickly bring the undiluted plume down to the ground.

A stack height determination has been undertaken to establish the height at which there is minimal additional environmental benefit associated with the cost of further increasing the stack. The stack height determination has focused on identifying the stack height required to overcome the wake effects of nearby buildings and orientation on the Project land (taking consideration of relief). This involved running a series of atmospheric dispersion modelling simulations to predict the ground-level concentrations with the stack at different heights.

8.5.4 Model Outputs

8.5.4.1 Receptors

The air quality assessment predicts the impacts at locations that could be sensitive to any changes. Such sensitive receptors should be selected where the public is regularly present and likely to be exposed over the averaging period of the objective.

Modelling of point source impacts has been undertaken using a grid of 3 km by 3 km centred on the stack, with a grid spacing of 30 m. All human receptors have been modelled at a height of 1.5 m, representative of typical head height. The locations of these discrete receptors are listed in Table 8.10 and illustrated in Appendix 8.1.

Table 8.10: Modelled Sensitive Receptors

Receptor Name	X(m)	Y (m)	Z(m)
1	286706	219893	1.5
2	287029	219772	1.5
3	287068	219791	1.5
4	287098	219791	1.5
5	287080	219883	1.5
6	287075	219979	1.5
7	287121	220007	1.5
8	285909	220060	1.5
9	285968	219333	1.5
10	286171	219231	1.5
11	286218	219186	1.5
12	286390	218945	1.5
13	286405	218835	1.5
14	285959	219180	1.5
15	286009	219188	1.5
16	286055	219209	1.5
17	286098	219199	1.5
18	286125	219180	1.5
19	286131	219155	1.5
20	286178	219173	1.5
21	286217	219136	1.5
22	286155	219029	1.5
23	285324	219573	1.5
24	285498	219775	1.5
25	285521	219808	1.5
26	285552	219843	1.5
27	285571	219961	1.5
28	285476	220075	1.5
29	285579	220030	1.5
30	285725	220019	1.5
31	285613	220268	1.5
32	285677	220246	1.5
33	285772	220357	1.5
34	286041	220289	1.5
35	286069	220311	1.5
36	286296	220395	1.5
37	286344	220398	1.5
38	286394	220405	1.5
39	286631	220328	1.5
40	286543	218679	1.5
41	286520	218592	1.5
42	286781	218684	1.5

Receptors have been modelled at 1.5m above ground level, representative of typical head height

The NO_2 objectives for all the different averaging periods apply at the façades of the modelled sensitive receptors.

8.5.4.2 NO_x to NO_2 Relationship

The NO_x emissions will typically comprise approximately 90-95% nitrogen monoxide (NO) and 5-10% nitrogen dioxide (NO_2) at the point of release. The NO oxidises in the atmosphere in the presence of sunlight, ozone and volatile organic compounds to form NO_2, which is the principal concern in terms of environmental health effects.

There are various techniques available for estimating the proportion of NO_x converted to NO_2 by the time it has reached receptors which depends on the distance and hence travel time betweenthe source and receptor. The methods used in this assessment are discussed below.

8.5.4.3 NO_x to NO_2 Assumptions for Annual-Mean Calculations

Total conversion (i.e. 100%) of NO to NO_2 is sometimes used for the estimation of the absolute upper limit of the annual mean NO_2. This technique is based on the assumption that all NO emitted is converted to NO_2 before it reaches ground level. However, in reality the conversion is an equilibrium reaction and even at ambient concentrations a proportion of NOX remains in the form of NO. Total conversion is, therefore, an unrealistic assumption, particularly in the near field. While this approach is useful for screening assessments, it is not appropriate for detailed assessments.

Historically, the EPA has recommended that for a 'worst-case scenario', a 70% conversion of NO to NO_2 should be considered for calculation of annual average concentrations. If a breach of the annual average NO_2 objective/limit value occurs.

8.5.4.4 NO_x to NO_2 Assumptions for Hourly-Mean Calculations

An assumed conversion of 35% follows the EPA's recommendations for thecalculation of 'worst-case scenario' short-term NO_2 concentrations.

8.5.4.5 Modelling of Long-term and Short-term Emissions

Long-term (annual-mean) NO_2 has been modelled for comparison with the relevant annual mean objectives. For short-term NO_2, the objective is for the hourly-mean concentration not to exceed 200 $\mu g.m^{-3}$ more than 18 times per calendar year. As there are 8,760 hours in a non-leap year, the hourly- mean concentration would need to be below 200 $\mu g.m^{-3}$ in 8,742 hours, i.e. 99.79% of the time. Therefore, the 99.79th percentile of hourly NO_2 has been modelled.

8.5.5 Significance Criteria

The guidance is for risk assessments and provides details for screening out substances for detailed assessment. In particular, it states that:

"To screen out a PC for any substance so that you don't need to do any further assessment of it,the PC must meet both of the following criteria:

- *the short-term PC is less than 10% of the short-term environmental standard*
- *the long-term PC is less than 1% of the long-term environmental standard*

If you meet both of these criteria you don't need to do any further assessment of the substance.

If you don't meet them you need to carry out a second stage of screening to determine the impactof the PEC.

It continues by stating that:

"You must do detailed modelling for any PECs not screened out as insignificant."

It then states that further action may be required where:

- "*your PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributors)*
- *the PEC is already exceeding an environmental standard"*

On that basis, the results of the detailed modelling presented in this report have been used as follows:

- *The impacts are not considered significant if the short-term PC is less than 10 % of the short-term Air Quality Assessment Level (AQAL);*

- *The impacts are not considered significant if the long-term PC is less than 1 % of the long-term AQAL; and*
- *The impacts are not considered significant if the PEC is below the AQAL.*

The Air Quality Assessment Level refers to the air quality standards air quality objective and the EU limit value.

8.5.6 Uncertainty

All air quality assessment tools, whether models or monitoring measurements, have a degree of uncertainty associated with the results. The choices that the practitioner makes in setting-up themodel, choosing the input data, and selecting the baseline monitoring data will decide whether the final predicted impact should be considered a central estimate, or an estimate tending towards the upper bounds of the uncertainty range (i.e. tending towards worst-case).

The atmospheric dispersion model itself contributes some of this uncertainty, due to it being a simplified version of the real situation: it uses a sophisticated set of mathematical equations to approximate the complex physical and chemical atmospheric processes taking place as a pollutant is released and as it travels to a receptor. The predictive ability of even the best model is limited by how well the turbulent nature of the atmosphere can be represented.

Each of the data inputs for the model, listed earlier, will also have some uncertainty associated with them. Where it has been necessary to make assumptions, these have mainly been made towards the upper end of the range informed by an analysis of relevant, available data to achievean assessment that has a conservative bias overall. Where no significant effects are predicted, based on conservative assumptions, there is no need to revisit these assumptions, although theopportunity exists to do so.

The main components of uncertainty in the total predicted concentrations, made up of the background concentration and the modelled fraction, include those summarised in Table 8.11.

Table 8.11: Approaches to Dealing with Uncertainty used Within the Assessment

Concentration	Source of Uncertainty	Approach to Dealing with Uncertainty	Comments
Background Concentration	Characterisation of future baseline air quality (i.e. the air quality conditions in the future assuming that the development does not proceed)	The future background concentration used in the assessment is the same as the current background concentration and no reduction has been assumed. This is a conservative assumption as, in reality, background concentrations are likely to reduce over time as cleaner vehicle technologies form an increasing proportion of the fleet.	The background concentration is the major proportion of the total predicted concentration. The conservative assumptions adopted ensure that the background concentration used within the model contribute to the result being towards the top of the uncertainty range, rather than a central estimate.
Model Input/Output Data	Meteorological Data	Uncertainties arise from any differences between the conditions at the met station and the development site, and between the historical met years and the future years. These have been minimised by using meteorological data collated at a representative measuring site. The model has been run for 5 full years of meteorological conditions.	The modelled fraction is likely to contribute to the result being between a central estimate and the top of the uncertainty range.

	Receptors	The model has been run for a grid of receptors. In addition, receptor locations have been identified where concentrations are highest or where the greatest changes are expected.	

The analysis of the component uncertainties indicates that, overall, the predicted total concentration is likely to be towards the top of the uncertainty range (i.e. the worst case) rather than being a central estimate. The actual concentrations that will be found when the development is operational are unlikely to be higher than those presented within this report and are more likely to be lower.

8.5.7 Do Nothing Scenario

Ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments in the surrounding industrial estates, changes in road traffic, etc).

8.5.8 Likely Significant Environmental Effects

The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) 3 (Moorcroft and Barrowcliffe et al., provides a method for describing the impacts on local air quality arising from development . Impact description involves expressing the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration. Table 8.12 sets out the matrix for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document.

From this, some initial screening criteria can be derived:

- any change in concentration smaller than 0.5% of the long-term (annual mean) environmental standard will be *negligible*, regardless of the existing air quality conditions;
- any change smaller than 1.5% of the long-term environmental standard will be *negligible* so long as the total (with-scheme) concentration is less than 94% of the environmental standard; and
- any change smaller than 5.5% of the long-term environmental standard will be *negligible* so long as the total (with-scheme) concentration is less than 75% of the environmental standard.

Table 8.12: Approaches to Dealing with Uncertainty used Within the Assessment

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>10
75 % or less of AQAL	Negligible	Negligible	Slight	Moderate
76 -94 % of AQAL	Negligible	Slight	Moderate	Moderate
95 - 102 % of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109 % of AQAL	Moderate	Moderate	Substantial	Substantial
110 % or more than AQAL	Moderate	Substantial	Substantial	Substantial

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.
3. The table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

Given that the hourly mean nitrogen dioxide objective allows a certain number of hours with concentrations exceeding the standard, rather than being a single concentration not to be exceeded, it is not possible to usefully assign a magnitude of change. The objective and limit value allow 18 hours a year to exceed the standard of 200 μg/m^3(the "objective value").

For the purposes of this assessment, the maximum process contribution (100th percentile) from the testing of the generators has been used to determine whether there could be an exceedance of the 1-hour mean objective value of 200 μg/m^3.

EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al., and Environment Agency guidance (Environment Agency, both recommend a screening criterion of 10% of the short term environmental standard when assessing short term concentrations. Thus, if the 100th percentile of hourly mean process contributions from the facility is less than 10% of the objective level (20 μg/m^3), the contribution can be considered insignificant without the need to consider total concentrations.

Where the process contribution cannot immediately be screened out, it is added to the baseline concentration to determine the 100 the percentile of total hourly mean concentrations. Where this total concentration is below 200 μg/m^3 it can be assumed that the short term objective will not be exceeded, and the effects are considered to be 'not significant'.

8.5.9 Modelled Scenarios

8.5.9.1 Model Narrative – Point Source Emissions

This section sets out the reasons for the approach to assessment and details the assumptions made in the dispersion modelling. The likely impact from process emissions may be estimated using an appropriate atmospheric dispersion model and reliable emission estimates. The emissions from the installation are based on information provided by the applicant. The emission data is presented in Appendix 8.1 (where the units are fuelled by HVO in the event of a failure of the grid supply of piped gas). The stack locations are shown in Appendix 8.1 Figure 8.38.

The objective of the dispersion modelling assessment is to predict the likely effect of the prevailing climate, local surface conditions and adjacent buildings on plume behaviour; and to predict the likely worst-case airborne concentrations at the nearest sensitive receptors around the installation. The receptor location around the installation are listed in Appendix 8.1 Table 8.4. The receptor locations are shown in Appendix 8.1 Figure 8.38. The pattern of pollutant dispersion may be estimated using several years of historical meteorological data from a representative site. Air quality impacts are assessed against the annual mean and short-term Air Quality Limit Values for NO_2.

The main assessment Scenario ignore impacts from process upsets, fluctuations and accidents. This is contingent on a programme of planned preventative maintenance being implemented to ensure that the risk of unplanned emissions is minimised. The main emission Scenario is based on the use of gas-fired turbines which will be the normal operation use except where there is a failure in the grid supply.

According to current professional Guidance[5], dispersion modelling studies should include a Sensitivity Analysis for model inputs, to provide an estimate of the possible errors in the predictions. The EPA has published requirements for dispersion modelling.[6] This includes advice on the Agency's requirements for reporting. These Guidance documents have been taken into account in the assessment.

A widely recognised mathematical model (ADMS) has been used to predict how emissions will be dispersed taking account of:

- the source conditions (using ELVs and stack gas flow rates);
- release conditions (efflux velocity and temperature);
- meteorological conditions from a representative site (in this case data from Dublin Airport);
- building effects and surface conditions (surface roughness).

ADMS was developed specifically for industrial point sources.[7] The model is widely used for environmental assessment and is generally considered by environmental agencies to be suitable for air quality impact assessment subject to its proper use.

The temperature and efflux velocity of the stack gases are based on client supplied data. The emissions have been considered as a continuous, steady state elevated point source release. The locations of the stacks are listed in Appendix 8.1 Table 8.1. The height of the releases from the flues are as stated in Appendix 8.1 Table 8.1. The details of the buildings and flue locations were obtained from the site planning drawings and the map base.

The surface roughness conditions at the site have initially been assumed to be typical of suburban areas, with a surface roughness value of 0.5m. This value is likely to represent conditions at receptors around the installation. A model sensitivity analysis has been conducted to assess the significance of adopting a range of roughness length values and is shown to be of negligible significance.

The selection of suitable meteorological data needs to be conducted with care. The main limiting factor for

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[5] *ADMLC January 2021. Guidelines for the Preparation of Short Range Dispersion Modelling Assessments for Compliance with Regulatory Requirements – An Update to the ADMLC 2004 Guidance.*

[6] *https://www.epa.ie/publications/compliance--enforcement/air/air-guidance-notes/EPA-Air-Dispersion-Modelling-Guidance-Note-(AG4)-2020.pdf*

[7] *CERC 2016. ADMS-5, The Multiple Source Air Dispersion Model. CERC, Cambridge. The model version used in this assessment is 5.5.5.0 with interface version 5.2.0 10/11/2016.*

suitable meteorological data is continuous observations of cloud cover, used in the model to determine atmospheric stability. Five years of hourly sequential data from Dublin Airport, approximately 38km to the north-east has been used in this study.

The dispersion model used can take account of the effects of re-circulating flow or downwash effects caused by buildings near the point of release. Building effects have been considered. Details of the buildings considered in the model are listed in Appendix Table 8.3, based on the drawings provided by the applicant. The locations of buildings considered in the dispersion model are shown in Appendix 8.1 Figure 8.38.

The averaging time for NO_2 is based on a 1-hour average. The 1-hour 99.8%ile has been calculated for NO_2. No chemistry has been assumed in the model predictions. The predicted contours for the annual mean NO_2 are plotted in Appendix 8.1 Figure 8.39. The predicted short term NO_2 is plotted in Appendix 8.1 Figure 8.40. This assumes that NO_2 is 0.50 of the predicted NO_x, based on EPA guidelines.

Predictions have been made at 42 fixed point receptors as listed in Table 8.10 to represent exposure at existing nearest sensitive receptors around the site and to assist with the model Sensitivity Analysis. These predictions have been modelled at a height of 1.5m above ground level. Predictions have also been made for the worst-case meteorological conditions using a 10m resolution grid.

Atmospheric chemistry and photo-lytic reactions have been ignored in the dispersion modelling. No allowance has been made for typical NO_x:NO_2 chemistry in the model predictions.

The main assessment considered the impacts from the proposed gas fired turbines. An additional model build considered the impacts from up to 120 proposed gas-fired reciprocating engines. This description relates to the proposed use of 120 gas-fired reciprocating engines. The model predictions include two Scenarios. The first Scenario assumes that all 120 reciprocating gas engines will be fired at maximum output simultaneously. The operator has advised that in practice it is unlikely that all units will operate simultaneously, so a second Scenario considers the impacts from 60 units operating. Further details of the emission rates are set out in Appendix 8.1. This assessment adopts the same worst-case dispersion conditions as previously reported (Dublin 2017 and surface roughness of 0.5m).

8.5.9.2 Summary of Significance of Operational Air Quality Effects

The operational air quality effects with designed mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix 8.1, and takes account of the assessment that:

- annual mean impacts of NO_2 at existing receptors are predicted to be negligible;
- during routine testing of the generators, it is highly unlikely pollutant concentrations will cause an exceedance of the 1-hour mean NO_2 air quality objective;
- based on modelling within this assessment, the chance of an exceedance of the 1-hour mean NO_2 air quality objective occurring during emergency operations are demonstrated to be very low and judged to be not significant; and,
- the scenarios and model setup has been based on very conservative assumptions, including that the operation of the generators will occur during the worst meteorological conditions (for dispersion) from any of the three years of chosen meteorological data.

Detailed Dispersion Model Inputs and Outputs are presented in Appendix 8.1.

8.5.10 Mitigation

8.5.10.1 Pre-Construction & Construction Phase

Mitigation measures are divided into general measures applicable to the entire and measures applicable specifically to the defined construction activities (i.e. demolition, earthworks, construction and track-out). As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures (IAQM, 2023).

A Dust Management Plan (DMP) will be prepared by the appointed contractor for the Site and submitted to the Council for written agreement prior to commencement of construction. The DMP will at a minimum include the following mitigation measures listed below to minimise and manage potential dust emissions:

8.5.10.2 Communications

With respect to communications, the following will be implemented:

- Develop and implement a stakeholder communications plan that includes community engagement;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the Site Manager;
- Appropriate training will be provided to all staff to ensure that they are aware of and understand the dust control and other environmental control measures; and,
- Display the head or regional office contact information.

To be implemented before works commence on site and training given as appropriate by the appointed contractor.

8.5.10.3 Site Management

With respect to site management, the following will be implemented:

- Daily visual inspections of the site and site boundary for evidence of dust depositions will be made. A dust inspection of the site will be undertaken by a suitable person, trained and nominated by the site manager. Increase frequency of site inspections will be undertaken when activities with a high potential to produce dust are being carried out, such as earthworks activities, power tool use and during prolonged windy or dry condition;
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints record available to the relevant regulatory authorities when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in an environmental log book;
- Avoid site runoff of water or mud;
- Use covered skips;
- No bonfires and burning of waste materials on site;
- It is recommended that passive monitoring at three - site boundary locations shall be completed for the duration earthworks (Bergerhoff method);
- Keep surfaces such as Site fencing and barriers clean using wet methods.

To be implemented during works as required by the appointed contractor.

8.5.10.4 Earthworks

Earthworks are planned as part of the Project including foundations (and associated excavation of soils and materials), creation of stockpiling and cut and fill areas. With respect to earthworks, the following will be implemented:

- Disturbance of the ground will be kept to a minimum wherever possible;
- Soil handling should be restricted during adverse weather conditions such as high winds or exceptionally dry spells – depending on outcome of walk over survey identifying any potential issues ;
- Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate;
- Dampening methods will be used where necessary; and,
- Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.

To be implemented during earthworks by the appointed contractor.

8.5.10.5 Construction

With respect to construction, the following will be implemented:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed;
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; and,
- Cleaning of hard stand areas by personnel only or if required mechanical road sweepers (with water suppressant fitted) to clean any site hard stand area.

To be implemented during construction period by the appointed contractor.

8.5.10.6 Vehicle Movement and Vehicle Emissions

As with any construction site, there are associated vehicle movement, emissions and plant use. With respect to vehicle movement and vehicle emissions, the following will be implemented:

- Implement a wheel washing system until earthworks are completed. Wheel wash system should have an adequate amount of hard surface between it and the Site exit;
- Transportation of dusty/fine materials will be conducted in enclosed or sheeted vehicles;
- An onsite speed limit (to be displayed) will be implemented by the main contractor that will be appropriate to the types of construction plant utilised;
- Regular cleaning and maintenance of site roads as appropriate. Hard surface roads should be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Ensure all vehicles switch off engines when stationary and not in immediate use - no idling vehicles (emissions to air controlled);
- All plant utilised should be regularly inspected (emissions to air controlled);
- Visual monitoring of plant will include: Ensuring no black smoke is emitted other than during ignition (emissions to air controlled);
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturers limits (emissions to air controlled); and,
- Vehicle exhausts will be directed away from the ground and other surfaces and preferably upwards to avoid road dust being re-suspended to the air.
- Avoid the use of diesel or petrol powered generators where possible, using mains electricity or battery powered items where practicable;
- Impose and signpost a speed limit of 20 km/hr on sealed surfaces and 15 km/hr on unsealed surfaces.

To be implemented throughout by the appointed contractor.

8.5.11 Operational Phase

The proposed facility incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- Reuse/recycling of material on-site where possible reducing emissions related to production of virgin materials;
- Solar photovoltaic (PV) arrays are located on the roof top of each of the six DC buildings. The solar PV arrays will provide a minimum 500kW peak per building provided as part of 30% renewable energy target for operational energy target;
- LED lighting, which is proven to use 75% less energy when compared to traditional incandescent bulbs will contribute to further reduce already minimal indirect emissions due to electricity use; and,
- Planting of trees contribute to carbon sequestration and improved air quality.

8.5.12 Residual Impacts

Construction stage impacts will be short duration, and upon completion, will have no further impact on the local environment. Mitigation measures have been outlined to control dust during the construction stage, to minimise the potential for impact. Following implementation of these measures, a short term, and localised minor impact is likely. Having considered the characteristics of the Project, the predicted impact from the operational phase on air quality will be not significant, negligible, long term impact.

8.6 Interactions

Air quality has the potential to interact with the following environmental issues: Chapter 7 Water Quality, Chapter 5 Biodiversity, Chapter 12 Traffic & Transportation, Chapter 14 Population and Chapter 15 Human Health.

8.7 Cumulative Effects

8.7.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. All cumulative projects have been considered in regard to air quality. During construction there are no other construction projects within 350m of the Project site boundary that will interact with dust generation. No construction dust cumulative impacts are anticipated. The predicted concentrations for the construction and operational phases already include traffic emissions from vehicles using other identified committed developments.

8.7.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

The construction works associated with the proposed pipeline will take place during Phase 1 of the construction programme for the Project, as the gas connection will be required in order to bring Data Centres online.

The receptors which have the potential to experience a cumulative impact from the Project construction programme and the GNI Gas Connection construction works have been identified and summarised in Table 8.13. For convenience the receptor locations are detailed in Figure 8.5.

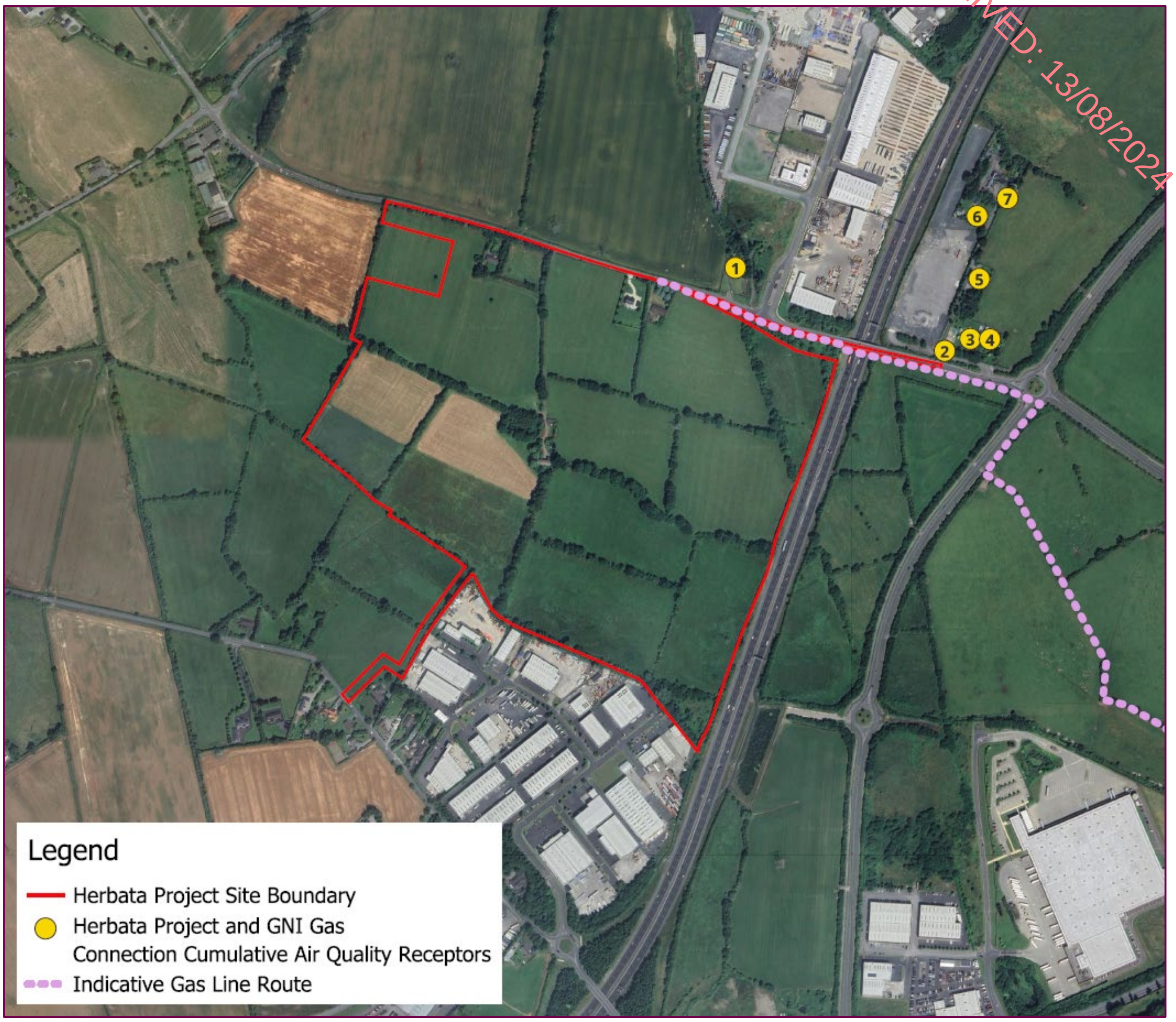

Figure 8.5: EPA Monitoring Sites (EPA, 2023)

All other air quality sensitive receptors considered within the EIAR are located more than 300m from the Gas Connection potential route. The potential Gas Connection route and within the Gas Networks Ireland Infrastructure Upgrade Outline Report (included in Volume II). It should be noted that these are representative worst case construction phase receptors that are in closest proximity to both the Project and the GNI gas connection.

Table 8.13: Potential Cumulative Impacts Receptors

Receptor	Distance to Gas Connection, m
1	50
2	50
3	75
4	85
5	165
6	250
7	295

A large portion of the construction works for the GNI Gas Connection will take place across agricultural lands. Works will involve a construction corridor of 14m width, centred on the pipeline. It is expected that tracked excavators and bulldozers will be the primary air quality sources associated with the works. Access to the works on agricultural lands will typically be provided at public road crossing locations. It is not expected that construction traffic for the Gas Connection will be significant in the context of existing traffic flows.

In many cases, the impact of the development being assessed will have a cumulative effect with other planned developments, which may or may not have planning permission. Where these developments have been granted planning consent and are therefore 'committed' developments, their impacts should be assessed cumulatively with those of the application site. The contribution of these committed developments should be accounted for in the 'future baseline', provided that their contributions can be quantified.

This situation can arise when several such developments are contributing additional road traffic on one stretch of road. In some particular cases, there may be another notable proposed development (without planning permission) in close proximity that could contribute an impact at receptors in combination with the primary development being assessed. In these circumstances, it may be necessary to quantify this combined impact for selected receptors and assess it against the future baseline. These occasions and the need for this form of scenario assessment will be rare. The cumulative effects in this instance are applicable to the construction phase of both the Project and the GNI gas connection.

In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments, together with those generated by the planned development. Therefore, the potential impacts of the Project cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned future development.

After an assessment of potential adverse effects produced by the development, it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors which cumulatively would not hinder the developments proceeding (the Project and the GNI gas connection).

Overall, the effects of the GNI gas connection on air quality are considered to be not significant after the implementation of mitigation measures. For example, as detailed in the IAQM guidance, there may be a provision to hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

8.8 Summary of Effects

This chapter considers the air quality impacts from the construction phase and once the Project is fully operational. In undertaking this assessment, RPS experts have exercised professional skills and judgement to the best of their abilities and have given professional opinions that are objective, reliable and backed with scientific rigour. These professional responsibilities are in accordance with the code of professional conduct set by the Institution of Environmental Sciences for members of the Institute of Air Quality Management (IAQM).

For the construction phase, an important consideration is dust. Without appropriate mitigation, dust could cause temporary soiling of surfaces, particularly windows and cars. The mitigation measures provided within this chapter will help ensure that the risk of adverse dust effects is reduced to a level categorised as "not significant". Another important issue during the construction phase is control of emissions from construction plant and machinery. Mitigation measures are detailed to help control air quality pollutants.

Pollutant concentrations are predicted to be within the relevant health-based air quality objectives. Therefore, air quality is acceptable at the receptors surrounding the development site, making it suitable for its proposed uses. The operational impact of the Project on existing receptors is predicted to be 'negligible' taking into account the changes in pollutant concentrations and absolute levels. Using the significance criteria adopted for this assessment together with professional judgement, the operational air quality effects are considered to be 'not significant' overall.

Air dispersion modelling was undertaken to assess the potential impact of the Project with regard to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the air quality modelling results emissions from the site are compliant with all National and EU ambient air quality values and will therefore not result in a significant impact on human health. Conservative assumptions were made when determining the input data for the air quality modelling assessment and the approach used in the study leads to an over estimation of the actual levels that will arise. In relation the spatial extent of the air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

The long-term operational impacts for all pollutants are predicted to be 'negligible', considering the changes in pollutant concentrations and absolute levels. The short-term operational impacts for all pollutants have been screened-out as being insignificant at all receptors. Using professional judgement, the resulting air quality effect is considered 'not significant'. Table 8.14 gives a summary of construction and operational potential impacts.

;

Receptor	nsitivity of ceptor	scription of Effect	)uration	agnitude	ınificance	ınificant / t significant	Notes
Construction phase							
Surrounding receptors (residential, amenity & commercial)	High	Fugitive dust & Emissions (Nitrogen Dioxide & Particulates) from plant and construction machinery	Short term	Medium	Moderate adverse	Not Significant	
Surrounding receptors (ecological)	Low	Fugitive dust & Emissions (Nitrogen Dioxide & Particulates) from plant and construction machinery	Short term	Low	Slight Adverse	Not Significant	
Operational phase							
Surrounding receptors (residential, commercial & amenity)	High	Emissions (Nitrogen Dioxide & Particulates) from traffic and combustion systems (heating systems)	Long Term	Negligible	Negligible	Not Significant	
Surrounding receptors (ecological)	Low	Emissions (Nitrogen Dioxide & Particulates) from traffic and combustion systems (heating systems)	Long Term	Negligible	Negligible	Not Significant	

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VOLUME I MAIN TEXT – CHAPTER 9 NOISE AND VIBRATION

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9 NOISE AND VIBRATION

9.1 Introduction

This chapter outlines the noise and vibration impact assessment for the Project and assesses the potential impacts and likely significant effects of noise and vibration associated with the construction and operational phases of the Project.

During the construction phase, there is potential for noise and vibration impacts at the nearest noise-sensitive properties from the use of construction plant and equipment. The operational phase of the Project has the potential to impact nearby noise-sensitive receptors, due to noise sources such as plant and equipment, traffic movements and car parking.

The effects of construction and operational noise and vibration have been assessed within this noise and vibration chapter.

The construction noise targets are set out along with the assessment methodology and results of the construction noise predictions. Construction noise mitigation measures are detailed such that noise targets are met throughout the construction phases.

Operational noise has been assessed, and noise mitigation recommendations made where appropriate.

The specific objectives of the noise and vibration assessment are to:

- Describe the existing noise baseline;
- Define the assessment methodology and significance criteria used in completing the noise and vibration impact assessment;
- Describe the potential effects, including direct, indirect and cumulative effects;
- Describe the mitigation measures proposed to address the likely significant effects; and
- Assess the residual effects remaining following the implementation of mitigation.

This Chapter is supported by the following Volume III Technical Appendices:

- Appendix 9.1: Baseline Noise Monitoring Survey;
- Appendix 9.2: Construction and Operational Noise Sensitive Receptors;
- Appendix 9.3: Construction Noise Assessment and;
- Appendix 9.4: Noise Propagation Modelling Inputs and Results

Operational vibration affecting noise receptors has been scoped out as there are no known significant vibration sources associated with the Project. There are therefore no significant operational vibration impacts anticipated.

9.2 Methodology

9.2.1 Relevant Guidance

The noise and vibration impact assessment has followed the methodology set out in chapter 3: EIA Methodology. Specific to the noise and vibration impact assessment, the following guidance documents have also been considered:

- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
- World Health Organisation (WHO) – Guidelines for Community Noise (1999);
- British Standard BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration;
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes – National Roads Authority (now Transport Infrastructure Ireland);
- Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes;
- Calculation of Road Traffic Noise (CRTN) - Department of Transport Welsh Office 1988;
- British Standard BS 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 1: Noise;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 2: Vibration;
- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1)and
- ISO9613: Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation.

9.2.1.1 Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

IEMA noise impact assessment guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur.

The guidelines provide specific support on how noise impact assessment fits within the Environmental Impact Assessment (EIA) process. They cover:

- How to scope a noise assessment;
- Issues to be considered when defining the baseline noise environment;
- Prediction of changes in noise levels as a result of implementing development proposals; and
- Definition and evaluation of the significance of the effect of changes in noise levels (for use only where the assessment is undertaken within an EIA).

The guidelines define core methods and techniques, used within the noise impact assessment process, and endeavour to highlight their limitations, where relevant. They can be applicable to all stages of a project, from construction through operation to restoration and decommissioning.

9.2.1.2 World Health Organisation (WHO) Guidelines for Community Noise

In the World Health Organisation (WHO) Guidelines for Community Noise (1999), a L_{Aeq} threshold daytime noise limit of 55 dB is suggested for outdoor living areas in order to protect the majority of people from being seriously annoyed. A second daytime limit of 50 dB is also given as a threshold limit for moderate annoyance.

The guidelines suggest that an internal L_{Aeq} not greater than 30 dB for continuous noise is needed to prevent negative effects on sleep. This is equivalent to a façade level of 45 dB L_{Aeq}, assuming open windows or a free-field level of about 42 dB L_{Aeq}. If the noise is not continuous, then the internal level required to prevent negative effects on sleep is a $L_{Amax,fast}$ of 45 dB. Therefore, for sleep disturbance, the continuous level as well as the number of noisy events should be considered.

The WHO Night Noise Guidelines for Europe was published in 2009 on the back of extensive research completed by a WHO working group. Considering the scientific evidence on the threshold of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive [2002/49/EC], a $L_{night,outside}$ of 40dB should be the target of the night noise guideline (NNG) to protect public, including the most vulnerable groups such as children, the chronically ill and the elderly. An interim target of 55dB is recommended where the NNG cannot be achieved. These guidelines are applicable to Member States of the European Region and may be considered as an extension to the previous WHO Guidelines for Community Noise (1999).

In 2011, the WHO published the *Methodological Guidance for Estimating the Burden of Disease from Environmental Noise*. This document outlines the principles of quantitative assessment of the burden of disease from environmental noise, describes the status in terms of the implementation of the European Noise Directive and reviews evidence on exposure-response relationships between noise and cardiovascular diseases.

In 2018, the WHO Regional Office for Europe has developed guidelines, based on the growing understanding of health impacts of exposure to environmental noise. The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices.

The 2018 guidelines are published by the WHO Regional Office for Europe. In terms of their health implications, the recommended exposure levels can be considered applicable in other regions and suitable for a global audience.

9.2.1.3 British Standard BS4142:2014 Methods for Rating Sound and Assessing Industrial and Commercial Sound

BS4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature at residential noise-sensitive receptors, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

BS 4142 also provides procedures in determining if the noise in question is likely to give rise to complaints from residents in the vicinity.

BS 4142 states that one should '*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.*

The aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if 'a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

To summarise, BS4142 section 9.2 advises the following in regards to corrections for acoustic characteristics:

- Tonality – for sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.
- Impulsivity – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level., Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.
- Other sound characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.
- Intermittency – When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

9.2.1.4 Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration

This assessment is based on the guidance given in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7, LA 111. This document sets out the requirements for noise and vibration assessments from road projects, applying a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation.

9.2.1.5 Guidelines for the Treatment of Noise and Vibration in National Road Schemes – National Roads Authority (now Transport Infrastructure Ireland)

This document provides guidance on the treatment of noise and vibration during the planning and design of national road schemes and includes design goals, noise prediction methodology and other assessment guidance. The guidelines also reference other relevant guidance, such as CRTN.

9.2.1.6 Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes - National Roads Authority (now Transport Infrastructure Ireland)

The NRA's Guidelines for the Treatment of Noise and Vibration in National Road Schemes, as revised by the National Roads Authority in October 2004, are based on the Authority's phased approach to road scheme planning and development. They cover the Constraints, Route Corridor Selection and Environmental Impact Assessment stages.

The Guidelines also set out a “design goal” for noise to ensure that the current roads programme proceeds on a path of sustainable development. This Good Practice Guidance is intended to expand and supplement the advice already provided in the Guidelines on these matters.

The guidance outlines the recommended phases of acoustic design for national road schemes, as well as technical detail of noise monitoring, noise predictions and mitigation. In additional to operational road traffic noise and vibration, the document also provides guidance regarding construction noise and vibration.

9.2.1.7 UK Department of Transport (Welsh Office) – Calculation of Road Traffic Noise (CRTN)

This Calculation of Road Traffic Noise (CRTN) guidance document outlines the procedures to be applied for calculating noise from road traffic. The document consists of three different sections, covering a general method for predicting noise levels at a distance from a highway, additional procedures for more specific situations and a measurement method for situations where the prediction method is not suitable. The prediction method constitutes the preferred calculation technique but in a small number of cases, traffic conditions may fall outside the scope of the prediction method, and it will then be necessary to resort to measurement. The prediction method has been used in this instance to determine the likely noise impact from traffic flow increases as a result of the Project.

This guidance document has been referenced as it provides the prediction methods for determining road traffic noise.

9.2.1.8 British Standard 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice

BS8233:2014 provides guidance values for a range of ambient noise levels within residential and commercial/industrial properties as shown in Table 9.1.

Table 9.1: Internal Ambient Noise Levels for Living Spaces

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq, 8hr}$

The standard allows for a further relaxation in standards of up to 5dB where "development is considered necessary or desirable". In relation to external amenity areas such as gardens and patios, the standard states that it is desirable that external noise does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$.

This guidance document has been used as reference for the internal standard ambient noise levels to be achieved inside residential properties.

9.2.1.9 British Standard BS5228:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites

This British standard consists of two parts and covers the need for protection against noise and vibration of persons living and working in the vicinity of construction and open sites. The standard recommends procedures for noise and vibration control during construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.

9.2.1.10 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 1: Noise

Part 1 of the standard provides a method of calculating noise from construction plant, including:

- Tables of source noise levels;
- Methods for summing up contributions from intermittently operating plant;
- A procedure for calculating noise propagation;
- A method for calculating noise screening effects; and
- A way of predicting noise from mobile plant, such as haul roads.

The standard also provides guidance on legislative background, community relations, training, nuisance, project supervision and control of noise and vibration.

The ABC method outlined in Section E3.2 has been used for the purposes of determining whether the predicted noise levels from the construction activities will result in any significant noise impact at the nearest noise sensitive properties.

Table 9.2 outlines the applicable noise threshold limits that apply at the nearest noise sensitive receptors. The determination of what category to apply is dependent on the existing baseline ambient (LAeq) noise level (rounded to the nearest 5dB) at the nearest noise sensitive property. For weekday daytime, if the ambient noise level is less than the Category A threshold limit, the Category A threshold limit (i.e. 65dB) applies. If the ambient noise level is the same as the Category A threshold limit, the Category B threshold limit (i.e., 70dB) applies. If the ambient noise level is more than the Category A threshold limit, the Category C threshold limit (i.e., 75dB) applies.

Table 9.2: Noise Threshold Limits at Nearest Sensitive Receptors

	Threshold Limits [dB(A)]		
	Category A	Category B	Category C
Night-time (23:00 - 07:00)	45	50	55
Evening and Weekends (19:00 - 23:00 Weekdays, 13:00-23:00 Saturdays, 07:00-23:00 Sundays)	55	60	65
Weekday daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

9.2.1.11 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 2: Vibration

Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels, including industry-specific guidance.

Human beings are known to be very sensitive to vibration, the threshold of perception being typically in the Peak Particle Velocity (PPV) range of 0.14 $mm \cdot s^{-1}$ to 0.3 $mm \cdot s^{-1}$. Vibrations above these values can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety lest some structural mishap might occur. Guidance of effects of vibration levels are illustrated in Table 9.3 below.

Table 9.3: Guidance on Effects of Vibration Levels

Vibration Level	Effect
0.14 mm·s^{-1}	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 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	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 mm·s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Limits of transient vibration, above which cosmetic damage could occur, are given numerically in Table 9.4 (Ref: BS5228-2:2009+A1:2014). Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 9.4, and major damage to a building structure can occur at values greater than four times the tabulated values.

Table 9.4: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Particle Velocity (PPV) (mm/s) in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	50 mm/s at 4 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.

This guidance document has been used for the assessment of construction noise from the Project.

9.2.1.12 Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports

The EPA Guideline on the Information to be contained in Environmental Impact Assessment Reports outlines the context and general approach for Environmental Impact Assessment, with detailed guidance for each aspect of the EIA and associated reporting.

9.2.1.13 British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1)

British Standard BS7445 provides the framework within which environmental noise should be quantified. BS 7445: Part 1 provides guidance to quantities and procedures in relation to environmental noise monitoring. BS7445-1 states that sound level meters that are used should conform to specifications of Class or Type 1 (or Class or Type 2 as a minimum) as given in BESN 61672.

The Class of a noise level meter describes its accuracy as defined by the relevant international standards. Sound level meters are defined by International Standards such as IEC 61672-1:2013 (or BS EN61672-1:2003). These standards define a wide range of complex accuracy, performance and calibration criteria that instruments must meet to be fit for purpose. Within the Standard, there are two allowable levels of tolerance and these are known as Class 1 and Class 2. Class 1 is more accurate than Class 2.

These Class 1 and Class 2 tolerances are necessary as a way of dealing with variations in the instruments. The variations are caused by the different electronic components used inside the sound level meters and because of the way different meters have been designed and verified. Even the test equipment used to check the sound level meters during manufacture will introduce some variation.

All equipment shall be calibrated and the configuration for calibration shall be in accordance with the manufacturer's instructions. A comprehensive recalibration at certain time intervals (for example annually) may be prescribed by authorities responsible for the use of the measurement results. A field check shall be made by the user at least before and after each series of measurements, preferably including an acoustic check of the microphone

Meteorological conditions are not prescribed but it is recommended that wind speed should not exceed 5 m /s at height of 3-11m above ground, any temperature inversions near ground, or heavy precipitation.

9.2.1.14 ISO 9613 Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation

ISO9613 (Part 2) specifies a methodology for calculating the attenuation of sound during propagation outdoors under meteorological conditions favourable to sound propagation. The standard applies to light downwind conditions and takes into account attenuation due to the following:

- Geometrical divergence;
- Atmospheric absorption;
- Ground effects:
- Reflection from surfaces;
- Screening by obstacles.

The ISO9613 methodology is used to predict equivalent continuous A-weighted sound pressure level (L_{Aeq}), including algorithms for octave-band source data from 63 Hz to 8 kHz. For this Project, ISO9613 has been implemented in CadnaA noise propagation modelling software. Further details are presented in Appendix 9.4.

9.2.2 Assessment Criteria and Assignment of Significance

9.2.2.1 Likelihood of Impacts

In keeping with the typical scope of an Environmental Impact Assessment (EIA), the emphasis of this noise and vibration chapter is on the assessment of the potential effects of the Project upon the surrounding environment (nearest noise-sensitive receptors) during the construction and operational phases.

As detailed in IEMA Guidelines for Environmental Noise Impact Assessment the following terminology and definitions are detailed as:

1. Noise Impact -The difference in the acoustic environment before and after the implementation of the proposals (also known as the magnitude of change). This includes any change in noise level and in other characteristics/features, and the relationship of the resulting noise level to any standard benchmarks.
2. Noise Effect -The consequence of the noise impact. This may be in the form of a change in the annoyance caused, a change in the degree of intrusion or disturbance caused by the acoustic environment, or the potential for the change to alter the character of an area such that there is a perceived change in quality of life. This will be dependent on the receptor and its sensitivity.
3. Significance of Effect -The evaluation of the noise effect and, particularly if the noise impact assessment is part of a formal EIA, deciding whether or not that impact is significant.

9.2.2.2 Receptor Sensitivity / Value

Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and noise-sensitive commercial premises. This is taken from the Scottish Government's Technical Advice Note (TAN) on Assessment of Noise, Table 2.1 Level of sensitivity associated with various examples of noise-sensitive receptors. Section 2.21 of TAN States

> "*There are three levels of sensitivity "high" "medium" and "low". The ranking is primarily based on the relationship between the amenity associated with a NSR and its susceptibility to noise.*"

TAN Chapter 2, Table 2.1 Level of Sensitivity Associated with Various Examples of Noise-sensitive Receptors provides sensitivity, description and examples of noise-sensitive receptors. Therefore, sensitivity of receptors, as defined in TAN has been used as reference criteria for sensitivity of receptors within this chapter.

Table 9.5 contains the general significance criteria that have been used for determining the level of impact associated with a particular aspect of the Project. Different aspects of noise from the Project (e.g. construction, plant/equipment, traffic etc.) are assessed using the different methodologies as described in the relevant guidance document. Where feasible, the significance criteria have been used in the various assessments included in this chapter having regard to the sensitivity of receptors.

Table 9.5: Receptor Sensitivity (Ref: TAN Assessment of Noise)

Sensitivity	Description	Examples of NSR
High	Receptors where people or operations are particularly susceptible to noise	Residential, including private gardens where appropriate. Quiet outdoor areas used for recreation Conference facilities Theatres/Auditoria/Studios Schools during the daytime Hospitals/residential care homes Places of worship
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Bars/Cafes/Restaurants where external noise may be intrusive. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise is minimal	Buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator noise is a normal part of the event Night Clubs

Receptors expected to be affected by noise and vibration impacts from the Project are residential receptors who are deemed to be highly sensitive. The significance of the effect is determined as a function of the sensitivity of the receptor and the magnitude of impact/effect they are exposed to, as summarised below in Table 9.6.

9.2.2.3 Magnitude of Impact Criteria

The magnitude of impact will be determined for of each element of the noise and vibration assessment. Descriptions of each magnitude of impact are shown in Table 9.6.

Table 9.6: Definitions of Magnitude

Sensitivity	Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

Details of how each noise assessment methodology relates for the magnitude of impact are shown in the sections below.

9.2.2.3.1 Construction Noise Magnitude of Impact

Construction noise comprises both plant noise and site traffic noise. The construction noise 'of effect' for this assessment refers to the '5dB change' method in BS5228-1:2009 2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' which is summarised in Table 9.7.

BS 5228:2009+A1:2014 does not contain any significance criteria, although examples of how limits of acceptability have been applied historically and some examples of assessing significance are presented. In this case Example Method 2, which refers to change of 5 dBA in the ambient noise level, has been used to assess the effects at residential receptors.

The magnitude of construction noise impacts has been determined in accordance with Annex E of BS 5228-1:2009+A1:2014. The significance criteria for assessing noise impact from construction works have considered example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014, as referred indicates that:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (preconstruction ambient plus site noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut off values of 65dB, 55dB and 45dB L_{Aeq} from site noise alone, for the daytime, evening, and night-time periods, respectively, and a duration of one months or more, unless works of a shorter duration are likely to result in a significant effect."

For the majority of noise-sensitive receptors, pre-construction ambient noise levels are relatively low, resulting in the criteria set within the lower cut-off levels given in BS5228, applying the most stringent limits. As such the lower cut-off levels are used throughout the construction assessment to all noise-sensitive receptors.

This daytime threshold is mirrored when an ABC method of establishing construction noise criteria is followed. Typical daytime noise level (50 – 55 dBA) is less than the Category A threshold limit, therefore the Category A threshold limit (i.e. 65dBA daytime) applies. Note that, as construction will take place during the daytime only, evening and night-time criteria are not relevant to this Project.

This classifies the magnitude of effect based on the sound level difference between the ambient noise level with and without construction. This is calculated by finding the difference between the baseline ambient level and the total level (construction noise plus baseline ambient level) at each location.

Table 9.7: Magnitude of Impact: Construction Noise Daytime (Ref: BS 5228 Part 1)

Sound Level Difference between Ambient Noise and Total Noise (dB, L_{Aeq})	Total Daytime Noise Level (dB $L_{Aeq, 12h}$) (Ambient and Construction Noise)	Magnitude of Impact
< 0 dB	< 65 dB (lower cut-off level)	Negligible
0 - 5 dB	65 - 70 dB	Low
5 – 10 dB	70 –75 dB	Medium
> 10 dB	> 75 dB	High

On account of the temporary nature of construction activities, higher noise threshold limits apply to construction phase activities as compared to permanent operational phase activities.

9.2.2.3.2 Operational Noise Magnitude of Impact

Magnitude of impact can be determined with reference to the outcome of the operational noise assessments, which are categorised based on the type of noise source. Each assessment methodology implemented in this chapter and their associated assignments of magnitude of impact are shown below.

Plant and Equipment Noise

In the case of noise from plant and equipment, BS4142 offers an indication of magnitude of impact based on the predicted rating level relative to the existing background L_{90} sound pressure level. These should be taken in context and consider factors such as the receiving sound environment, the nature of the noise source and the noise-sensitive receptors.

BS4142 advises to obtain an initial estimate of impact of the specific sound by subtracting the measured background sound level from the rating level.

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 sound source having a low impact, depending on the context.

How these BS4142 classifications align with the EIA magnitudes of impact/effect requires professional judgment. The assignment of the magnitude of impact should take in to account all pertinent factors, including absolute sound level, character and level of residual sound compared to that of the specific sound and the sensitivity of the receptors.

The IEMA guidelines cite several examples which highlight different changes in ambient noise level and the associated effect when taking into consideration various features of the noise source level and operation as well as the receiving environment. Once such example suggests the following criteria to describe the change in noise level exposure:

Table 9.8: IEMA Example of Noise Level Exposure Categorisation

	Large	Medium	Small	Negligible
Relative Change in Sound Level	Great than 10 dB(A)	5 to 9.9 dB(A)	3 to 4.9 dB(A)	2.9 dB(A) or less

These should be taken in the context of the individual site assessment, however they are a useful benchmark which reflects the phenomenon of human sound perception whereby an increase of 1 to 2 dB is not perceptible under normal conditions, with an increase of 3 dB typically the minimum perceptible change in noise levels.

Operational Traffic Noise

When considering operational traffic, 'magnitude of effect' is quantified by the long-term change in traffic noise level based on the guidance in the 'Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7, LA 111, Noise and Vibration'.

As discussed in relation to Table 9.8, it is generally accepted that changes in noise levels of 1 dBA or less are imperceptible, and changes of 1 to 3dBA are not widely perceptible.

The operational traffic magnitudes of effect are given in Table 7.15.

Table 9.15: Magnitude of Impact: Operational Traffic

Change in Traffic Basic Noise Level (dB $L_{A10,18h}$ or L_{night})	DMRB Classification	Magnitude of Impact
Less than 3.0	Negligible	Negligible
3.0 - 4.9 dB	Minor	Low
5.0 - 9.9 dB	Moderate	Medium
10+ dB	Major	High

Car Parking

Although no specific criteria apply to car parking, absolute noise levels may be assessed using guidance provided in other relevant standards and guidance documents. The WHO Guidelines for Community Noise and BS8233 offer criteria for annoyance.

In the WHO guidelines, an L_{Aeq} threshold daytime noise limit of 55 dB is suggested for outdoor living areas in order to protect the majority of people from being seriously annoyed. A second daytime limit of 50 dB is also given as a threshold limit for moderate annoyance.

The WHO guidance is reflected in the BS8233 guidance values for a range of ambient noise levels within residential properties as shown in Table 9.9 The BS8233 values, assuming an open window providing 10-15 dB attenuation, are broadly in line with the WHO external guidance values.

Magnitude of Impact has been determined based on the WHO external L_{Aeq} criteria, as shown in Table 9.16.

Table 9.16: Magnitude of Impact: External Noise Levels

External $L_{Aeq, 1hr}$, dB (Daytime)	WHO Classification	Magnitude of Impact
<50	Few People Moderately Annoyed	Low
50 – 55	Few People Seriously Annoyed	Medium
55 +	-	High

The impact of L_{AMax} sound pressure levels due to the impulsive noise associated with car doors slamming will take into account the relevant criteria within WHO guidance and BS8233. These criteria primarily apply to the night-time period, therefore defined criteria levels and equivalent magnitude of impact have not been presented for daytime L_{AMax} assessment.

9.2.3 Significance of Effects

Following the identification of receptor importance and magnitude of the effect, it is possible to determine the significance of the effect.

The significance of effect is determined as a function of the sensitivity of the receptor and the magnitude of impact the receptor is exposed. The significance of effects for receptors of high sensitivity are summarised in Table 9.17.

Table 9.9: Assessment of Significance Matrix

Sensitivity	Magnitude of Impact			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

Definitions are shown below in relation to the Matrix in Table 9.17.

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- ***Moderate***: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Following initial assessment, if the impact does not require additional mitigation (or none is possible), the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

9.3 Characteristics of the Project

The EIAR is provided in support of the Project which comprises of two main elements, namely:

(a) The Data Centre, comprising 6 no. two storey Data Centre buildings, an administration/management building, car parking, landscaping, energy infrastructure and other associated works.

(b) The substation, comprising a grid substation and 110kV transmission connection.

9.4 Baseline

Total site area of the subject site of the Project is 38.64 ha, The subject lands are located on the western side of the M7 motorway, positioned between Junctions 9a and 10. The site is bound to the north by the R409 road which provides a direct link to the centre of Naas, c.2.5km to the east.

There has been significant development in the locality in recent years, particularly light industry, logistics and services. The site is located between the existing 'M7 Business Park' and 'Osberstown Business Park'. The Osberstown Wastewater Treatment Plant is located nearby to the north. The site is bounded to the east by the M7 motorway and to the west by agricultural lands. The 'Newhall Retail Park' is located to the south of the site, on the east side of the M7 motorway.

The site is currently in agricultural use and comprises a number of fields which are bounded by hedgerows, mature and semi-mature trees. A watercourse, the *Bluebell Stream*, is located to and bounds the southern boundary of the Project site.

9.4.1 Noise Sensitive Receptors

Noise-sensitive receptor locations were obtained from aerial imagery and mapping. The noise-sensitive receptor locations[1] are shown in Volume III, Appendix 9.2, as a list of their identification references (ID's), and location coordinates. These receptors are relevant to both construction and operational phases.

All noise-sensitive receptors identified within the noise and vibration study area are residential properties. 42 properties in the vicinity of the Project Site have been selected as noise-sensitive receptors. All receptors at a greater distance from the Project are expected to experience a lower noise impact than the 42 receptors included in this noise impact assessment.

9.4.2 Baseline Noise Monitoring Survey

9.4.2.1 Survey Methodology

A baseline noise monitoring survey consisting of attended and unattended noise measurements was conducted within the vicinity of the Project Site.

The noise monitoring locations (NML) were chosen to be representative of the closest noise receptors in the vicinity of the Project site. The purpose of the noise monitoring survey was to determine the representative baseline noise levels at the nearest noise sensitive receptors and to assess these levels in accordance with the relevant guidance to inform the following assessments:

The details of the unattended noise monitoring surveys including a description of the noise monitoring locations, date, time and sound level meter used are summarised in Table 9.18.

[1] (N. B. Addresses of the construction noise receptors have not been included due to General Data Protection Regulations (GDPR) and publication of personal data).

Table 9.18: Unattended Noise Monitoring Summary

Noise Monitoring Location	Description of Noise Monitoring Location	Date Range	Sound Level Meter
NML 1	In a field at the northern side of the site boundary, to the east of 2 houses on Carragh Road.	02/02/2023 – 09/02/2023	Norsonic 140
NML 2	In a field at the north western corner of the site boundary, close to Carragh Road.	02/02/2023 – 09/02/2023	Rion NL-52
NML 3	In a field at the south western boundary of the site	02/02/2023 – 09/02/2023	Norsonic 140
NML 4	To the south west of the site boundary, adjacent a residential property located on the L2030 Newhall Road	12/06/2023 – 20/06/2023	Larson Davis LXT
NML 5	To the west of the site boundary, adjacent a farming/residential property on the R409 Road	12/06/2023 – 20/06/2023	Larson Davis LXT

Noise measurements were made with a microphone height of 1.2 – 1.5 m above ground level. Noise data was captured in 15-minute time intervals. The weather conditions were in accordance with the requirements of ISO 1996: *Acoustics - Description, Measurement and Assessment of Environmental Noise*.

The following parameters were recorded during each monitoring period:

L_{Aeq} The continuous equivalent A-weighted sound pressure level. This is an ‘average’ of the sound pressure level

L_{Amax} This is the maximum A-weighed sound level measured during the sample period

L_{Amin} This is the minimum A-weighted sound level measured during the sample period

L_{A10} This is the A-weighted sound level that is exceeded for noise for 10% of the sample period

L_{A90} This is the A-weighted sound level that is exceeded for 90% of the sample period

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 pressure levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

Further details of the noise monitoring methodology, instrumentation, photographs, calibration certificates and results are illustrated in Volume III, Appendix 9.1.

9.4.2.2 Baseline Noise Monitoring Results

The results of the baseline noise monitoring are summarised in Table 9.19, including daytime and night-time periods. Note that the averaging time for daytime sound pressure levels was 1hr, with night-time samples taken over 15-minute periods. These results show the 'typical' background (L_{A90}) and ambient (L_{Aeq}) sound pressure level at each noise monitoring location, following detailed analysis of the survey results.

Table 9.10: BS4142 Assessment Background Sound Level Summary

Noise Monitoring Location	Sound Pressure Level, dB L_{A90}		Sound Pressure Level, dB L_{Aeq}	
	Daytime	Night-time	Daytime	Night-time
1	58	44	59	52
2	51	41	57	48
3	49	40	51	44
4	44	41	47	46
5	46	42	50	44

9.4.3 Baseline Traffic Survey

As per Chapter 12: Traffic and Transportation, baseline traffic flow surveys were carried out to determine the existing levels of traffic on the surrounding road network. The surveys were undertaken at the following locations:

- North Arm of the Millennium Roundabout; and
- West Arm of the Bundle of Sticks Roundabout.

These surveys were undertaken on 18th January 2023 between 0700 – 1000 and 1600 – 1900 hours. The surveyed traffic flows, which represent weekday morning and evening peak traffic flows are summarised in Table 9.20 below.

Table 9.20: Baseline Traffic Survey Analysis Summary

	Location 1 – Bundle of Sticks R'about	**Location 2 – Millennium Park R'about**
18th January 2023 07:00 – 10:00 hrs		
Minimum no. vehicle movements in any 1-hour period	1042	791
Maximum no. vehicle movements in any 1-hour period	1660	1183
Total Vehicle Movements	4069	2949
18th January 2023 16:00 – 19:00 hrs		
Minimum no. vehicle movements in any 1-hour period	1143	877
Maximum no. vehicle movements in any 1-hour period	1825	1252
Total Vehicle Movements	4697	3302

9.5 Impact Assessment

The noise and vibration impact assessment considered the following aspects of environmental noise:

- Assessment of construction noise and vibration impact (with reference to BS5228[2]);
- Assessment of operational noise relative to existing background sound levels (with reference to BS4142[3]);
- Assessment of absolute operational noise levels (with reference to e.g BS8233[4], World Health Organisation Guidance);

There are no significant sources of operational vibration associated with the Project. Gas turbines and gas generators are supplied within bespoke enclosures and fitted with anti-vibration mounts onto concrete slab, which are designed to reduce noise and vibration emissions. As equipment is not expected to cause significant levels of vibration at source (and therefore at receptors), operational vibration has been scoped out of the noise and vibration impact assessment.

The functional interdependence that exists between the Project and the GNI Gas Connection dictates the need for a cumulative assessment to be undertaken of the required gas infrastructure works. For noise, this includes the construction phase only, as there is no operational noise associated with the gas connection.

9.5.1 Construction Noise and Vibration Effects

The likely significant noise impacts have been considered for the construction activities. The predicted construction noise effects are assessed in accordance with BS 5228 threshold limits. The proposed construction works will include construction activities which have the potential to impact the noise environment such as piling and excavation.

The Construction Environmental Management Plan (CEMP) includes a requirement for a Noise Management Plan (NMP), Traffic & Navigation Management Plan (TNMP) and a Method Statement (MS) to be prepared by the successful Contractor after Contract Award and provided by Kildare County Council.

The Planning Schedule of Conditions should include a requirement for a NMP, TNMP & MS prior to construction commencing in the usual manner.

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the proposed works. By their nature, construction phase impacts will be short-term and localised. These impacts will be reduced as far as practicable through compliance with the mitigation measures identified within this EIAR and the relevant industry standards and guidelines.

The proposed construction phasing, noise predictions and the applicable BS 5228 noise limits are detailed in Volume III, Appendix 9.3.

It is anticipated that construction will take place over a period of approximately 9 years. Noise impacts identified in the construction noise assessment have considered worst-case construction scenarios. The noise impacts will not be continuous and will vary by phase and by construction activity or combination of activities taking place.

9.5.1.1 Construction Phasing, Duration and Hours

The programme of construction for the Project has been developed whereby construction is expected to last for just over under 9 years. The works will be undertaken in a ten-stage programme, commencing on completion of the tender processes and the discharge of pre-commencement planning conditions. Table 9.21 provides a high-level breakdown of the program by the key construction stages, with an assumed start date of January 2025, for indication only.

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[2] BS5228:2009: Noise and Vibration Control on Open Construction Sites

[3] BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

[4] BS8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice

Table 9.21: Indicative Construction Programme

Phase	Overall Construction Programme	08/01/2025	27/09/2033
Phase 1	Enabling Works Overall Construction Programme	08/01/2025	27/07/2025
	ESB Substation Overall Construction Programme	01/06/2025	28/03/2026
	AGI Building Overall Construction Programme	01/06/2025	28/07/2026
	DC 1 Overall Construction Programme	01/06/2025	17/07/2027
	DC 2 Overall Construction Programme	16/07/2026	01/09/2028
Phase 2	DC 3 Overall Construction Programme	31/08/2027	16/10/2029
	DC 5 Overall Construction Programme	15/10/2028	30/11/2030
Phase 3	DC 6 Overall Construction Programme	27/11/2029	13/07/2032
	DC 4 Overall Construction Programme	11/01/2031	27/08/2033
	Site Wide Works Overall Construction Programme	01/03/2032	27/09/2033

The proposed site working hours will be as follows:

- 0800 to 1800 hours on Mondays to Fridays.
- 0800 to 1300 hours on Saturdays.
- No working on Sunday or Bank Holidays unless authorised by the Kildare County Council.

Peak traffic periods (0800-0900 and 1700-1800 hours on Monday to Friday and 1500-1600 hours on Saturdays) will be avoided wherever possible when booking delivery vehicles.

Where additional or alternative working hours are required, a request for derogations to work outside the permitted working hours will be submitted to KCC at least five working days in advance. The request will be supported by a detailed case including an Engineering report explaining the requirement to work outside the permitted working hours and listing proposed dates with commencement and finishing times.

All affected residents and stakeholders shall be notified on receipt of any approved derogations including the rationale for the extended working hours.

9.5.1.2 Construction Activities

The key construction activities and associated noise sources are shown below:

Demolition

The existing dwellings and farm buildings on this site will require demolition. Demolition will be undertaken using mechanical plant and craneage.

Vegetation Clearance

Primary noise sources associated with Vegetation clearance are expected to be chainsaws, excavators/tracked excavators and lorries to remove vegetation for processing/repurposing or disposal.

Earth Works

Cut and fill earth works are expected to involve noise sources such as dozers, tracked excavators, lorries and loaders.

Piling and Excavation

Bored piles are to be installed for the new building foundations. In terms of noise impact, the bored piling technique is generally more favourable than percussive piling, however there are several noise sources associated with the bored piling method which must be considered, including:

- Crane
- Drilling rig
- Concrete pump
- Excavators

Data Centre Buildings sub-structure, super-structure and fit-out

Construction of substructure will require installation of several cranes at the beginning of the phase, then laying of concrete floor slab and core. Primary noise sources associated with these operations are cranes, concrete mixers and lorries.

Construction of the building frames will use standard hot rolled steel girders tied into steel columns and the flooring will be metal deck slab with concrete. The girders will be brought by lorry to the site and loaded from the loading area in the site.

Noise sources for this construction operation will include lorries, cranes, concrete mixers, and hand tools.

9.5.1.3 Construction Noise Effects

Construction noise sources will include plant and equipment activity on site, as well as construction traffic noise; materials and staff traveling to and from the Project construction site. The effect of noise at noise-sensitive receptors during construction activities will be highly dependent upon the particular construction activities, techniques, equipment occurring simultaneously, as well as the location of works and the number of activities/items of plant and equipment in use. There will also be wide variations in noise impact across the construction programme.

The proposed construction phasing shown in Table 9.15 indicates, in broad terms, which construction stages are likely to overlap within each phase and the construction phase map (please see Appendix 9.3) shows approximate locations for each of the construction phases.

The construction activities which are likely to be employed during each phase have been used to predict the received sound pressure levels at the closest noise-sensitive receptor to the construction activity. The source data and assumptions used for the construction noise predictions are detailed in Appendix 9.3.

These indicative predictions apply to a single item of each equipment/plant type and are intended to enable a review the of proposed activities and identify potential noise sources associated with the construction programme which may have an adverse impact. Using these predictions, the, activities, time periods or locations of construction activity with the potential to negatively affect noise-sensitive receptors are highlighted. This is useful for recommending suitable construction noise mitigation measures and to inform a construction noise management plan.

The results of the construction noise predictions, which can be found in Appendix 9.3, are summarised in Table 9.22 for each stage of the three phases. Predictions show indicative results for 50% and 100% utilisation of one of each individual item of plant and equipment within each stage.

Table 9.22: Construction Noise Modelling Results Summary

		Predicted Sound Pressure Level at Closest Receptor, dB $L_{Aeq, T}$	
		100 % Utilisation	**50 % Utilisation**
Phase 1	Enabling Works Overall Construction Programme	83	80
	ESB Substation Overall Construction Programme	61	58
	AGI Building Overall Construction Programme	68	65
	DC 1 Overall Construction Programme	61	58
	DC 2 Overall Construction Programme	60	57
Phase 2	DC 3 Overall Construction Programme	63	60
	DC 5 Overall Construction Programme	61	58
Phase 3	DC 6 Overall Construction Programme	60	57
	DC 4 Overall Construction Programme	70	67
	Site Wide Works Overall Construction Programme	64	61

Construction noise criteria has been derived from the BS5228 ABC method. The typical daytime noise level (50 – 55 dBA) is less than the Category A threshold limit, therefore the Category A threshold limit (i.e. 65dBA) applies.

The highest predicted sound pressure levels at the closest receptor are associated with the site preparation works within Phase 1, which has been assumed to include high-noise activities such as rock breaking. During site preparation works at the closest receptor, exceedance of the 65 dBA construction noise threshold is predicted. This is a worst case in terms of proximity of plant to receptors and the predicted level at all other receptors will be lower. Site preparation works are expected to be complete within the first 6 months of the construction programme and would therefore be considered to be short-term temporary works. Higher construction noise levels are more likely to tolerated if they are of a temporary nature.

The majority of the construction works programme will involve the erection of the Data Centre buildings and the associated fit-out, with each building constructed over a period of approximately 2-3 years. The construction noise predictions show that noise levels for building construction are expected to be highest during construction of DC4. Noise levels from during construction of DC4 are predicted to be higher than those for other buildings due to the proximity of DC4 to receptor 1. It should be noted noise sources have not been defined or quantified at this stage, therefore the absolute levels here are not truly representative but nevertheless, relative predicted noise levels can be informative and provide a focus for noise mitigation measures and construction programme planning.

Predicted construction noise levels for some construction activities and processes are expected to exceed the construction noise threshold of 65 dBA. For singular items of plant and equipment in use, this included site preparation, in particular rock breaking, and construction of Data Centre building 4 (DC4), due to its close proximity to receptor 1.

The predicted sound pressure levels, assuming operation of single items of plant and equipment, are at least 60 dBA in all phases/stages of construction. The combination of multiple construction noise sources and concurrent construction activities, stages and phases is likely to give rise to an increase of 5 dB at receptors, therefore exceeding the criterion level of 65 dBA at time during construction.

Significant construction effects could arise from a multitude of combinations of noise sources throughout the construction programme. These should be taken into consideration when developing the construction noise management plan, with mitigation employed as necessary. This is discussed further in Section 9.5.5 Mitigation.

9.5.1.4 Construction Traffic Noise Effects

The effect of construction traffic noise has been assessed in the context of the existing environment. Construction traffic will be managed in terms of access routes and delivery scheduling. Full details can be found in Volume III, Appendix 4.6 Construction Traffic Management Plan.

Transportation of Materials

Numerous types of delivery vehicles will be used to bring materials to and from the site. These will typically include:

- Muck away wagons for soil arising's from foundations.
- Skip lorries. These will include standard 8-yard skips for waste (approx. size 7m long and 2.4m wide.
- Ready mix concrete lorries. (approx. size 8.25m long and 2.45m wide).
- Flatbed delivery vehicles for the delivery of various materials including scaffolding, steelwork, reinforcement, bricks/blocks, timber, roofing materials, plaster, joinery etc. (approx. size 8.5m long and 2.45m wide).
- Articulated Lorries, for delivery of steel framing, cladding components, reinforcement, major M&E plant and materials, tower cranes and other major plant and equipment.

The projected vehicle movements are approximately 47 per day during the main contract works/ peak construction period (and will be considerably less outside of these peak periods of construction).

Staff Trips

The forecast for these busiest construction months (months 7 and 30) an estimated maximum of 1100 construction staff will require to travel to and from the site per day. Based on all construction staff travelling by car, with an average of 1.5 staff to each car. This will result in 733 car trips to and from the site per day, with estimated 40% (293 car trips) travelling to and from the site during the traditional peak hours. It is estimated that site staff will generate 425 car trips on an average day, with 175 travelling during the traditional peak hours.

The effect of construction traffic noise on receptors will vary and depend upon traffic volumes relative to the existing baseline and the time of day that vehicles arrive or depart. Existing traffic flows are shown in Table 9.15 with further details of existing traffic available in Chapter 12: Traffic and Transportation.

Construction staff travelling to and from site are expected to generate an additional 175 trips during peak hours. It is anticipated that there will be 47 delivery vehicles travelling to and from the site daily, with 7 of these occurring during the peak hour.

Construction Traffic Noise Assessment

As a worst-case, it is assumed that all 54 vehicle movements occur within the peak traffic period with the minimum number of vehicles surveyed (791 in any 1-hour period). An increase of 54 vehicles within this 1-hour period would equate to a <7 % increase in traffic during the peak traffic period. This increase is temporary and worst-case for the construction period only.

HD213/11, part of the Design Manual for Road and Bridges states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1 dBA change in traffic noise levels. On this basis, the change in traffic noise levels associated with all road links during the operational phase of the Project will be significantly less than 1dB(A).

The NRA (now TII) guidelines for the Treatment of Noise and Vibration in National Road Schemes state that it takes an approximate 3 dB(A) increase in noise levels to be perceptible to the average person, therefore the likely effect of construction traffic noise increases on all other roads local road network will be imperceptible.

9.5.1.5 Construction Vibration Effects

At this stage, prior to planning consent and appointment of a contractor, there is insufficient detail available to conduct a full analysis of vibration effects. Further assessment of construction vibration should be carried out when construction methodology is finalised. It is expected that any vibration effects are most likely to arise from activities such as piling and demolition. It is understood that rotary bored piling will be employed. Although this piling technique tends to generate lower levels of vibration than pile driving, transient vibrations can also occur when the auger strikes the base of the borehole. If it is necessary to insert an appreciable length of temporary casing to support the boring, a casing dolly can be used and, as with the impact bored piling method, this will give rise to intermittent vibrations. The use of special tools, such as chisels, will also result in intermittent vibrations.

Assessment of construction vibration should reference thresholds for building damage are higher than threshold for human perception so the effect and significance of vibration levels should be set based on human perception thresholds.

9.5.1.6 Construction Noise and Vibration Impact Assessment Summary

Construction noise predictions were calculated for each construction activity as detailed in Volume III Appendix 9.3. Construction noise criteria has been derived from the BS5228 ABC method. The typical daytime noise level is less than the Category A threshold limit, therefore the Category A threshold limit (i.e. 65dB) applies.

There is potential for significant construction noise impacts at the nearest noise sensitive receptors if worst-case construction activities take place without mitigation measures in place. While BS 5228:2009+A1:2014 does not contain significance criteria the exceedance of the daytime noise threshold limit of 65dB(A) by 15 dB(A) would equate to a temporary major adverse impact during the time that such activities are carried out simultaneously at the Project site boundary**.**

While construction works will extend over a period of years, the duration over which noise will be produced in the vicinity of any individual receptor or group of receptors will be for shorter periods. Work generating peak levels of noise will be carried out intermittently over this time and will not be constant for those periods. Nevertheless, on the basis of the predicted worst-case construction noise levels from the Project, it is clear that there will be a requirement for mitigation measures to be put in place in order to ensure that construction noise levels are reduced as much as practicable. The target for mitigation measures is a reduction in daytime construction noise to achieve the daytime noise threshold limit of 65dB(A)

Noise mitigation measures for construction activities are outlined in section 9.5.5.

9.5.2 Operational Noise and Vibration Effects

Details of the Project are outlined in Chapter 4: Description of the Project. The operational aspects of the Project which have potential to generate noise have been assessed in accordance with the appropriate guidance and standards outlined in Section 9.2.1 and include:

- Assessment of operational plant and equipment noise;
- Assessment of operational traffic noise;
- Assessment of car parking noise.

9.5.2.1 Assessment of Operational Plant and Equipment Noise

Predicted operational noise levels from the Project Site have been assessed relative to the existing noise environment using the methodology within BS4142:2014 and IEMA Guidelines. In order to carry out these assessments, a detailed acoustic model of all operational plant and equipment has been developed, with noise levels at receptors predicted for worst-case operational scenarios during daytime and night-time periods. A summary of the operational noise model inputs is shown in the sections that follow. For full details, please refer to Appendix 9.4: Noise Propagation Modelling.

9.5.2.1.1 Plant and Equipment Noise Modelling

Noise levels have been predicted at receptors for the operational plant and equipment associated with the Project. An acoustic model has been developed which includes all primary plant and equipment noise sources as follows:

- Data Hall Cooling System
  - AHU air intake fans;
  - AHU exhaust fans.
- Power Generation
  - Gas turbines including exhaust stack (as per operating scenario);
  - Gas engines including exhaust stack;
  - Battery storage inverters.
- 110kV substation.

Sound pressure levels during operation of plant and equipment have been predicted at the 42 representative noise-sensitive receptors, as detailed in Volume III Appendix 9.2. All noise model inputs and assumptions can be found in Volume III Appendix 9.4: Noise Propagation Modelling.

Operational Scenarios

The Project will operate 24/7. Operational scenarios have assumed that all 56no. duplex Air Handling Units (AHUs) will operate continuously through the daytime and night-time periods. Operating conditions which have the greatest influence on the noise output from the Project are the gas turbines and gas engines within the external plant compound.

The power requirements of the Data Centres will typically be met by a minimum of 30% renewable energy from wind/solar farms annually. The remaining energy demands will be fulfilled by a combination of gas turbines and reciprocating gas engines. As such, the number of gas turbines and engines will be variable.

To ensure that the worst-case daytime and night-time noise scenarios have been considered, the noise output from various combinations of gas turbines and engines was considered. This only included actual scenarios where the power requirements were being met. The worst-case power scenarios are typically situations where renewable energy was not readily available and the power generation plant is more heavily relied upon to power the Data Centres. The worst-case power generation scenario has been identified for both daytime and night-time noise and summarised in Table 9.23.

These power generation operating conditions will apply to a small percentage of the total operating time, with power generation noise outputs at all other times lower than those assumed.

Note that these scenarios consider operational noise from all 6 Data Centre buildings operating simultaneously, with the assumptions and operating conditions applicable to all 6 buildings.

All other plant and equipment noise sources are assumed to be operating with a 100% on time in each noise model scenario.

Table 9.23: Operational Noise Model Power Scenarios

	No. of Gas Turbines Operating per DC Compound	No. of Gas Engines Operating per DC Compound	No. of BESS Inverters Operating per DC Compound
Worst-Case Daytime Power Scenario	8	0	40
Worst-Case Night-Time Power Scenario	7	0	35

Noise Modelling Results

Noise modelling results for each of the 42 noise-sensitive receptors are presented in Volume III Appendix 9.4 for both daytime and night-time worst-case operations. Predicted sound pressure level contours maps are in Volume II (Figures 9.1 – 9.3).

The predicted daytime and night-time sound pressure level at each receptor represent the BS4142 Specific Sound Level for daytime and night-time.

9.5.2.1.2 BS4142:2014 Assessment

An assessment has been conducted of received sound levels due to operational plant and equipment noise compared with the existing sound environment. This assessment has been carried out using the methodology described in BS4142:2014, which involves comparison of predicted received level of the proposed noise source (Specific Sound Level L_{Aeq}) with the existing Background Sound Level (L_{A90}) to determine if there is likely to be a noise impact. Acoustic features associated with the proposed noise source are subject to a penalty which is added to the Specific Sound Level to determine the Rating Level. Further details of this assessment methodology can be found in 9.2.1. The BS4142 assessment process and outcome are presented below.

Specific Sound Level

The specific sound level of the external plant and equipment associated with the Project has been predicted based on the available acoustic data, as detailed in Volume III Appendix 9.4. The worst-case specific sound level has been predicted for the 42 closest residential properties to the Project site boundary.

Acoustic Feature Correction

Tonality

With regards to tonality, BS4142:2014 states: "*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible*."

The bespoke acoustic enclosures and silencers which have been installed across the site have been designed to reduce noise emissions and tonality from plant and equipment and manufacturer data for all items of plant and equipment show no indication of tonality. The substation has been considered as a potentially tonal noise source, however the contribution of substation noise to predicted sound pressure levels in negligible at all noise-sensitive receptors, therefore any tonality would not be audible or distinguishable at receptors. Therefore, no penalty for tonality has been applied.

Impulsivity

With regards to impulsivity, BS4142:2014 states: "*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible*."

Impulsivity is not considered to be a relevant sound characteristic of the Project noise sources.

Intermittency

The intermittency of the sound source needs to be considered when it has identifiable on/off conditions with regards to intermittency, BS4142:2014 states: "*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*."

The dominant sources associated with the Project are the gas turbines/gas engines and the AHU fans. All of these are steady-state noise sources which will operate continuously daytime and night-time, constantly monitored and carefully controlled. The number of gas turbines or gas engines required will vary with factors such as renewable energy requirements and ambient temperature. When turbines or engines are brought online, this procedure will be carefully carried out with an inherent soft-start as equipment works up to operational capacity. Similarly, when equipment is taken offline, this will not be a step down, but rather a ramping down of power and therefore of noise level.

It is not expected that any noise source associated with the Project will be intermittent. As such, no intermittency correction has been applied.

Overall Acoustic Feature Correction

No additional acoustic characteristics have been identified as relevant for the proposed noise sources. Therefore, the overall acoustic feature correction is 0 dB.

Rating Level

The rating level is the specific sound level with the addition of any relevant acoustic feature correction. As no acoustic feature corrections apply to the Project; the rating level is equal to the specific sound level.

Background Sound Level

The background sound level for each receptor has been established from the results of the baseline noise monitoring survey, as described in Volume III Appendix 9.1.

One of the five Noise Monitoring Locations (NMLs) has been assigned to each noise-sensitive receptor, as detailed in Volume III Appendix 9.2. The selection of representative NML has been based on both distance between NML and receptor (typically the closest NML representing a receptor), and also on proximity to existing noise sources. With road traffic noise the predominant noise source in the vicinity of the Project, distance from the M7 motorway and industrial developments close to the M7 was carefully considered when electing a representative NML for each receptor. For the purposes of the assessment, the background sound level L_{A90} for the representative NML was adopted for each noise-sensitive receptor.

Daytime BS4142 Assessment

The assessment of daytime operational plant and equipment noise, as per BS4142, is shown in Table 9.24. The rating level at all 42 receptors has been compared with the representative background sound level to show the excess over background. Where the excess over background is negative, the predicted sound pressure level is below the existing background sound level.

The results are shown by receptor and have been ordered by 'excess over background', with the predicted level closest to the existing background in the first row of the table.

Table 9.24: Daytime BS4142 Assessment (Worst Case)

Receptor	Representative NML	Representative Background Sound Level (Daytime) $L_{90, 1hr}$, dB	Specific Sound Level, $L_{Aeq, T}$ dB	Acoustic Feature Correction, dB	Rating Level, dB	Excess Over Background, dB	Magnitude of Impact
10	4	44	40.4	0	40.4	-3.6	Low
21	4	44	40.1	0	40.1	-3.9	Low
20	4	44	39.9	0	39.9	-4.1	Low
11	4	44	39.3	0	39.3	-4.7	Low
17	4	44	39.3	0	39.3	-4.7	Low
18	4	44	39.2	0	39.2	-4.8	Low
9	4	44	39.1	0	39.1	-4.9	Low
16	4	44	39	0	39	-5	Low
19	4	44	38.9	0	38.9	-5.1	Low
15	4	44	37.9	0	37.9	-6.1	Low
12	4	44	37.4	0	37.4	-6.6	Low
22	4	44	37.2	0	37.2	-6.8	Low
14	4	44	37	0	37	-7	Low
8	5	46	35.6	0	35.6	-10.4	Negligible
35	5	46	35.3	0	35.3	-10.7	Negligible
34	5	46	35.1	0	35.1	-10.9	Negligible
30	5	46	35	0	35	-11	Negligible
26	5	46	34.3	0	34.3	-11.7	Negligible
25	5	46	34.1	0	34.1	-11.9	Negligible
27	5	46	33.6	0	33.6	-12.4	Negligible
24	5	46	33.5	0	33.5	-12.5	Negligible
29	5	46	33.4	0	33.4	-12.6	Negligible
32	5	46	32.9	0	32.9	-13.1	Negligible
31	5	46	32.2	0	32.2	-13.8	Negligible
23	5	46	32.1	0	32.1	-13.9	Negligible
33	5	46	32.1	0	32.1	-13.9	Negligible
28	5	46	31.7	0	31.7	-14.3	Negligible
39	2	51	36	0	36	-15	Negligible
37	2	51	35.8	0	35.8	-15.2	Negligible
1	1	58	42.7	0	42.7	-15.3	Negligible
38	2	51	35.7	0	35.7	-15.3	Negligible
36	2	51	35.6	0	35.6	-15.4	Negligible

Receptor	Representative NML	Representative Background Sound Level (Daytime) $L_{90, 1hr}$, dB	Specific Sound Level, $L_{Aeq, T}$ dB	Acoustic Feature Correction, dB	Rating Level, dB	Excess Over Background, dB	Magnitude of Impact
2	1	58	39	0	39	-19	Negligible
3	1	58	38.1	0	38.1	-19.9	Negligible
4	1	58	37.8	0	37.8	-20.2	Negligible
5	1	58	37.3	0	37.3	-20.7	Negligible
6	1	58	36.9	0	36.9	-21.1	Negligible
7	1	58	36	0	36	-22	Negligible
13	1	58	35.8	0	35.8	-22.2	Negligible
40	1	58	33.5	0	33.5	-24.5	Negligible
42	1	58	33.3	0	33.3	-24.7	Negligible
41	1	58	32.4	0	32.4	-25.6	Negligible

The worst-case daytime rating level did not exceed the background level at any of the 42 receptors. At 29 of the receptors, the rating level was 10 dB or more below the existing background. The noise effect will be equal to or lower than the values in Table 9.19 at all other receptors in the vicinity of the Project Site , due to the increased distance from the site.

This indicates that daytime operational noise from plant and equipment within the Project will have a **low to negligible** noise effect.

Night-Time BS4142 Assessment

The assessment of night-time operational plant and equipment noise, as per BS4142, is shown in Table 9.25. The rating level at all 42 receptors has been compared with the representative background sound level to show the excess over background. Where the excess over background is negative, the predicted sound pressure level is below the existing background sound level.

The results are shown by receptor and have been ordered by 'excess over background', with the predicted level closest to the existing background in the first row of the table.

Table 9.25: Night-Time BS4142 Assessment (Worst Case)

Receptor	Representative NML	Representative Background Sound Level (Night-Time) $L_{90, 15min}$, dB	Specific Sound Level, $L_{Aeq, T}$ dB	Acoustic Feature Correction, dB	Rating Level, dB	Excess Over Background, dB	Magnitude of Impact
10	4	41	40.9	0	40.9	-0.1	Low
1	1	44	43.6	0	43.6	-0.4	Low
11	4	41	40.3	0	40.3	-0.7	Low
9	4	41	40.1	0	40.1	-0.9	Low
21	4	41	40	0	40	-1	Low
20	4	41	39.9	0	39.9	-1.1	Low
17	4	41	39.5	0	39.5	-1.5	Low
18	4	41	39.4	0	39.4	-1.6	Low
16	4	41	39.2	0	39.2	-1.8	Low
19	4	41	39.1	0	39.1	-1.9	Low
15	4	41	38.2	0	38.2	-2.8	Low

Receptor	Representative NML	Representative Background Sound Level (Night-Time) $L_{90,\ 15min}$, dB	Specific Sound Level, $L_{Aeq,\ T}$ dB	Acoustic Feature Correction, dB	Rating Level, dB	Excess Over Background, dB	Magnitude of Impact
22	4	41	37.5	0	37.5	-3.5	Low
14	4	41	37.4	0	37.4	-3.6	Low
12	4	41	37.1	0	37.1	-3.9	Low
2	1	44	39.4	0	39.4	-4.6	Low
37	2	41	35.8	0	35.8	-5.2	Low
39	2	41	35.7	0	35.7	-5.3	Low
36	2	41	35.6	0	35.6	-5.4	Low
38	2	41	35.6	0	35.6	-5.4	Low
8	5	42	36.2	0	36.2	-5.8	Low
3	1	44	38	0	38	-6	Low
34	5	42	35.8	0	35.8	-6.2	Low
4	1	44	37.7	0	37.7	-6.3	Low
35	5	42	35.5	0	35.5	-6.5	Low
30	5	42	35.4	0	35.4	-6.6	Low
5	1	44	37.1	0	37.1	-6.9	Low
6	1	44	36.6	0	36.6	-7.4	Low
26	5	42	34.3	0	34.3	-7.7	Low
25	5	42	34	0	34	-8	Low
27	5	42	34	0	34	-8	Low
7	1	44	35.8	0	35.8	-8.2	Low
24	5	42	33.8	0	33.8	-8.2	Low
29	5	42	33.8	0	33.8	-8.2	Low
13	1	44	35.6	0	35.6	-8.4	Low
32	5	42	32.8	0	32.8	-9.2	Low
28	5	42	32.2	0	32.2	-9.8	Low
31	5	42	32.1	0	32.1	-9.9	Low
23	5	42	32	0	32	-10	Negligible
33	5	42	31.9	0	31.9	-10.1	Negligible
40	1	44	33.2	0	33.2	-10.8	Negligible
42	1	44	33.2	0	33.2	-10.8	Negligible
41	1	44	32	0	32	-12	Negligible

The worst-case night-time rating level did not exceed the background level at any of the closest 42 receptors. At 5 of the receptors, the rating level was 10 dB or more below the existing background. The noise effect will be equal to or lower than the values in Table 9.20 at all other receptors in the vicinity of the Project Site due to the increased distance from the site.

This indicates that night-time operational noise from plant and equipment within the Project Site will have a **low** noise effect. The

Assessment of Relative L_{Aeq} Sound Pressure Levels

In addition to the BS4142 methodology, which compares existing L_{A90} with predicted rating level, it is also useful to compare predicted future ambient sound pressure level during the operational phase with the existing ambient sound pressure level (L_{Aeq}) at receptors. This methodology, which is referenced in (IEMA) Guidelines for Environmental Noise Impact Assessment, is somewhat subject to professional judgement, however it is generally accepted that there are thresholds of change of noise level which are perceptible to the human ear. There is variability in this perceptibility where noise sources are irregular or intermittent or have other characteristics such as tonality. For steady-state noise sources with no acoustic features, typically an increase in noise level of < ±3 dB is imperceptible to most people, with changes of around ±3 dB just perceptible.

The plant and equipment associated with the Project is expected to be continuous with no acoustic features (as discussed in Section 9.5.2.1.2).

A summary of the existing daytime and night-time ambient L_{Aeq} sound pressure levels in the vicinity of the Project Site are shown in Table 9.21 and Table 9.22 respectively, along with the maximum predicted daytime sound pressure levels from the noise propagation modelling (See Appendix 9.4)

The typical existing daytime and night-time ambient values have been determined from the background noise monitoring survey, as per Section 9.4.2 and Appendix 9.1. Modelling results are shown for each noise monitoring location as these represent the closest receptors and the range of ambient noise levels in the vicinity of the site. By assessing the highest predicted sound pressure levels for each representative NML, a robust assessment has been carried out, with all lower predicted levels having a lower noise impact.

Predicted sound pressure levels have been logarithmically added to existing ambient levels to predict the future ambient sound pressure level. The existing ambient has been arithmetically subtracted from the future ambient to give the change in ambient sound pressure level.

The noise effects shown in Table 9.26 and Table 9.27 have been determined with reference to example assessment tables within the IEMA guidelines.

Table 9.26: Summary of Daytime Ambient and Predicted Sound Pressure Levels

Receptor with Highest Predicted L_{Aeq} and Relevant NML[5]	Typical Ambient $L_{Aeq,\ 1hr}$ dB	Highest Predicted Total $L_{Aeq,\ T}$ dB	Predicted Future Ambient $L_{Aeq,\ T}$ dB	Predicted Change in Ambient Sound Pressure Level L_{Aeq}, dB	Noise Effect
Receptor 1 NML1	59	42.7	59.1	+0.1	Negligible
Receptor 39 NML2	57	36	57	+0.0	Negligible
Receptor 10 NML4	47	40.4	47.9	+0.9	Negligible
Receptor 8 NML5	50	35.6	50.2	+0.2	Negligible

[5] NML3 not presented as all receptors are more accurately represented by the other Noise Monitoring Locations

The results shown in Table 9.27 indicate that the highest predicted sound pressure levels at the noise-sensitive receptors will cause a change in daytime $L_{Aeq, T}$ of less than 1 dB when compared with the existing ambient sound pressure levels at the relevant noise monitoring locations. This change will be imperceptible and the effect of operational daytime noise will be **negligible**.

Table 9.27: Summary of Night-Time Ambient and Predicted Sound Pressure Levels

Receptor with Highest Predicted L_{Aeq} and Relevant NML[6]	Typical Ambient $L_{Aeq, 15min}$ dB	Highest Predicted Total $L_{Aeq, T}$, dB	Predicted Future Ambient $L_{Aeq, T}$ dB	Predicted Change in Ambient Sound Pressure Level L_{Aeq} dB	Noise Effect
Receptor 1 NML1	52	43.6	52.6	0.6	Negligible
Receptor 36 NML2	48	35.6	48.2	0.2	Negligible
Receptor 9 NML4	46	40.1	47.0	1.0	Negligible
Receptor 8 NML5	44	36.2	44.7	0.7	Negligible

The results shown in Table 9.23 indicate that the highest predicted sound pressure levels at the noise-sensitive receptors will cause a change in night-time $L_{Aeq, T}$ of 1 dB when compared with the existing ambient sound pressure levels at the relevant noise monitoring locations. This change will be imperceptible and the effect of operational night-time noise will be **negligible**.

It should be noted that the changes shown in Table 9.21 and Table 9.22 represent operational scenario predictions which assume the worst-case power generation scenarios for daytime and night-time. Operational noise levels will be lower when higher proportions of renewable energy are available and therefore when fewer gas turbines or gas engines are in operation;

Additionally, the assessment locations represent the closest noise-sensitive receptors, with all other receptors predicted to have a lower noise effect due to increased distance from the Project site.

9.5.2.1.3 Plant and Equipment Noise Impact Assessment Summary

A relative noise impact assessment has been carried out, comparing predicted daytime and night-time L_{Aeq} sound pressure levels against measured background L_{A90} sound pressure levels as per the methodology within BS4142:2014.

The rating level at all noise-sensitive receptors was below the representative background sound level. As such, the noise impact of the plant and equipment associated with the Project was found to be **low to negligible** for daytime and low for night-time periods.

The change in ambient L_{Aeq} sound pressure levels was assessed by predicting the future ambient sound pressure levels at receptors during worst-case operational scenarios for daytime and night-time and comparing

[6] NML3 not presented as all receptors are more accurately represented by the other Noise Monitoring Locations

with existing ambient levels. The predicted change in daytime and night-time ambient level did not exceed 1dB. This change in ambient level will be imperceptible and therefore the effect is negligible.

Overall, the effect of operational plant and equipment noise is **low to negligible** for the closest receptors with all other receptors in the vicinity of the Project site also experiencing a **low to negligible** effect.

9.5.2.2 Assessment of Operational Road Traffic Noise

Operational traffic noise was assessed using the criteria and guidance contained within the DMRB LA 111 and CRTN.

The anticipated number of HGV and car trips to and from the site are shown below and are based on staffing numbers for the Data Centre site. Note that these do not account for shift patterns etc;

- 225no. total staff at Project site;
- ~125 – 175no. visitors daily;
- 56no. person arrivals during the AM peak hour period;
- 56no. person departures during the PM peak hour period.
- Operational HGVs – 26no. total trips per day.

It is anticipated that the operation of the Project will generate an additional 56 trips during both the AM and PM peak periods. 92.7% (52) of these trips are expected to be car trips.

Once operational, it is estimated that each of the Data Centre buildings would generate 2 HGV trips per day (4 two-way trips), with the administration building generating 1 HGV trip per day (2 two-way trips). This would equate to 26 daily two-way HGV trips being generated by the Project once operational, however, it is understood that HGV trips will typically fall outside of peak traffic hours.

For full details of traffic volumes, please refer to Chapter EIAR Volume I Chapter 12 Traffic and Transportation.

The link flow assessment, as per Chapter 12 Traffic and Transportation, indicates that the Project is expected to increase traffic volumes on the west arm of the Bundle of Sticks Roundabout by approximately 1%, and by approximately 4% on the north arm of the Millennium Park Roundabout.

As a worst-case assessment of road traffic noise, the % increase in traffic movements has been calculated assuming that all additional 56 trips take place during the 1-hour period with lowest volume of traffic flow. An increase of 56 traffic movements during the 1-hour period with the lowest traffic flows would equate to a maximum increase in traffic flow of 6.6% (at Millennium Park Roundabout) compared with measured traffic flows.

The TII guidelines state that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1 dBA change in traffic noise levels. On this basis, the change in traffic noise levels associated with all road links during the operational phase of the Project will be significantly less than 1dB(A).

It is generally accepted that it takes an approximate 3 dB(A) increase in noise levels to be perceptible to the average person, therefore the likely effect of traffic noise increases on all other roads local road network will be imperceptible.

9.5.2.3 Car Parking

It is proposed that 30 car parking spaces would be provided at each of the six Data Centre buildings, with an additional 30 car parking spaces located at the administration / management building. This would equate to a total of 210 car parking spaces across the Project.

The site will operate 24/7, therefore the car parks may be in use at any time of night or day. Night-time car park activity is expected to consist mainly of staff arrivals and departures, and with the majority of vehicles remaining parked for the duration of a work shift.

It is anticipated that staff shift patterns will fall into the following categories:

- Security and Cleaning staff – 12 hour shifts, typically 7am-7pm and 7pm-7am;
- General and Landlord Management staff – Typically more conventional hours such as 8:30am - 5:30pm. Arrivals and departures can be variable as they may be attending other facilities;

- Maintenance staff – May work across multiple facilities and working patterns will be primarily out of hours shift work and therefore arrive and depart the campus outside typical peak hours; and
- Visitors, Customers and Subcontractors – Attendance will be variable dependent upon the tenants of each building and their needs. These would typically arrive and depart the facility outside of peak traffic hours given the site is 24 hours operated.

From the information available at this stage regarding staff numbers, expected shift patterns and working hours – based upon similar colocation Data Centre facilities and with the exception of Administration staff, the daily occupancy typically equates to 40% of the total staff numbers and a total daytime occupancy of 98 staff for the whole campus.

It is expected that staff and site visitors will primarily use the car park during the daytime period, during the evening if arriving for a 7pm- 7am night shift, and between 6:30am and 7am, when arriving for the daytime 7am -7pm shift. As such, both the daytime and night-time situations have been assessed below.

There is no specific guidance in relation to car parking noise. Operational car park noise is not covered in the scope of BS 4142:2014+2019. The L_{Aeq} and L_{AMax} due to car parking events have been estimated below and assessed against the absolute criteria in BS8233/WHO, with reference to the existing background sound pressure level as per BS4142.

The closest car parking to a residential property is the DC4 car park which has 30 spaces; receptor 1 is located approximately 85m from the closest DC4 car parking space.

9.5.2.3.1 Car Park L_{Aeq} Predictions

Using a measured LAE value of 59 dB @ 10m for car doors being closed (free-field) and 57 dB(A) @ 10m for a car engine being started and driving off (free-field), which combined is 61 dB(A) @ 10m, the calculation formula is as follows:

Where N is the number of events over the 1-hour period and T is the number of seconds in an hour.

A distances of 85m has been assumed, representing the range of distances across the DC4 car park to receptor 1. Distance attenuation for a line source assumes cylindrical spreading and is calculated by using the calculation:

Where d = distance from source to receptor in metres and d_0 is the reference distance in metres.

The maximum number of parking events is based on the number of spaces in the DC4 car park (30) and assumes that there are 2 car parking events in a one-hour period for each space (60 total). The simplified model has assumed that all 60 parking events take place at the closest parking space, which is located at a distance of 85m from receptor 1. This scenario assumes that 100% of DC4 car parking events will take place at the closest point of the car park to receptor 1. Obviously this is extremely unlikely, but represents a worst-case scenario.

Predicted sound pressure levels have been calculated, assuming that a car park event includes a car door being closed and a car engine being started and driving off at the closest DC4 parking space to receptor 1. The predicted external car parking L_{Aeq} sound pressure levels are shown in Table 9.28.

Table 9.28: Predicted External Car Parking Noise Levels (dB L_{Aeq}) at Nearest Existing Noise Sensitive Receptor

Distance to Receptor 1, m	Distance Attenuation, dB	Single Parking Event LAE, dB @ 10m	$L_{Aeq, 1hr}$ Sound Pressure Level at 10m, dB (60 Car Parking Events)	$L_{Aeq, 1hr}$ Sound Pressure Level at Receptor 1, dB (60 Car Parking Events)
85m	19	61	43	34

Worst-case predicted sound pressure level at receptor 1 due to parking is 15 dB below existing daytime (Lowest recorded L_{A90} measurement) of 49 dB and 6 dB below the lowest existing background night-time sound pressure level, as established in the background noise monitoring survey.

The predicted 1-hour L_{Aeq} from car parking noise is 34 dB externally, equivalent to an internal bedroom sound pressure level of 19 – 24 dB , assuming a 10-15 dB sound reduction through an open window. This is 11 dB below the BS8233 and WHO guidance internal night-time criteria of 30 dBA for restful sleep.

It is unlikely that the worst-case scenario considering all car parking spaces in use will be applicable, particularly at night.

It should also be noted that in the simplified model above, the DC4 car park has been assumed to be at capacity and all parking events assumed to take place at the closest location to receptor 1. This is a conservative overestimation which will not happen in reality, with the number of events lower than assumed in the predictions above, and the distance from source to receptor 1 increased for the vast majority of parking events.

All other receptors are a minimum of 350 m from parking facilities, many benefiting from the screening effect of the Data Centre buildings for sound reduction in addition to the attenuation afforded by the increased distance from car parking noise sources. As such, the received L_{Aeq} sound pressure level at all other receptors due to car parking will be significantly lower than those predicted for receptor 1.

9.5.2.3.2 Car Park L_{AMax} Predictions

Impulsive noise, measured in terms of L_{Amax}, could have an effect depending on the levels at the dwellings and the number of events. A distance of 85m has been used for prediction purposes. Distance attenuation for a point source assumes hemispherical spreading and is calculated by using the calculation:

Where d = distance from source to receptor in metres and d_0 is the reference distance in metres.

Noise levels from closing car doors and staff talking could range from 60 – 70 dB L_{Amax} resulting in 21 - 31 L_{AMax} externally at 85m distance, as shown in Table 9.29.

Table 9.11: Predicted Car Park Noise Levels (L_{Max}) at Nearest Existing Noise Sensitive Receptors

Distance, m	Distance Attenuation, dB	Predicted External Receptor Noise Level (Based on car doors closing /staff talking 60 dB L_{Amax} at 1m)	Predicted External Receptor Noise Level (based on car doors closing /staff talking 70 dB L_{Amax} at 1m)
85	39	21	31

Taking into account a sound level difference of a partially open window (-10-15dB); the range of predicted L_{Amax} noise levels would be 6 - 21 dB internally, based on the car park activity events taking place at the proposed parking bays assuming 85m distance from existing residential properties.

Suitable targets for controlling peak noise events inside dwellings are generally accepted to be controlling and for this level to be exceeded typically no more than 10 - 15 times per night. This is based in WHO 'Guidelines for community noise' (1999) research. On this basis, any peak noise events at the nearest residential properties would not be expected to exceed the 45 dB L_{Amax} guidance level.

Given how unlikely it is like vehicles would consistently use the spaces closest to the dwellings during the night-time and that the number of events during the night-time is likely to be very low, noise impact from the car park during the night-time is unlikely to cause any adverse impact.

The car parking facilities within the Project will be in use primarily during the day. As it is possible that night-time use may be required by staff, night-time scenarios have also been considered, however these are very much worst-case.

Noise impact from car parking at all other Data Centre buildings and the administration building is expected to be lower than those predicted for DC4, due to increased distance between car parking activity and noise-sensitive receptors. The results of the assessment of car parking noise indicate that the magnitude of impact will be Negligible or Low for all receptors.

9.5.3 Cumulative Effects

Projects with the potential to have cumulative operational and construction noise impacts have been reviewed to identify any requirement for cumulative noise impact assessment. The construction phase of the proposed Gas Networks Ireland Gas Connection has the potential to have a cumulative noise impact with the construction of the Data Centre and Substation and therefore a cumulative construction noise impact assessment has been carried out.

9.5.3.1 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

An GNI Infrastructure Upgrade Outline Report has been used to assess the potential for cumulative effects with the Project.

The construction works associated with the proposed gas pipeline will take place during Phase 1 of the construction programme for the Project, as the gas connection will be required in order to bring Data Centres online.

The cumulative construction noise impact of the Project construction programme and the GNI Gas Connection has been reviewed, considering the concurrent Phase 1 construction and Gas Connection construction at the relevant noise-sensitive receptors.

As noted in the GNI Infrastructure Upgrade Outline Report, a large portion of the construction works for the GNI Gas Connection will likely take place across agricultural lands. Works will likely involve a construction corridor of 14m width, centred on the pipeline.

Access to the works on agricultural lands will typically be provided at public road crossing locations. It is not expected that construction traffic for the Gas Connection will be significant in the context of existing traffic flows (see Section 9.5.1.4).

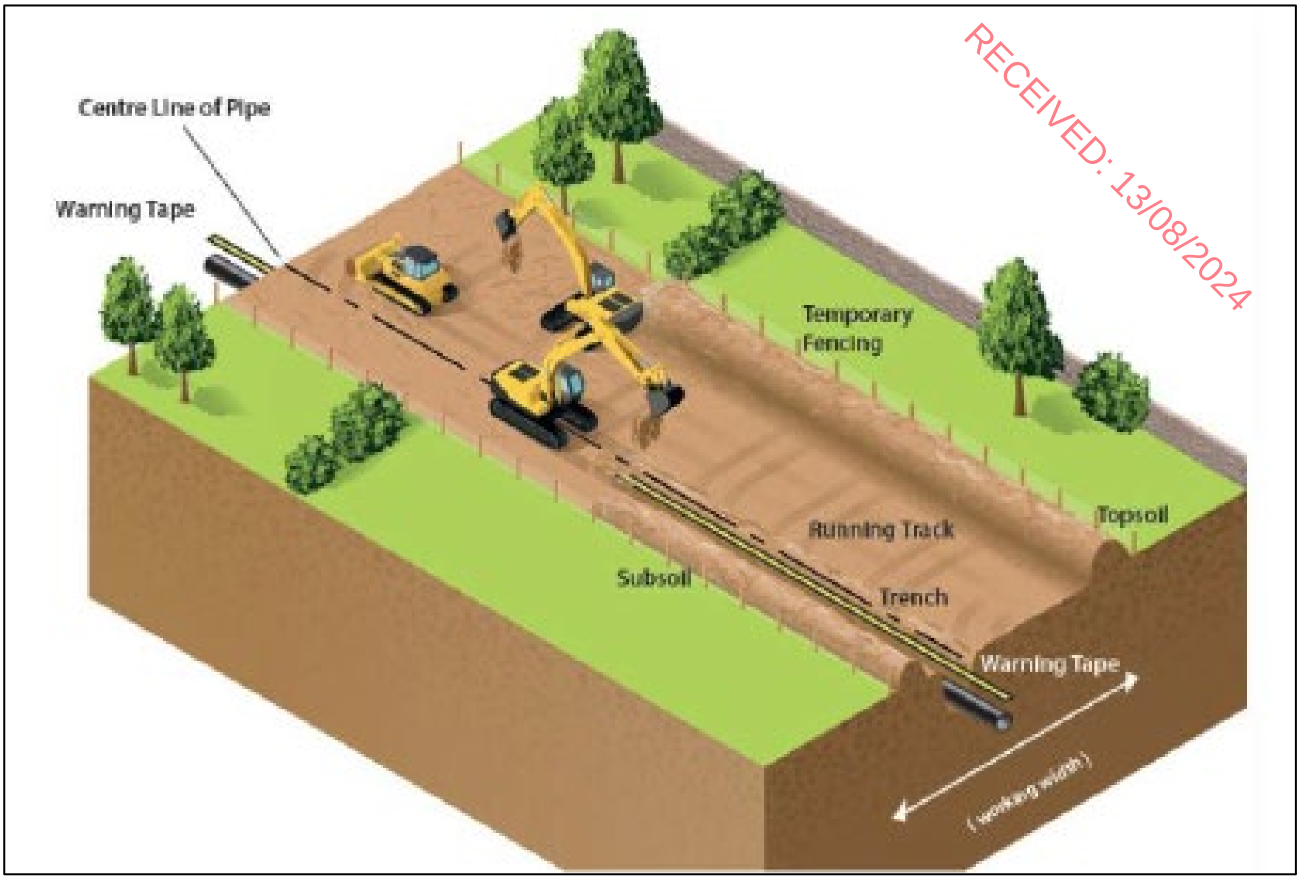

Figure 9.1: Typical pipeline installation working arrangement across agricultural lands

The receptors which have the potential to experience a cumulative impact from the Project construction programme and the GNI Gas Connection construction works have been identified, summarised in Table 9.30. All other noise-sensitive receptors considered within the EIAR are located more than 300m from the Gas Connection potential route. The potential Gas Connection route and within the Gas Networks Ireland Infrastructure Upgrade Outline Report (included in Volume II, Appendix 1.2).

Table 9.30: Potential Cumulative Impacts Receptors

Receptor	Distance to Gas Connection, m
1	50
2	50
3	75
4	85
5	165
6	250
7	295

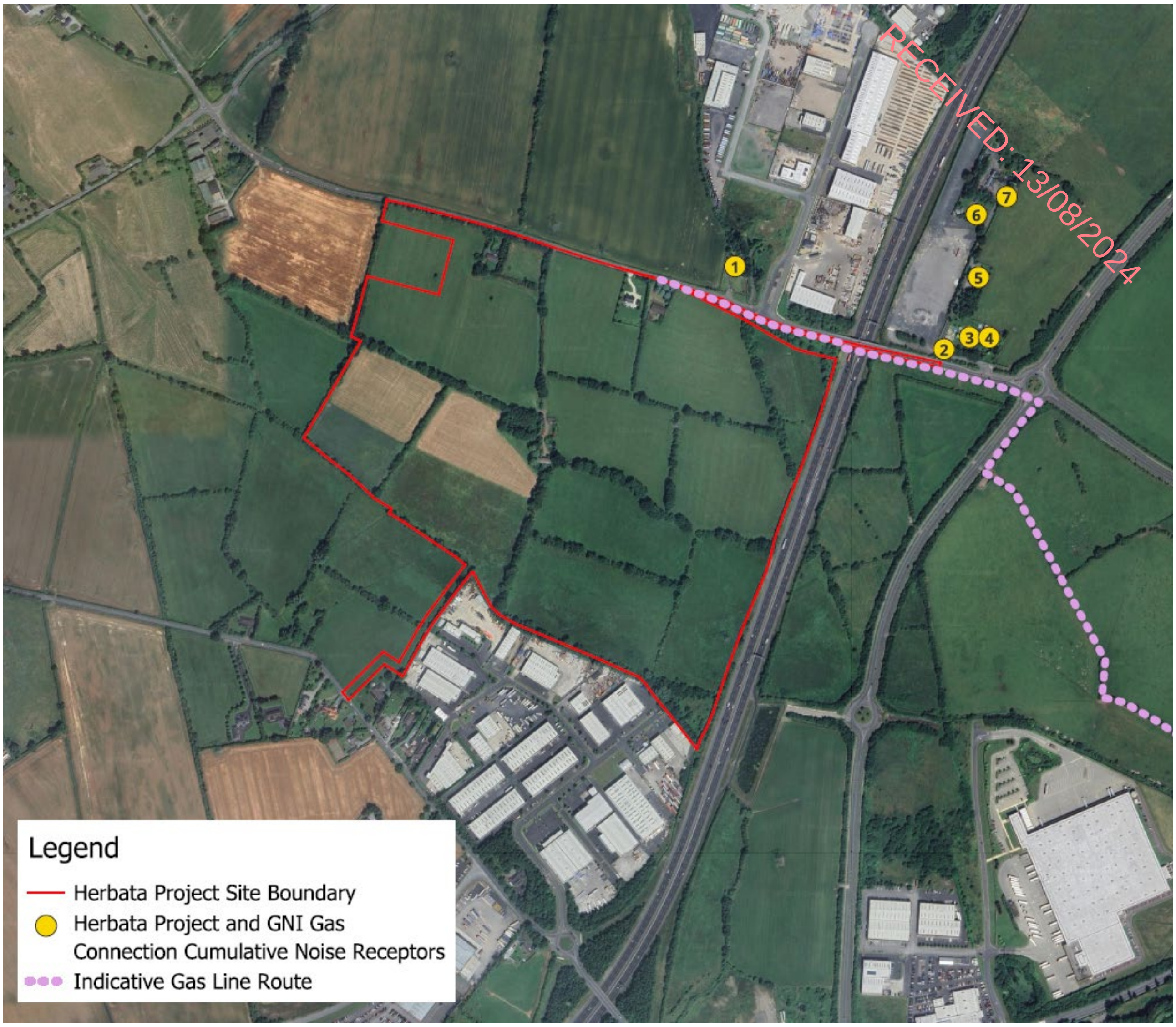

Figure 9.2: Indicative GNI Gas Line Route and Cumulative Receptors

It is anticipated that the majority of excavation works will be carried out using tracked excavator and dozers and that rockbreaker(s) and water pumps may also be required. Indicative sound pressure levels for each item of equipment is shown in Table 9.30, as taken from BS5228.

Table 9.30: Construction Plant Noise Levels (REF: BS 5228:2009+A1:2014)

Plant	Reference from Annex C & D BS5228	Sound Pressure Level at 10m dB(A)
Rock Breaker	C.9.12	93
Tracked Excavator	C.2.3	80
Dozer	C.2.1	79
Water Pump	C.4.88	68

The predicted sound pressure level at each of the 7 receptors included in the cumulative assessment are shown in Table 9.25. These are based on the distance from the construction area to each receptor, as per Table 9.23 and assume one item of plant operational at the closest distance to the receptor with 100% 'on-time'. Cumulative predicted sound pressure levels are shown in Table 9.31 which include Phase 1 works and the Gas Connection works.

Table 9.31: Predicted Sound Pressure Levels- Gas Connection Construction Works

Plant	Sound Pressure Level at 10m dB(A)	Sound Pressure Level at Noise Sensitive Receptor, dB L_{Aeq}						
		1	2	3	4	5	6	7
Rock Breaker	93	79	79	75	74	69	65	64
Tracked Excavator	80	66	66	62	61	56	52	51
Dozer	79	65	65	61	60	55	51	50
Water Pump	68	54	54	50	49	44	40	39
Total		79	79	76	75	69	65	64

Table 9.32: Cumulative Predicted Construction Sound Pressure Levels

	Maximum Predicted Sound Pressure Level (Phase 1 Construction), dB L_{Aeq}		Maximum Predicted Sound Pressure Level (Gas Connection Construction), dB L_{Aeq}		Maximum Cumulative Sound Pressure Level (Phase1 and Gas Connection Construction), dB L_{Aeq}	
	100% Utilisation	50% Utilisation	100% Utilisation	50% Utilisation	100% Utilisation	50% Utilisation
Site Clearance and Preparation	83	80	79	76	84	81
Construction of DC1	61	58	79	76	79	76
Construction of DC2	60	57	79	76	79	76
Construct AGI	68	65	79	76	79	76
Construct ESB SUB	61	58	79	76	79	76
Construct Underground Services	62	59	79	76	79	76
Construct Internal Roads and Parking	64	61	79	76	79	76
R409 Improvement Works	78	75	79	76	82	79

The predictions shown in Table 9.32 consider several possible construction scenarios whereby some Phase 1 construction activities and Gas Connection construction activities take place concurrently.

The construction programme for the Gas Connection is expected to take 7-8 months for the upgrade of approximately 10km of gas pipeline. The duration of the Gas Connection works in the vicinity of the Project receptors would be expected to take place over a shorter duration within the 7-8 month programme, with any cumulative impact at receptors 1 – 7 occurring only temporarily.

It is anticipated that phase 1 construction will take place over approximately 44 months. The variation construction in activities and location of construction works throughout each of the construction programmes will determine the actual cumulative construction noise impact and it is possible that construction works across both programmes do not occur concurrently.

As a worst case, as shown in Table 9.26, predicted cumulative construction noise levels for some construction activities and processes are expected to exceed the construction noise threshold of 65 dBA temporarily during concurrent construction of Phase 1 and the Gas Connection.

The predicted sound pressure levels, assuming operation of single items of plant and equipment, are at least 60 dBA in all phases/stages of construction. The combination of multiple construction noise sources and concurrent construction activities, stages and phases is likely to give rise to an increase of 5 dB at receptors, therefore exceeding the criterion level of 65 dBA at time during construction.

Significant cumulative construction effects could arise from combinations of noise sources throughout the construction programmes, if works take place concurrently, however these are expected to impact receptors in the short-term only. Combined construction noise effects should be taken into consideration when developing the construction noise management plan for both the Project and the GNI Gas Connection, with mitigation employed as necessary, as discussed in Section 9.5.5 Mitigation.

9.5.4 Do Nothing Scenario

In the ‘do nothing’ scenario, the Project site is likely to continue to be retained for agricultural use. Noise levels at receptors would be expected to remain similar to those established in the baseline noise monitoring surveys (see Appendix 9.1). The dominant noise source in the vicinity of the Project site is road traffic noise, in particular from the M7 motorway, and it would be expected that this would continue to dominate the noise environment in the area.

9.5.5 Likely Significant Effects

The noise impacts, or effects, have been assessed in terms of magnitude of impact. The noise effects for construction and operational noise are taken in the context of the sensitivity of the receptor to determine the significance of the effects.

9.5.5.1 Likely Significant Construction Noise Effects

While construction works will extend over a period of years, the duration over which noise will be produced in the vicinity of any individual receptor or group of receptors will be for shorter periods. Work generating peak levels of noise will be carried out intermittently over this time and will not be constant for those periods. Nevertheless, based on the predicted worst-case construction noise levels from the Project, it is clear that there is a potential for significant construction noise effects and that there will be a requirement for mitigation measures to be put in place in order to ensure that construction noise levels are reduced as much as practicable. Without appropriate mitigation, there is the potential for adverse noise impact during peak periods of construction.

9.5.5.2 Likely Significant Operational Noise Effects

Operational noise has been assessed and found to have a negligible to low noise effect on noise-sensitive receptors. This includes operation of all plant and equipment associated with the Project as well as operational traffic noise and car parking.

The closest noise-sensitive receptors are residential properties. As such, and considering the continuous 24/7 operation of the Data Centre, all receptors are considered to have a high sensitivity to operational noise.

With reference to the significance matrix Table 9.17, the negligible/low effect of operational noise is of **Minor Significance.**

9.5.6 Mitigation

9.5.6.1 Construction Phase

Worst case construction noise predictions can be reduced through use of appropriate mitigations as detailed below in Section Construction Mitigation. The target for mitigation measures is a reduction in daytime construction noise to achieve the daytime Category A threshold limit (i.e. 65dBA).

BS 5228-1 states that:

> "*…if the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.*"

These factors have therefore been considered to determine the effect significance.

As a summary of proposed construction works:

1. Construction works will be temporary and limited in duration;
2. Construction plant and machinery have been assessed as operating for the full working period of the day, i.e. 100% duty cycle. Due to natural pauses in activity and rest breaks equipment will not be fully operational during the working day; and
3. Construction works are not proposed to occur during night-time or on Sundays, unless for emergency works. Therefore, there will be no associated construction noise impact during these times at construction noise receptors.
4. Temporary construction noise barriers will be used to achieve attenuation of noise levels between ground based construction plant and the nearest noise-sensitive properties.

Specific Construction Mitigation

Construction mitigation measures will be put in place to ensure construction noise levels are attenuated and reduced where necessary.

Best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.

BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the Project. Construction best practice measures which will be implemented included below:

1. Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order;
2. Careful selection of quiet plant and machinery to undertake the required work where available;
3. Machines in intermittent use will be shut down in the intervening periods between work;
4. Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, temporary construction barriers or enclosures will be utilised around noisy plant and equipment;
5. Handling of all materials will take place in a manner which minimises noise emissions; and
6. Audible warning systems will be switched to the minimum setting required by the Health & Safety Executive.

The use of the proposed construction noise mitigation measures will ensure that construction noise levels are controlled to the lowest levels practicable.

Construction traffic noise will be controlled through management of parking, loading and traffic arrangements. These will be managed by the contractor to reduce traffic volumes and in and around the site prevent congestion.

Piling Noise and Vibration Mitigation

Particular attention should be paid to piling noise when piling strategy is developed, in terms of location, scheduling and pile type. It is understood that rotary bored piling will be employed. Although this piling technique tends to generate lower levels of vibration than pile driving, transient vibrations can also occur when the auger strikes the base of the borehole. If it is necessary to insert an appreciable length of temporary casing to support the boring, a casing dolly can be used and, as with the impact bored piling method, this will give rise to intermittent vibrations. The use of special tools, such as chisels, will also result in intermittent vibrations.

Occupants of residential properties should be advised of likely piling and demolition schedules; awareness of when and where these works will be taking place can help residents and businesses to prepare for potential impacts.

Construction Environmental Management Plan

Further details of all environmental mitigation measures are included in the Construction Environmental Management Plan (CEMP) (Volume II, Appendix 4.5).

Prior to construction, a specific Noise Management Plan will be produced and implemented by the final appointed contractor of the project. The CEMP and subsequent noise management plan will set out the mitigation measures that will be employed to reduce the noise and vibration impacts of the development during the construction phase.

9.5.6.2 Operational Phase

Mitigation measures have been considered and implemented in the design and engineering of the Project, including factors such as selection of plant and equipment, noise control at source, selection of construction materials, orientation of buildings and site layout. The benefit of these mitigation measures has been included in the noise predictions and subsequent operational noise impact assessment in Section 9.5.2.

Operational conditions have been carefully considered to ensure that operational requirements are fulfilled in terms of power generation and cooling, whilst minimising noise impact. This is particularly important for the night-time period. There will be controlled use of gas turbines/gas engines during the night, with the number of gas turbines or engines online minimised where possible. The number of gas turbines or engines online should not exceed the 'worst-case' scenarios for daytime and night-time which have been assessed in this chapter. Routine maintenance works, such as testing and servicing will be limited to daytime periods where there is potential for increased noise outputs.

9.5.7 Residual Impacts

9.5.7.1 Construction Phase

Pre-mitigation, the predicted construction noise impacts are anticipated to result in effects ranging from negligible to major at construction noise receptors. The Construction Environmental Management Plan (CEMP) and Noise Management Plan (as produced by the contractor) include specific noise and vibration control measures. Construction noise monitoring may be requested by Kildare County Council, if deemed necessary. Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.

Residents will be informed of the timing and duration of activities that may produce high noise or vibration. Elevated levels can be tolerated if prior notification and explanation is given. Temporary slight adverse impacts due to construction noise have been identified at the closest receptors to proposed construction works. No permanent residual noise and vibration impacts are predicted during construction of the Project. With construction mitigation measures in place the noise impact of construction activities is predicted to be reduced to temporary minor / moderate.

9.5.7.2 Operational Phase

The design of the Project, including layout and selection of equipment have carefully considered the noise impact on noise-sensitive receptors. The operational noise assessment presented within this chapter includes the benefit of noise control mitigation.

The ongoing operational management of the site will include controlled use of plant and equipment. Daytime and night-time operations should not exceed the 'worst-case' operational scenarios which have been assessed in this chapter. This will be achieved through careful monitoring and control of plant and equipment operation, particularly power generation equipment.

The operational noise and vibration impact, including the relevant mitigation measures within this EIAR, will be **negligible/low** with **minor significance.**

9.6 Limitations of the Assessment

The assessments carried out in this noise and vibration chapter have been based on the latest information made available to RPS. Uncertainties are inherent in aspects of the assessment, such as determination of background noise levels and prediction of noise levels. These uncertainties have been reduced as far as possible, with every aspect of the project considered in detail and represented as accurately as possible with the information available. Limitations of the assessment remain where assumptions have been relied upon, as detailed within the chapter, and where there are inherent uncertainties.

9.7 References

- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
- World Health Organisation (WHO) – Guidelines for Community Noise (1999);
- British Standard BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration;
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes – National Roads Authority (now Transport Infrastructure Ireland);
- Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes;
- Calculation of Road Traffic Noise (CRTN) - Department of Transport Welsh Office 1988;
- British Standard BS 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 1: Noise;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 2: Vibration;
- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1)and
- ISO9613: Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation.

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10 CULTURAL HERITAGE

10.1 Introduction

This chapter of the EIAR covers the cultural heritage assessment of the Project as described in Chapter 2.0. UNESCO define the term 'Cultural Heritage' as encompassing several aspects of tangible assets (*immovable*: archaeological sites and monuments, architectural heritage buildings; *movable*: artefacts; and *underwater:* shipwrecks and ruins) and intangible assets (e.g. folklore, oral tradition and language).

The chapter is accompanied by the following Appendices contained within Volume II:

- Appendix 10.1 Photographic Record
- Appendix 10.2 Cultural Heritage Inventories

Figures 10.1 – 10.14 are contained within Volume III.

The Data Centre Application and the Substation Application together constitute the "Project" for the purposes of Environmental Impact Assessment. The Project lands are located in the townlands of Halverstown, Jigginstown and Newhall on the western side of the M7 motorway, positioned between Junctions 9a and 10, c.2.5km west of Naas, County Kildare The site is bound to the north by the R409 road, to the east by the M7 Motorway and to the south by the M7 Business Park, with agricultural land to the west. A recorded monument (KD019-028) classified as a 'Fulacht Fia' is located within the south-eastern portion of the site.

10.2 Methodology

The assessment was based on a programme of desktop research combined with a field survey of the Project site, in addition to two geophysical surveys (23R0105 and 23R0225) of all fields within the development boundary except Field 6 and the southern half of Field 10 which were unsuitable for survey due to waterlogged and uneven ground conditions. The recorded and potential cultural heritage resource within a study area encompassing the lands comprising the Project site, and surrounding lands extending for 1km in all directions, was assessed in order to compile a comprehensive cultural heritage context for the area.

The following presents an overview of the assessment studies and the methodology applied to determine the nature and significance of potential impacts on the cultural heritage resource.

10.2.1 Desktop Study

Documentary research on the recorded and potential cultural heritage resource within the study area was carried out in order to identify any recorded archaeological, architectural and other cultural heritage sites and features. This information has provided an insight into the diachronic development of the study area over time and also assisted in an evaluation of the potential presence of hitherto unrecorded cultural heritage sites or features within the Project site.

The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) maintained by the Department of Housing, Local Government and Heritage. The current Record of Protected Structures (RPS) and structures listed in the National Inventory of Architectural Heritage (NIAH) were reviewed in order to assess the designated architectural heritage resource within the study area.

Other sources consulted as part of the assessment included the following:

- *Development Plans*: The current *Kildare County Development Plan 2023 – 2029 (adopted December 2022)* was consulted as part of this assessment. This publication identifies buildings listed in the Record of Protected Structures and outlines the Council's policies for the protection of the archaeological and architectural heritage resources. The current *Naas Local Area Plan 2021-2027* was also consulted.
- *Database of Irish Excavation Reports*: The Database of Irish Excavation Reports contains summary accounts of all archaeological excavations carried out in Ireland (North and South) from 1969 to present. Current data was accessed via www.excavations.ie in August 2023.

- *Literary Sources*: Various published literary sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area and these are listed in Section 10.9 of this chapter.
- *Archaeological Survey of Ireland*: While there is no published archaeological inventory for County Kildare, the National Monuments Service's online Historical Environment Viewer (www.archaeology.ie) presents inventory descriptions compiled by the Archaeological Survey of Ireland for a range of known archaeological sites within the county. All available inventory entries for sites located within the study area are included within Appendix 10.2 (Volume II).
- *Historic Maps*: The detail on historic maps sources can indicate the presence of past settlement patterns, including features of archaeological and architectural heritage significance that no longer have any surface expression. Available cartographic sources dating from the seventeenth-century onward were reviewed and relevant extracts are presented in Figures 10.3 – 10.8 (Volume III).
- *Aerial/Satellite Imagery*: A review of available online aerial and satellite images of the study area was undertaken in order to ascertain if any traces of unrecorded archaeological sites were visible and to review the extent of development within the study area during recent decades and relevant extracts are presented in Figure 10.9 (Volume III).
- *LiDAR Imagery*: The Project site is within the coverage area of Office of Public Works (OPW) LiDAR data which has been published online by the Geological Survey Ireland. This form of imagery has the potential to reveal the presence of archaeological sites with low surface expressions and was reviewed as part of the assessment. An extract of this imagery is presented in Figure 10.10 (Volume III).
- *Irish Heritage Council: Heritage Map Viewer*: This online mapping source (www.heritagemaps.ie) is a spatial data viewer which collates various cultural heritage datasets sourced from, among others, the National Monuments Service, National Museum of Ireland, local authorities, the Royal Academy of Ireland and the Office of Public Works.
- *National Museum of Ireland Topographical Files*: These files comprise a written and digital database which records known information in relation to the discovery locations of Irish archaeological artefacts, including those held in the museum's collection. The files are archived in the museum's premises in Kildare Street, Dublin and were inspected as part of the desktop study.
- *Irish National Folklore Collection*: Transcribed material from the National Folklore Collection archive has been digitised and published online at www.duchas.ie.
- *Placenames Database of Ireland*: This online database (www.logainm.ie) provides a comprehensive management system for data, archival records and place names research conducted by the State.
- *UNESCO designated World Heritage Sites and Tentative List*: There are two World Heritage Sites in Ireland (Brú na Bóinne and Sceilg Mhichíl) and a number of other significant sites are included in a Tentative List that has been put forward by Ireland for consideration in 2022[1]. None of these are located within the environs of the Project site.

10.2.1 Site Inspection

A field survey of the Project site was carried out in good weather in September 2022 by a qualified cultural heritage specialist, Ms Camilla Brännström. No potential archaeological features were identified during the inspection.

10.2.2 Site Investigation – Geophysical Survey

A detailed gradiometry survey of a field (Field 10) in the south of the Project lands which contains recorded fulacht fia (sometimes spelled 'fulacht fiadh') site (KD019-028) was undertaken on 18th and 27th April 2023 (Licence no 23R0105). The following summary details the findings of the survey (Figure 10.1, Volume III):

[1]https://www.worldheritageireland.ie/news/news-single-view/article/ministers-announce-new-world-heritage-tentative-list-for-ireland/?cHash=376a52892e7c00bd7825a9d98fe89068

> The geophysical survey has successfully identified the location (E686460 N719360) and extent of the fulacht fia site (KD019-028) The results suggest the fulacht fia is roughly circular in form, measuring c.15m in diameter, with an associated spread of burnt material extending c.18m to the east. A further possible spread of burnt material has been identified to the east of the fulacht. This measures c. 8m in diameter and is of archaeological potential. In the west of the field, amorphous responses and a linear trend have also been recorded. The archaeological potential of these responses is unclear. The ground was completely waterlogged here, and the remnants of a former field drain are evident. These responses may be more recent in origin as no clear archaeological pattern is evident. A drainage ditch traverses the field east to west and clear parallel trends to the north of this are indicative of ploughing activity. This may represent ridge and furrow cultivation. However, the ploughing clearly respects the drainage ditch, suggesting more recent agricultural activity.

A detailed gradiometry survey of the remaining fields, except Field 6 and the southern half of Field 10 which were unsuitable for survey due to waterlogged and uneven ground, was undertaken on 2nd -16th June and 21st August 2023 (Licence no 23R0225). The following summary details the findings of the survey (**Figure 10.1**):

> In the east of the Project area, within Field 8, there are responses indicative of an archaeological enclosure (E686590 N719634). The enclosure comprises of a circular ditched feature (c.31m diam.) with multiple internal responses indicative of pits and spreads of burnt material. This is typical of habitation activity. The main enclosure appears to have two sub-rectilinear annexes, extending c.25m to the east of the main enclosure. Outside of these annexes are areas of increased responses, suggesting spreads of burnt material.
>
> At the eastern extent of Field 8 there is another curvilinear response evident. This would have most likely extended to the east, outside the survey area and where the M7 Motorway now runs. Although interpretation is difficult it is speculated that the curvilinear response represents the remains of a further archaeological ditched feature, which is now truncated by the motorway.

Other magnetic signatures noted throughout the survey area may represent potential archaeological features, such as an isolated potential pit (1) in Field 1 and two potential pits (4) in Field 4 (Figure 10.1). However, it is noted that the data is littered with modern ferrous responses and that these potential features may represent more deeply buried ferrous debris.

A cluster of responses (7) in Field 5, though not clear, may be the plough damaged remains of archaeological ditched features.

In the south of Field 9 there are small areas of increased response (14). Although it is possible that these represent more recent activity it is possible that these represent small spreads of burnt material of archaeological interest.

The geophysical survey report notes that ‘no clear responses of archaeological potential were recorded in Fields 2 & 3’ and that ‘no responses of interest were detected in Field 10.’ (Leigh 2023). An electricity pylon located in the field boundary between Fields 7 and 8 has created a spread of magnetic disturbance, which may mask any subtle responses of archaeological potential within that portion of the survey area.

10.2.3 Consultation

The lead consultant has undertaken formal pre-planning discussions with Kildare County Council in relation to the Project.

10.2.4 Methodology for Assessment of Impacts

The methodology used for the assessment of likely significant effects has been informed by the Environmental Protection Agency (EPA 2022) *Guidelines for Information to be Contained in EIAR*, in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X and XI) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).

The following summation of the criteria used to assess impacts is provided in order to concisely outline the methodology specifically applied to the cultural heritage resource. Assessment is achieved by a consideration of the duration, quality, type, value and magnitude of effect(s) on the cultural heritage resource:

Duration of Effect is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

The *Quality of Effect* on the cultural heritage resource can be positive, neutral or negative.

- Positive: a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation and re-use of an otherwise vulnerable derelict structure).
- Neutral: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Negative: a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site)

The *Type of Effect* on the cultural heritage resource can be direct, indirect or no predicted impact.

- Direct impact: where a cultural heritage site is physically located within the footprint of the Project, which will result in its complete or partial removal.
- Indirect impact: where a cultural heritage site or its setting is located in close proximity to the footprint of the Project.
- No predicted impact: where the Project will not adversely or positively affect a cultural heritage site.

The *Magnitude of Effect* is based on the degree of change, incorporating any mitigation measures, and is based on a consideration of the character, duration, probability and consequences (Table 10.1). The magnitude can be negative or positive and is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible. The descriptions of magnitudes presented in Table 10.1 is based on guidance published in *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 16-7).

Table 10.1: Magnitudes of Effect on Cultural Heritage Assets

Magnitude	Description
High	Most or all key archaeological or architectural materials affected such that the resource is totally altered Comprehensive changes to setting Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation
Medium	Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. Considerable changes to setting that affect the character of the archaeological asset. Changes to the setting of a historic building, such that it is significantly modified.

	Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. Slight changes to setting of an archaeological monument. Change to setting of a historic building, such that it is noticeably changed. Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	Very minor changes to key archaeological materials or setting. Slight changes to historic building elements or setting that hardly affect it. Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.

10.2.5 Evaluation of Cultural Heritage Value/Sensitivity

The evaluation of the Value/Sensitivity of a heritage receptor is largely based on its significance criteria, and should not be considered definitive, but rather an indicator which contributes to a wider judgment based on the individual circumstances of each feature. Generally, the more criteria that is evident for a given receptor, the higher in scale its respective value shall be. Non-exhaustive criteria to be considered in addition to any legal designations include a consideration of the condition/preservation, documentary/historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value. It is noted that, without recourse to archaeological excavation, there are limitations in determining the value or significance of sub-surface archaeological attributes (such as artefacts, human burials or other remains) for both extant and levelled sites. The Value/Sensitivity of all known or potential receptors that may be affected by the Project can be considered using a non-exhaustive range of indicators and professional judgement per Table 10.2. and ranked according to the following scale: Very High, High, Medium, Low and Negligible.

Table 10.2: Indicative Factors for Assessing the Value/Sensitivity of Cultural Heritage Assets

Value	Description
Very High	World Heritage Sites (including Tentative List properties) Sites, buildings or landscapes of acknowledged international importance Intangible associations with individuals or innovations of global significance
High	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance Undesignated assets of the quality and importance to be designated Assets that can contribute significantly to acknowledged national research objectives Archaeological Landscapes with significant group value Intangible associations with individuals or innovations of national significance

Medium	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character Intangible associations with individuals or innovations of regional significance
Low	Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings and settings Intangible associations with individuals or innovations of local significance
Negligible	Assets with very little or no surviving archaeological interest Landscapes little or no significant historical interest Buildings or urban areas of no architectural or historical note; buildings of an intrusive character
Unknown Potential	Assets whose importance has not been ascertained Buildings with some hidden (i.e., inaccessible) potential for historic significance

The *Significance of Effects* is assessed based on a consideration of the Magnitude of the Impact (graded from High to Negligible, based on a consideration of character, duration, probability and consequences) combined with the Value (graded from High to Negligible, based on a consideration of significance/sensitivity) of the cultural heritage asset. The Significance of Effects can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 10.3 and Table 10.4).

Table 10.3: Significance and Description

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

Table 10.4: Significance of Effects (per EPA EIAR Guidelines 2022)

Magnitude of Impact	Negligible	Low	Medium	High
High	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight

Value/Sensitivity of the Asset

10.3 Characteristics of the Project

10.3.1 Description of Site

The Project lands are in excess of 37ha (38.64 ha) and are located in the townlands of Halverstown, Jigginstown and Newhall, on the western side of the M7 motorway, positioned between Junctions 9a and 10, c.2.5km west of Naas, County Kildare The site is bound to the north by the R409 road, to the east by the M7 Motorway and to the south by the M7 Business Park, with agricultural land to the west. A recorded monument (KD019-028) classified as a ‘Fulacht Fia’ is located within the south-eastern portion of the site. This feature cannot be defined by its surface expression and will be preserved *in situ* within greenspace as part of the project design.

10.3.2 Legal and Planning Context

This section presents a concise summary of the legal and planning policy frameworks relevant to this assessment in order to provide a context for the statutory protection assigned to the cultural heritage resource. The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the Granada Convention (1985) (formally the European Convention on the Protection of Architectural Heritage), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015. The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were reviewed and none are located within the environs of the study area.

The National Monuments Service (NMS), which is currently based in the Department of Housing, Local Government and Heritage, is responsible for the protection and promotion of Ireland’s archaeological heritage.

The national legal statutes and guidelines relevant to this assessment include:

- Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 (“the Act”)
- National Monuments Acts 1930 (as amended)
- Heritage Act 1995 (as amended)
- National Cultural Institutions Act 1997
- The Architectural Heritage (National Inventory) and Historic Monuments (Misc) Provisions Act 1999
- Planning and Development Act 2000 (as amended)

- Department of Arts, Heritage and Gaeltacht 2011 Architectural Heritage Protection: Guidelines for Planning Authorities.

  Department of Arts, Heritage, Gaeltacht and the Islands 1999 *Framework and Principles for the Protection of Archaeological Heritage*

10.3.2.1 Relevant Legislation and Planning Policies

The *Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023* ("the Act") was enacted on 13th October 2023[1]. While the Act is now law, it is important to note that most of its provisions will not enter into force until the Minister (DHLGH) has made one or more Commencement Orders per subsections (7) to (13) of section 1 of the Act). At the time of writing, no Commencement Orders have been made and therefore none of the Act other than section 225 and a number of non-heritage related "miscellaneous" provisions in Part 13 of the Act have entered into force. Section 225 provides that the Minister (DHLGH) will be required to report to the Oireachtas on the operation of the Act within three years of its enactment and at five-year intervals thereafter.

As no other aspects of the Act have entered into force, this means that section 7 of the Act (which provides for the repeal of the *National Monuments Acts 1930 to 2014* and related legislation) has not entered into force. Accordingly, the *National Monuments Acts 1930 to 2014* (as amended) currently remain fully in force.

The National Monuments Act 1930 and its Amendments, the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains. There are a number of mechanisms under the National Monuments Acts that are applied to secure the protection of archaeological monuments. These include the designation of National Monument status for sites of national significance, the Register of Historic Monuments (RHM), the Record of Monuments and Places (RMP), the Sites and Monuments Record (SMR), and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Section 2 of the National Monuments Act, 1930 defines a National Monument as 'a monument or the remains of a monument, the preservation of which is a matter of national importance…'. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders. Archaeological sites within the ownership of local authorities are also deemed to be National Monuments. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument or at sites which are subject to a Preservation Order. There are no National Monuments in State Care or sites assigned Preservation Orders located within the study area. The nearest National Monument is Jigginstown House (KD019-033001-, NM no. 528) c.1.3km southeast.

The RMP was established under Section 12(1) of the National Monuments (Amendment) Act, 1994 and was based on the earlier SMR and RHM. It comprises lists and maps of all known archaeological monuments and places for each county in the State and all listed archaeological sites receive statutory protection under the National Monuments Act 1994. No works can be undertaken at their locations or within their surrounding Zones of Notification without providing two months advance notice to the National Monument Service. There is one recorded archaeological site located within the boundary of the Project site, a fulacht fia (KD019-028----), which will be preserved *in situ* (Table 10.5 and Figure 10.1).

The *Kildare County Development Plan 2023 – 2029 (adopted December 2022)* includes the following relevant objectives in relation to the protection of the archaeological resource within the county:

> **AH P2** Protect and enhance archaeological sites, monuments and where appropriate and following detailed assessment, their setting, including those that are listed in the Record of Monuments and Places (RMP) or newly discovered archaeological sites and/or sub- surface and underwater archaeological remains.
>
> **AH O2** Manage development in a manner that protects and conserves the archaeological heritage of County Kildare, avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest and secures the preservation in-situ or by record

[1] See NMS briefing note here: https://www.archaeology.ie/news/enactment-of-historic-and-archaeological-heritage-and-miscellaneous-provisions-act-2023-and [Accessed 21.11.2023]

of all sites and features of historical and archaeological interest, including underwater cultural heritage. The Council will favour preservation in – situ in accordance with the recommendation of the Framework and Principles for the Protection of Archaeological Heritage (1999) and the Council will seek and have regard to the advice and recommendations of the Department of Housing, Local Government and Heritage.

AH O3 In co-operation with the National Monuments Service, Department of Housing, Local Government and Heritage require archaeological impact assessment, surveys, test excavation and/or monitoring and/or underwater archaeological impact assessments for planning applications in areas of archaeological importance and where a development proposal is likely to impact upon in-situ archaeological monuments, their setting and archaeological deposits, based on recommendations of a suitably qualified archaeologist and the Council will seek and have regard to the advice and recommendations of the Department of Housing, Local Government and Heritage.

AH O4 Ensure that development in the vicinity of a site of archaeological interest is not detrimental to the character of the archaeological site or its setting by reason of its location, scale, bulk or detailing and to ensure that such proposed developments are subject to an archaeological assessment prepared by a suitably qualified archaeologist. Such an assessment will seek to ensure that the development can be sited and designed in such a way as to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features, objects and areas of underwater archaeological heritage.

AH O5 Require the preservation of the context, amenity, visual integrity and connection of the setting of archaeological monuments. As a general principle, views to and from archaeological monuments shall not be obscured by inappropriate development. Where appropriate, archaeological visual impact assessments will be required to demonstrate the continued preservation of an archaeological monument's siting and context.

AH O6 Secure the preservation in-situ or by record of:

• the archaeological monuments included in the Record of Monuments and Places as established under section 12 of the National Monuments (Amendment) Act, 1994

• any sites and features of historical and archaeological interest including underwater cultural heritage and protected wrecks.

• any subsurface archaeological features including those underwater, that may be discovered during the course of infrastructural/development works in the operational area of the Plan. Preservation relates to archaeological sites or objects and their settings.

The *Naas Local Area Plan 2021-2027* includes the following relevant policies and objectives in relation to the protection of the archaeological resource:

BH 4.1 Protect and preserve in situ (or upon agreement preservation by record) items of archaeological interest provided for on the Sites and Monuments Record (www.archaeology.ie) from inappropriate development that would adversely affect and/or detract from the interpretation and setting of these sites.

The protection of architectural heritage is provided for through a range of legal instruments that include the Heritage Act 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000. The Planning and Development Act 2000 requires all Planning Authorities to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st of January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. A protected structure also includes the land and other structures within its curtilage. While the term 'curtilage' is not defined by legislation, the Architectural Heritage Protection Guidelines for Local Authorities (Department of Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. In addition, local authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance through designation of Architectural Conservation Areas (ACAs).

The National Inventory of Architectural Heritage (NIAH) was established to record architectural heritage structures within the State and while inclusion in the NIAH does not provide statutory protection listing in the inventory is a signifier of architectural heritage value and it is intended to advise local authorities on compilation of their Record of Protected Structures. The NIAH also includes a Survey of Historic Gardens and Landscapes which comprises a non-statutory, desk-based survey of such features. Details on the Protected Structures and NIAH-listed features within the study area are provided in Section 10.3.3.2 of this chapter.

The *F (adopted December 2022)* presents a number of objectives to ensure the protection of the architectural heritage resource within the County and these include:

AH P6 Protect, conserve and manage the archaeological and architectural heritage of the county and to encourage sensitive sustainable development in order to ensure its survival, protection and maintenance for future generations.

AH P9 Promote the protection, retention, appreciation and appropriate revitalisation of the built vernacular heritage of the county.

AH O20 Conserve and protect buildings, structures and sites contained the Record of Protected Structures of special architectural, historical, archaeological, on artistic, cultural, scientific, social or technical interest.

AH O21 Protect the curtilage of protected structures or proposed protected structures and to refuse planning permission for inappropriate development that would adversely impact on the setting, curtilage, or attendant grounds of a protected structure, cause loss of or damage to the special character of the protected structure and/or any structures of architectural heritage value within its curtilage. Any proposed development within the curtilage and/or attendant grounds must demonstrate that it is part of an overall strategy for the future conservation of the entire built heritage complex and contributes positively to that aim.

AH O22 Refuse planning permission for the demolition of any protected structure unless the Council is satisfied that exceptional circumstances exist. The demolition of a protected structure with the retention of its façade will likewise not generally be permitted.

AH O23 Require an Architectural Heritage Assessment Report, as described in Appendix B of the Architectural Heritage Protection, Guidelines for Planning Authorities (2011), to accompany all applications with potential for visual or physical impacts on a Protected Structure, its curtilage, demesne and setting. This report should be prepared by a person with conservation expertise that is appropriate to the significance of the historic building or site and the complexity of the proposed works.

AH O31 Protect the designed landscapes associated with protected structures and retain important elements of the built heritage including historic gardens, stone walls, pathways, and avenues within the curtilage and attendant grounds of protected structures.

AH O32 Ensure that new development will not adversely impact on the setting of a protected structure or obscure established views of its principal elevations.

AH O43 Ensure that national guidelines and the principles of conservation best practice are followed in assessing the significance of a Protected Structure and in considering the impact of proposed development on the character and special interest of the structure, its curtilage, demesne and setting.

AH O44 Co-operate with Waterways Ireland in the management, maintenance and enhancement of the Royal Canal and Grand Canal and associated structures/features. Such projects shall be subject to an AA Screening Report, and where applicable, Stage 2 AA. They shall have a regard for any hydrological connection shared with a European Site and their qualifying interest species. The project shall account for any potential likely significant effects and provide mitigation and monitoring where appropriate.

AH O45 Support the implementation of the National Policy on Architecture, 'Places for People' prepared by the Department of Housing, Local Government and Heritage.

AH O53 Ensure that an assessment of the existing buildings on site is undertaken through an analysis of historic maps and an appraisal of the historic fabric and features. Development proposals should retain and incorporate existing buildings of merit and any elements that contribute to their distinctive character.

AH O54 Have regard to guidance in the DHLGH Guidelines and conservation best practice in assessing proposed interventions to vernacular structures, traditional farmhouses, their curtilage, out buildings and settings.

> **AH O55** Resist the demolition of built vernacular heritage, in particular thatched cottages and farmhouses, and to encourage their sensitive reuse having regard to the intrinsic character of the structure and the potential to prolong the life cycle of the embodied carbon contained within the structure.
>
> **AH O56** Require that a sustainable use and appropriate maintenance plan is in place for earlier dwellings of heritage interest on farms or rural sites, where planning permission is sought for a new dwelling.
>
> **AH O57** Require the submission of a written report from a suitably qualified professional where it is proposed to redevelop a derelict property or one that has been unoccupied for a long period of time. The report must demonstrate that any proposal will not structurally compromise the subject building and shall outline the measures to be taken in order to protect the building from collapse, both prior to and during construction works.
>
> **AH O58** Have regard to guidance in The Thatched Houses of Kildare (2005) and Reusing Farm Buildings, A Kildare Perspective (2007) published by Kildare County Council and A Living Tradition – A Strategy to Enhance the Understanding, Minding and Handling of our Built Heritage (2021) published by the Department of Housing, Local.

The *Naas Local Area Plan 2021-2027* also presents a number of objectives to ensure the protection of the architectural heritage resource within the County and these include policies regarding protected structures. The relevant policies involved for these sites include:

> **BH 1.1** Ensure the protection and conservation of all protected structures (or parts of structures), including the curtilage and attendant grounds of structures contained in the Record of Protected Structures as listed in the Kildare County Development Plan.

10.4 Baseline

10.4.1 Archaeological and historical context

There is **one** recorded archaeological site (fulacht fia KD019-028----) within the Project site boundary. There are **five** additional archaeological sites (mound KD019-016----, burial KD019-017----, church KD019-029----, graveyard KD019-029001- and fulacht fia KD019-068----) recorded by the ASI within the 1km radius study area which surrounds the subject site. Mound KD019-016---- and Burial KD019-017---- are also designated Recorded Protected Structures (NS019-092---- and NS019-093---). These recorded archaeological sites are listed in Table 10.5, mapped in Figure 10.2 (Volume III) and their published inventory descriptions are provided in Appendix 10.1 (Volume II).

The potential also exists for the presence of unrecorded, sub-surface archaeological sites to exist in undisturbed locations within the Project site boundary.

Table 10.5: List of recorded archaeological sites within the 1km study area

SMR Number	Class	Townland	ITM (E, N)	Distance
KD019-016----	Mound	Osberstown	687097, 720106	340m N
KD019-017----	Burial	Ploopluck	687652, 719355	810m NE
KD019-028----	Fulacht fia	Jigginstown	686460, 719359	Within
KD019-029----	Church	Jigginstown	687649, 719305	808m SE
KD019-029001-	Graveyard	Jigginstown	687654, 719305	825m SE
KD019-068----	Fulacht fia	Jigginstown	686865, 719322	198m E

The subject site was part of the Gaelic kingdom of *Airthear Life*, bordering Uí Faoláin, the kingdom of Ó Broin and Uí Muirí, the Ó Tuathail kingdom. There was believed be a pre-Norman *dún* in Naas, first cited by the Annals of the Four Masters in AD750. This was located on the site of a later motte (KD019-030009), probably built by Maurice Fitzgerald, to whom Strongbow granted Naas in 1176 as part of the barony of Offelan.

In 1185, King John confirmed this grant to William, eldest son of Maurice FitzGerald and his heirs. The Augustinian Priory of St. John the Baptist (KD019-030010-) was established in the 12th century, and the FitzEustace family founded a Dominican friary (KD019-030012-) in the 13th century. The town was apparently burned by Edward Bruce in 1316 but quickly recovered. Naas also had a number of other tower houses (KD019-030013-, KD019-030014-, KD019-030015- and KD019-030018-) and there are accounts of murage grants and town defences town defences (KD019-030001-) from 1415.

Naas and other lands of the Fitzgeralds were seized by the Lord Deputy, William Skeffington after the rebellion of Silken Thomas in 1534. The lands were not reinstated until 1552. The town was incorporated in 1568 by Elizabeth I, and then a new charter was granted by James I in 1609. The Naas canal was built in 1786 by the Kildare Canal Company as a branch of the Grand Canal, and was taken over by the Grand Canal Company in 1808 and continue to be used for trade until 1959. In 1846, the Great Southern & Western Railway's Dublin-Cork line was built via Naas, served by the Sallins train station.

The first reference to Jigginstown or Sigineston was made in 1280, when Henry Harole was recorded as renting three carucates of land from William de Loundres, a descendant of the Fitzgeralds and the baron of Naas. A tower house (KD019-034----) in Jigginstown was probably one of the castles in possession of Roland FitzEustace in 1486 (Tickell 1960, 368). In 1635, Christopher Wandesworth (1592–1640), Lord Deputy of Ireland bought the Earl of Kildare’s lands at Sigginstown but shortly thereafter sold them to his successor Thomas Wentworth, Earl of Strafford (*circa* 1593-1641) (DNB Vol. 59, 286).

In the 1630s, Jigginstown House (KD019-033001-) c.1.3km southeast of the site, was built by Wentworth as a summer residence and place to entertain the King on visits. The mansion, built from red brick and Kilkenny marble was left unfinished on his death. The Civil Survey of 1654-6 (Simington 1952, 66) indicated that the house was already in ruins (Figure 10.3, Volume III). It also recorded the Earl possessing 180 acres in ‘Siginstowne’ (ibid.). Hermann Moll’s 1728 map depicts the townland as ‘Siggins T.’ (Figure 10.4, Volume III). Alexander Taylor’s 1783 map of Kildare shows the site as ‘Jigginstown’ (Figure 10.5, Volume III).

10.4.2 Topographical files

A review of the National Museum of Ireland Topographical Files which records known information in relation to the discovery locations of Irish archaeological artefacts, identified 20 no. recorded artefacts from the townlands of Jigginstown and Halverstown Table 10.6.

Table 10.6: List of recorded archaeological artefacts from Jigginstown and Halverstown

NMI Reg No	Type	Townland	Location
1938:9733	Human remains	Halverstown	Halverstown
1939:1141	Bowl	Halverstown	Pit burial
1939:1142.1	Human remains	Halverstown	Pit
1939:1142.2	Animal remains	Halverstown	Pit
1939:1143	Human remains	Halverstown	Pit
1981:335.1	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:335.2	Pottery	Halverstown	By the river Liffey near Carragh bridge

1981:335.3	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:335.4	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:336	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:337.1	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:337.2	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:337.3	Pottery	Halverstown	By the river Liffey near Carragh bridge
1981:397	Buckle	Halverstown	By the river Liffey near Carragh bridge
1979:13:00	Pottery	Jigginstown	No information available
1984:05:00	Fibula	Jigginstown	Field
1984:06:00	Object	Jigginstown	Field
1985:108	Mount	Jigginstown	No information available
1985:109	Knife	Jigginstown	No information available
1986:12:00	Pin	Jigginstown	No information available

10.4.3 Database of Irish Excavation Reports

The Database of Irish Excavation Reports contains summary accounts of archaeological investigations undertaken in the Republic of Ireland and Northern Ireland from 1969 to present (www.excavations.ie).

A review of the Excavations Database 1969 – 2023 revealed no recorded licensed archaeological investigations undertaken within the Project Site boundary, however it did return two excavations undertaken within the surrounding 1km study area (Table 10.7).

Table 10.7: List of archaeological investigations within the 1km study area

Location	Licence	Summary
Jigginstown, County Kildare	05E0442, 05E0524	Monitoring of topsoil-stripping associated with the construction of the Millenium Park Western Link Road was carried out by Sinéad Phelan (05E0442). The site of a fulacht fiadh or burnt mound was identified 300m north of the R445. This area was cordoned off and excavated between 16 and 26 May 2005. The burnt mound was originally U-shaped. It had a single shallow trough, located within

		the arms of the U, with evidence for a wooden internal structure. The mound sealed an original peat deposit and also a scatter of stake-holes, which formed the outline of a possible oval structure. Samples were submitted for radiocarbon dating. The one from the mound returned a date of 3869 6 52 BP (2480–2190 cal BC at 2 sigma), while that from the trough was 3926 6 71 BP (2620–2190 cal BC at 2 sigma).
Newhall	16E0418	A programme of test trenching was carried out in two phases in greenfield areas within the proposed Upper Liffey Valley Sewerage Scheme Contract 2A (Network) pipeline footprint, located to the south and east of Newbridge, Co. Kildare. This first phase of testing was undertaken in response to planning conditions attached to the proposed development (Planning Ref.: Part VIII). It follows a desktop assessment report which recommend testing in greenfield and in the vicinity of five Areas of Archaeological Potential. Phase 1 testing was undertaken between 1 and 11 November and comprised the excavation of 67 trenches, measuring 4,461.5 linear metres, in the townlands of Newhall and Greatconnell. The test areas (Fields 1-5) were located in arable land on the banks of the River Liffey. No features or deposits of archaeological potential were identified in these areas. A second phase of test trenching is to be carried out in 2017.

10.4.4 Architectural heritage

There are no designated NIAH sites or RPS sites within the subject site. There are four RPS sites within the 1km radius study area which surrounds the site (Table 10.8, Figure 10.6*)*. One of the RPS sites, Limerick Bridge, is also recorded in the National Inventory of Architectural Heritage (NIAH). Three designated RPS sites are also recorded on the RMP (Mound KD019-016----, Burial KD019-017---- and Church KD019-029----). In addition, Local Authorities must provide for the preservation of townscapes etc. through designation of Architectural Conservation Areas (ACAs). There are no ACAs within the study area. The nearest ACA to the Project site is Naas ACA, which is located approximately 2.3km to the east. Any changes that materially affect the character of a protected structure require planning permission.

Landscape and Visual Impact Assessment (LVIA) Chapter 11 has established that the Project will not have an adverse impact on the Naas ACA, due to separation distance and intervening built form and vegetation.

Table 10.8: List of designated architectural heritage sites within the 1km study area

Reference Number	Class	Townland	ITM (E, N)	Distance
RPS NS019-059 NIAH 11901903	Bridge	Jigginstown	687296, 718758	810m SE
RPS NS019-080	Church	Jigginstown	687651, 719320	808m SE

SMR KD019-029----				
RPS NS019-092 SMR KD019-016--	Enclosure	Osberstown	687100, 720106	340m N
RPS NS019-093 SMR KD019-017--	Cemetery Mound	Ploopluck	687648, 720237	810m NE

10.4.5 Cartographic Review

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and can also highlight the impacts of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest.

The cartographic sources examined for the study areas include William Petty's map of Kildare (circa 1655), Hermann Moll's map of Offaly, Laois and Kildare (1728), Alexander Taylor's A map of the County of Kildare (1783), the first edition of the 6-inch Ordnance Survey (OS) map (surveyed and published in the 1830s-40s) (Figure 10.7) and the 25-inch OS maps (surveyed and published 1887-1913) (Figure 10.8). The first edition of the 6-inch OS map is the earliest available map that depicts the Project site and study area in detail. This map show that the subject site comprised irregular fields enclosed in the main by a combination of hedgerows and streams, some of which are townland boundaries. At the centre of the site, a cluster of farm buildings is depicted, with a laneway connecting them to the road (now the R409) to the north. To the southern and eastern extents of the subject site are townland, barony and parish boundaries. The 25-inch map shows changes in field boundaries but no other development withing the Project site. No unrecorded archaeological sites are evident from cartographic evidence.

10.4.6 Review of Aerial, Satellite and LiDAR Imagery

A review of publicly accessible aerial, satellite and LiDAR sources published online by the Ordnance Survey of Ireland, Google, Bing Maps and the Geological Survey of Ireland (LiDAR) was undertaken in order to assess if any traces of potential unrecorded archaeological sites were visible within the Project site. A review of available aerial/satellite imagery for a variety of years from 1995 to 2022 did not identify any previously unrecorded archaeological or cultural heritage sites within the development boundary (Figure 10.9, Volume III).

A series of parallel linear trends, orientated in a general north to south direction are visible throughout the north and northwest portions of the Project site on the available LiDAR images. These features most likely relate to recent arable agricultural activity. The south-eastern portion of the Project site (including the location of recorded monument KD019-028) is somewhat more undulating and potentially disturbed. This potential disturbance may relate to modern field drainage or construction works associated with the M7 motorway. No potential archaeological features are discernible, and the extent of the recorded monument (fulacht fia KD019-028) cannot be determined from the LiDAR imagery (Figure 10.10, Volume III).

10.4.7 Undesignated Cultural Heritage Assets

While encompassing the archaeological and designated architectural heritage resources, cultural heritage also includes various undesignated assets such as settlements, demesne landscapes, vernacular structures, townland boundaries, folklore, placenames and historical events.

The development area contains a small number of undesignated vernacular buildings centred around an enclosed farmyard. One of the buildings within the group consists of a partially collapsed single storey mud walled cottage adjoining a two-storey stone and brick dwelling house.

A review of the National Folklore Commission's Schools Collection[2] revealed that it contains a number of references to Jigginstown House and the Earl of Stafford, including one collected by Thomas O'Shea (Christian Brothers, Naas) presented as follows:

> Situated on the Newbridge road is the Jigginstown building. It was built in the seventeenth century by the Earl of Strafford who was Viceroy in Ireland. He built it so as to have a mansion suitable for the King in case King Charles ever came on a visit to Ireland. He got the bricks from Denmark. a legend tells us that he had his men lined from Dublin to Naas and they passed the bricks from one to another till they arrived at Jigginstown. It is about one hundred and fifty yards long. There are many underground cellars in it. Before it was finished the Lord Deputy was called over to England and was beheaded for making friends with the Irish. A legend tells us that in one of the cellars is a spring well which used to supply the house with water. It is said that there is gold buried there and that a black dog minds it. There is a tunnel leading to Killashee from Jigginstown.

There are also a number of references to the townland of Halverstown, including one to Halverstown House:

> At Halverstown House owned by Purcells there was a tree which was planted by Daniel O'Connell's father. When he was planting it soldiers came and were going to kill him, but he said, "Do not kill me for I am planting this tree to my memory. They did not kill him. However a few years later the tree was cut down by people named O'Dean's, and it was said they would never have a day's luck. The prophesy came true for all their cattle died (Julia O'Connor, Convent, Kilcullen).

10.4.7 Placenames

The Project site is located within the townlands of Halverstown, Jigginstown and Newhall. The placenames of Jigginstown *Baile an tSigínigh* and Halverstown *Baile Halbhaí* are both derived from *Baile* meaning townland, town, homestead and personal names. The origins of the placename of Newhall are unknown.

The surrounding 1km study area extends into a further four townlands: Osberstown, Ploopluck, Castlekeely and Yeomanstown. None of them are indicative of the presence of associated unrecorded archaeological sites but may perhaps suggest historic settlement activity (Table 10.9).

Table 10.9: Townland names review (Source: www.logainm.ie)

Townland	Irish root	Translation
Jigginstown	*Baile an tSigínigh*	'*Baile*' townland, town, homestead
Halverstown	*Baile Halbhaí*	'*Baile*' townland, town, homestead
Newhall	*An Halla Nua*	Not defined
Osberstown	*Bhaile Osbeird*	'*Baile*' townland, town, homestead
Ploopluck	*Ploopluck*	Not defined
Castlekeely	Caisleán Uí Chaollaí	The castle of Ó Caollaí 'Caisleán' castle 'Uí Chaollaí' surname
Yeomanstown	*Baile an Ghíománaigh*	'*Baile*' townland, town, homestead

10.4.8 Field Survey

The Project site and its environs were inspected on 29th September 2022 by a suitably qualified Cultural Heritage specialist. See Figure 10.12, Appendix 10.1 and Table 10.10.

The focus of the site inspection was to establish to what extent the proposed design layout for the Data Centre shall affect the Cultural Heritage resource. There is one recorded monument within the proposed site

[2] https://www.duchas.ie/en

boundary, a fulacht fia (RMP no. KD019-028----) located within the southern portion of the site near a watercourse which also functions as the boundary between the townlands of Halverstown, Jigginstown and Newhall. No above ground evidence of this monument was visible at the time of the site inspection. Outside of the 1km study area the high value receptor of Jigginstown House (KD019-033001; Nat. Mon. No. 528) c. 1.4km to the east-southeast of the proposed site was also visited to assess any potential indirect impact on this resource.

The lands of the Project area comprises medium to large sized pasture fields grazed by sheep. Field boundaries are substantial and largely defined by banks, ditches and tall hedges interspersed with mature deciduous trees of considerable age. Several townland boundaries, all well-defined, are present within the footprint of the site. The general area around the proposed site is dominated by the M7 motorway and local road network which flanks the development to the east and north, the M7 Industrial Estate to the south and agricultural lands mixed with commercial developments elsewhere.

Overall archaeological potential of the site is deemed high, given its slight south-facing aspect, proximity to a watercourse and presence of one recorded archaeological site within its boundary.

Table 10.10: Description of Lands Within Project site (cross refer to Figure 10.12, Volume III)

ID	Description
Field 1	Large, well-drained, level pasture field. Its boundaries are marked by post and wire fences, tall hedges and occasional trees. A wide ditch and escaped hedge define its southern boundary. A road (R409) bounds this field to the north. A 110kV OHL traverse the field northeast-southwest. **Plate 1**
Field 2	Well drained, level pasture field. Its boundaries are defined by a timber railing fence and maintained hedges to the north, a combination of post and wire fences, hedges and mature trees to the east and west with a bank and escaped hedge to the south. A stone laneway extends along its western boundary and two 110kV and 220kV OHL traverse the field northwest-southeast and northeast-southwest respectively. **Plate 2**
Field 3	Well drained pasture field on slight south-facing slope. Bounded to the east by the townland boundary between Halverstown and Jigginstown, defined by a ditch and bank topped by mature trees and an escaped hedge. The bank is c.4m wide at the base, c.1.5m wide at the top and c.1m high. The field is bounded to the north by a hedge and timber railing next to the R409. A block wall and post and wire fence separate the field from the garden of a house which is located at the northwest corner of the field. The southern and western boundaries are defined by escaped hedges and post and wire fences. A 220kV OHL traverse the field from southeast to northwest. A pylon is located within the boundary between Field 2 and 3. **Plate 3** and **4**
Field 4	Poorly drained, triangular boggy field with substantial areas covered by rough grass. Its western boundary towards Field 3 consists of the townland boundary between Halverstown and Jigginstown described above. The field is bounded to the east and north by a timber fence flanking the M7 motorway and R409 road. **Plate 5**
Field 5	Well drained pasture field, on slight south-facing slope. Its southernmost part is ungrazed and planted with arable crops for wildlife. The field is bounded on two sides by townland boundaries. A watercourse (Bluebell stream) lined by mature trees to the south represents the boundary between Halverstown and Newhall while a low bank and ditch to the east with mature trees and an escaped hedge mark the boundary between Halverstown and Jigginstown. On all other sides the field boundaries are defined by escaped hedges, mature trees and a post and wire fence. A 110kV OHL traverse the field from southwest to northeast. **Plate 6**
Field 6	Well drained level pasture field located west of farmyard. The field is bounded to the south by a watercourse (Bluebell stream) lined by mature trees which also represents the townland boundary between Halverstown and Newhall. On all other sides the field boundaries are defined by escaped hedges, mature trees and a post and wire fence. **Plate 7, 8 and 9**
Field 7	Well drained pasture field on very slight south facing slope located east of farmyard. A stone laneway leading to the same bounds the field in the northwest. Its southern boundary is also the townland boundary between Halverstown and Jigginstown which is defined by a ditch and c.1m high bank lined with mature trees and a post and wire fence. Elsewhere the field boundaries are defined by a

	combination of post and wire fences, mature trees and escaped hedges. Two OHL traverse the field **Plate 10**
Field 8	Well drained pasture field which falls away slightly to the north and south from a central ridge. The field is bounded to the east and south by the townland boundary of Halverstown and Jigginstown. Both townland boundaries are defined by a substantial bank and ditch topped by mature trees and a post and wire fence. The northern boundary is marked by a post and wire fence and bank topped by an escaped hedge while the northern boundary consists of a line of mature trees. A 220kV OHL traverse the field and an associated pylon is located at its northwest corner. **Plate 11 and 12**
Field 9	Well drained, level pasture field with unfenced openings to Field 10 and 11. It is bounded to the north by the townland boundary between Halverstown and Jigginstown (described under Field 7), to the east by an escaped hedge and ditch and escaped hedges elsewhere. A 220kV OHL traverse the northeast corner of the field. **Plate 13**
Field 10	Poorly drained level pasture field which contains fulacht fia (KD019-028----). At the time of the field inspection the southern portion of the field where the monument is located was waterlogged and covered by long tussocky grass. No above ground evidence of the monument could be identified. The field is bounded to the south by a watercourse lined with mature trees which defines the townland boundary between Jigginstown and Newhall. Its western boundary, defined by a ditch and bank topped with mature trees is also the townland boundary between Jigginstown and Halverstown. Its northern boundary is marked by a c.1m high earthen bank topped by an escaped hedge and mature trees while its eastern boundary towards Field 11 consists of a ditch, escaped hedge and low bank with frequent gaps. **Plate 14** and **15**
Field 11	Level pasture field, poorly drained to the south where it is covered by rough tussocky grass. It is bounded to the south by the townland boundary between Jigginstown and Newhall (see Field 10) while its northern boundary also functions as the townland boundary of Jigginstown and Halverstown (see Field 8). A timber railing fence of the M7 motorway defines its eastern boundary while the western boundary towards Field 10 consists of a ditch, escaped hedge and low bank with frequent gaps. A large modern culvert associated with the motorway is located at the southeast corner of the field. A 220kV OHL traverses the field from north to south and a pylon is located at its centre. **Plate 16**
Farm buildings	At the centre of the Project area is a group of vernacular buildings set around a courtyard with an early to mid 20th century tin hay shed a short distance to the south. The western side of the courtyard consists of a derelict farmhouse comprising a collapsed single-story mud walled thatched cottage (with later tin roof on top of thatch) attached to a two-story three bay rendered stone dwelling with a slate roof (partially collapsed). The northern, eastern and southern sides of the courtyard are defined by single story stone sheds. The farmyard is accessed from the R409 road to the north by a stone lane which extends through Field 2 and 3. **Plate 17, 18** and **19**.

10.4.9 Baseline Summary Observations

The Project site contains one recorded monument, fulacht fia (KD019-028----). There are a further five recorded monuments within a 1km radius of the Project site boundary. A geophysical survey (23R0105) undertaken within the development boundary as part of the pre-planning works for this Project identified the precise location and extent of fulacht fia (KD019-028----) in the southern portion of the Project area. Project designs have been amended to allow for the preservation *in situ* of this feature as identified by geophysical survey within green space (see Figures 10.1, 10.13, 10.14). A second geophysical survey (23R0225) of the wider Project area identified an enclosure in Field 8, which cannot be preserved *in situ* within the project designs.

Archaeological works associated with the development of the Millennium Park Western Link Road c.200m east of the site in 2005 identified a fulacht fia (SMR no. KD019-068----) which was subsequently excavated (05E0442, 05E0524). There are four designated Recorded Protected Structures within 1km of the development boundary, of which three are also recorded on the RMP. The field inspection identified a group of partially derelict vernacular buildings located at the centre of the Project area.

10.5 Impact Assessment

10.5.1 Do Nothing Scenario

A 'Do Nothing Scenario' will see the continued preservation of recorded and potential cultural heritage features within the study area and will not result in any predicted significant effects on the cultural heritage resource.

10.5.2 Likely Significant Environmental Effects

The proposed site works associated with the development of the Data Centre will involve substantial ground reduction to facilitate the construction of 6 no. two storey Data Centre buildings, an administration / management building, car parking, landscaping, gas storage and gas turbines, energy storage and other associated works. These works will be in close proximity (c.5m) to recorded monument (KD019-028----), and will necessitate the removal of previously unrecorded potential archaeological features identified from geophysical investigation, including the enclosure identified in Field 8, thus there is a predicted negative impact associated with the construction phase of works. A series of mitigation measures for the archaeological resource within the Project site are outlined in Section 10.5.3.

The recorded monument (KD019-028----) as identified by the geophysical survey will be preserved in situ, however development designs will encroach into the zone of notification associated with this monument and will be set in close proximity (c.5m) to the monument. Significance of Effect on this monument is adjudged to be slight. The existing recorded monument has no surface expression, as such there will be no predicted visual impact on its setting during the operational phase.

The Significance of Effect for previously unrecorded archaeological features, including an enclosure identified by geophysical survey in Field 8 is adjudged to be significant, however this will be ameliorated by the implementation of the proposed mitigation measures outlined in Section 10.5.3.

The Significance of Effect for undesignated cultural heritage features in the form of vernacular buildings and townland boundaries within the site is adjudged to be moderate, due to their proposed demolition/removal, however this will also be ameliorated by the implementation of the proposed mitigation measures outlined in Section 10.5.3.

There is no predicted impact on any other archaeological sites recorded in the RMP and other recorded cultural heritage sites within the 1km study area.

There is no intervisibility between the subject site and Jigginstown House (KD019-033001-), a National Monument in State Care (No.528) located c. 1.3km to the southeast of the development boundary and its setting will remain unaffected. Therefore there is no predicted impact on this receptor.

10.5.2.1 Cumulative Effects

10.5.2.1.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. A number of planning applications (permitted, submitted but undetermined and under construction) have been identified within the locale of the Project site. Many of these projects are associated with the commercial and industrial complexes located to the north and south of the Project site. It is not likely that the Project will result in any negative significant cumulative effects on cultural heritage in combination with these external plans/projects.

10.5.2.1.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

A desktop review of the likely high pressure gas pipeline route was undertaken to assess potential impacts on recorded archaeology and built heritage. Immediately west of Glebe West AGI the likely route of the proposed pipeline passes immediately south of the Zone of Notification for a Hilltop enclosure (KD024-271----) at Tipperkevin. The working area for the construction of the pipeline will potentially encroach into the ZoN for the Hilltop enclosure. It is likely that much of the working area has been disturbed previously during the installation of the existing gas pipeline, however, there is potential to uncover previously unrecorded archaeology in undisturbed areas during works on the proposed pipeline; any such works would be required to be undertaken through a programme of archaeological excavation and recording under licence from the National Monuments Service (NMS) in the Department of Housing, Local Government and Heritage.

Further northwest of the likely route of the proposed pipeline (still following the route of the existing pipeline) travels through part of the old racecourse (no longer in use and not visible on aerial images) at Punchestown as marked on the 25-inch Ordnance Survey map. This is not a recorded cultural heritage feature and has been impacted previously by the existing pipeline, therefore there is no predicted impact. Moving north-westward, the proposed pipeline traverses agricultural land, with numerous recorded archaeological sites (particularly enclosures, standing stones and barrows) within the wider landscape. No recorded archaeological sites or built heritage features are located within 50m of the proposed pipeline as far as Naas Town AGI.

From Naas Town AGI the likely route of the proposed pipeline follows the route of existing services westward along the southern edge of the Southern Link Road, then northwest as far as the junction with Newbridge Road (R445). Here, the proposed pipeline will be located within a roadside margin immediately east of the boundary of Jigginstown House/ Castle (National Monument no. 528). At this location, the working area for the construction of the proposed pipeline will likely encroach into the ZoN for Jigginstown and associated features (KD019-033001-, KD019-033002-, KD019-033003-, KD019-033004-, KD019-033005-). As the proposed works will be outside the boundary and former entrance laneway to Jigginstown House (Protected Structure NS19-058), there will be no proposed direct impact on the recorded, upstanding remains within the complex. However, there is potential to uncover extra-mural archaeology (either associated with Jigginstown or from other periods) within the working area.

Immediately north of Jigginstown, the likely route of the proposed route will cross the Grand Canal, an important late eighteenth-century industrial heritage feature maintained by Waterways Ireland and Kildare County Council (see Objective AH044 from *Kildare County Development Plan 2023 – 2029*). The method of constructing this crossing (and other watercourses along the likely route) will typically consist of either open excavation (from smaller watercourses and ditches) or directional drilling / pipe jacking as appropriate. Works will be designed to avoid impact on the structure and features of the canal. The likely route of the proposed pipeline will travel close to a bridge over the canal, Jigginstown Bridge (Protected Structure NS19-060, NIAH11901906) but will avoid direct impact with it.

From immediately west of Jigginstown Bridge, the likely route of the proposed pipeline will run across agricultural land, following the assumed wayleave of the existing Foul Drainage Network in a north-westerly direction to just south of Caragh Road Roundabout. From here it moves west-northwest, crossing Millenium Park (R445) and the M7, joining with the R409 Road and on to the northern boundary of the proposed Herbata Data Centre site.

In conclusion, much of the proposed pipeline route will follow existing gas and other service. All existing services will have a zone of disturbance associated with previous construction works in the areas immediately adjacent to the services. However, any undisturbed areas across the proposed pipeline working area that will be impacted by the proposed pipeline construction have the potential to contain previously unrecorded archaeology sub-surface and as such will require archaeological mitigation. The proposed pipeline route as currently understood will run close to a small number of recorded archaeological and built heritage sites, including Hilltop enclosure (KD024-271----) at Tipperkevin. Jigginstown House and associated features (KD019-033001- (Protected Structure NS19-058), KD019-033002-, KD019-033003-, KD019-033004-, KD019-033005-) and Jigginstown Bridge (Protected Structure NS19-060, NIAH11901906). Careful design and micro-routing of the proposed pipeline will ensure that these sites are not directly impacted.

There is no predicted negative significant cumulative effects on cultural heritage as a result of these two associated projects.

10.5.3 Mitigation

10.5.3.1 Mitigation by Avoidance / Design

The fulacht fia (KD019-028----) located within the Project area will be preserved *in situ* as an undeveloped greenspace. The project design has been altered to avoid a direct impact on this feature whose extent has been identified from the geophysical survey. A minimum 5m buffer from the outer edge of the archaeological site will be established prior to any construction works commencing within the site.

10.5.3.2 Mitigation by Prevention

The c.5m buffer around fulacht fia (KD019-028----) will be fenced-off prior to the commencement of construction in order to protect the site during the course of works. This fence shall remain in place until all development works have been completed. The fencing will be erected under archaeological supervision and no construction related activities, such as machine movements, dumping of spoil or storage of materials will occur within the fenced-off area.

10.5.3.3 Mitigation by Reduction

Archaeological investigations have identified the existence of several previously unrecorded features of potential archaeological origin within the development area. With the exception of the recorded monument (fulacht fia KD019-028----) preservation *in situ* of the identified features of archaeological potential is not a viable option within the Project site. Therefore, they will be preserved by record through a programme of archaeological excavation and recording under licence from the NMS in the Department of Housing, Local Government and Heritage.

The archaeological excavations will involve the stripping of topsoil from appropriate areas around the identified archaeological features within the development site and this will be carried out under the constant supervision of a suitably qualified archaeologist. The stripped area will include at least 10m of clearance from the edge of the archaeological feature to the edge of the excavation. The supervised topsoil stripping will be undertaken using a mechanical excavator fitted with a toothless bucket which will remove the topsoil down to the uppermost archaeological layer or the surface of natural subsoil in areas where no archaeological material is present. A systematic programme of manual archaeological excavation of all revealed features of archaeological potential will then be carried out in accordance with the method statement submitted to the NMS as part of the licence application process. This will include the manual excavation of all identified archaeological features, the compilation of written, drawn and photographic records, the retrieval of archaeological objects and a programme of environmental sampling.

The archaeological excavations will be undertaken in advance of the main construction works in the relevant areas in order to allocate adequate time to appropriately excavate and record the archaeological deposits/features.

Following the completion of excavations, a post-excavation phase of works, involving analysis, reporting and dissemination to the relevant authorities will be undertaken off site. The level of the post-excavation analysis and reporting will be commensurate with the level of archaeology excavated on site.

There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological excavations and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement stating the proposed strategy for the pre-construction archaeological excavations will accompany the submitted licence application which will clearly detail the extent of the archaeological works and outline the processes to be enacted to excavate and record all identified archaeological materials. A preliminary report on the archaeological excavations will then be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all archaeological works in written, mapped and photographic formats. Following the completion of all required post-excavation analyses, including environmental, artefact studies and dating, a final report on the excavations will be submitted to the above bodies.

It is also proposed to carry out a photographic survey of the vernacular buildings located at the centre of the site prior to their demolition to allow for their preservation by record.

A photographic survey of the portions of townland boundary to be removed should be undertaken prior to their removal and other groundworks on site. Sections through the townland boundaries should be archaeologically recorded during the archaeological excavations outlined above.

10.5.4 Residual impacts

10.5.4.1 Construction Phase

The mitigation measures presented in Section 10.5.3 will result in the preservation *in situ* of recorded monument (KD019-028----) within a buffer zone. The proposed design has been altered so as to respect the extent of the fulacht as identified by the geophysical survey. The proposed buffer zone would be marked by a fence prior to any construction work taking place. The magnitude of impact on the recorded monument will be slight.

Within the remainder of the development area, the mitigation of previously unrecorded features of archaeological potential identified during geophysical investigations will be by full archaeological excavation. The high magnitude of impact on these features will be ameliorated by the creation of a full and detailed archaeological record, the results of which shall be disseminated. This shall result in a potential moderate range of significance of effect in the context of residual impacts on the unrecorded archaeological resource.

10.5.4.2 Operational Phase

All required onsite archaeological mitigation measures will be implemented prior to and during the construction phase and, therefore, no cultural heritage mitigation measures requiring monitoring are predicted during the operational phase of the Project site. There will be no residual impact on any archaeological or cultural heritage feature. Recorded monument (KD019-028----) will remain preserved *in situ* within a greenfield portion of the development.

10.6 Interactions

This Chapter has an inter-relationship with Chapter 11 Landscape and Visual Impact. The Project site is located approximately 2.3km west from the Naas ACA. The LVIA has established that the Project will not have an adverse impact on the Naas ACA due to separation distance and intervening built form and vegetation.

10.7 References

DNB *Dictionary of National Biography* 1885-1900, London: Smith, Elder & Co.

Donnachadh O'Brien & Associates Consulting Engineers. 2023. *Gas Networks Ireland Infrastructure Upgrade Outline Report*. Unpublished report for Herbata Limited.

Simington, R. 1952. *The Civil Survey A.D. 1654-1656 Vol. VIII County Of Kildare*, Dublin: Stationary Office.

Environmental Protection Agency (EPA) (2015) *Draft Advice Notes for Preparing an Environmental Impact Statement.*

Environmental Protection Agency (EPA) (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports.*

ICOMOS. 2011. Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.

J. M. Leigh Surveys Ltd. 2023. *Geophysical Survey Report - Jigginstown, Naas, County Kildare (Licence: 23R0225)*. Unpublished geophysical report.

Tickell, E. F. 1960. The Eustace Family and their lands in County Kildare, Part 3. *Journal of the Kildare Archaeological Society* 13, 364-413.

Internet sources

Database of Irish archaeological excavations, accessed 20/10/22: http://www.excavations.ie/

Department of Housing, Local Government and Heritage's Historic Environment Viewer, accessed 20/10/22: http://webgis.archaeology.ie/historicenvironment/

Geohive Mapviewer Resource, accessed 20/10/22: http://www.geohive.ie/

Heritage Map Viewer - various interactive heritage maps, accessed 20/10/22:

https://heritagemaps.ie/WebApps/HeritageMaps/index.html

Kildare County Council. 2022. *Kildare County Development Plan 2023 – 2029 (adopted December 2022)*, accessed *:* *https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/*

Naas Local Area Plan 2021–2027, accessed 20/10/22:

https://kildarecoco.ie/AllServices/Planning/LocalAreaPlans/LocalAreaPlans/NaasLocalAreaPlan2021-2027/

National Inventory of Architectural Heritage, accessed 20/10/22: http://www.buildingsofireland.ie/Surveys/Buildings/

Teagasc soil map, accessed 20/10/22: http://gis.teagasc.ie/soils/map.php

UNESCO. 2022. World Heritage in Ireland, accessed13/10/2023:

https://www.worldheritageireland.ie/news/news-single-view/article/ministers-announce-new-world-heritage-tentative-list-for-ireland/?cHash=376a52892e7c00bd7825a9d98fe89068

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VOLUME I MAIN TEXT – CHAPTER 11 LANDSCAPE AND VISUAL

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11 LANDSCAPE AND VISUAL

11.1 Introduction

The purpose of this Landscape and Visual Impact Assessment (LVIA) is to identify and determine the effects on landscape character, landscape features, visual receptors, and visual amenity as a result of the works associated with the construction and operation of the Project (comprising of both the Data Centre Application and Substation Application).

The chapter should be read in conjunction with the following appendices (EIAR Vol III):

- Appendix 11.1 Landscape Statement
- Appendix 11.2 Tree Survey and Arboricultural Impact Assessment Report
- Appendix 11.3 Photomontages
- Appendix 11.4 Glint and Glare Assessment

This assessment has been prepared and reviewed by Chartered Landscape Architects at RPS.

11.2 Methodology

11.2.1 General Approach

The methodology and approach to the assessment contained within this chapter has been carried out in accordance with best practice guidance described in the following documents;

- Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3);
- Technical Guidance Note 06/19 Visual Representation of Development Proposals (The Landscape Institute, 2019).

GLVIA3 recommends that an LVIA '*concentrates on principles and process*' and '*does not provide a detailed or formulaic 'recipe"* to assess effects, it being the '*responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand*' (preface to the third edition).

The effects on the landscape resources and visual receptors (people) have been assessed by considering the proposed change in the baseline conditions (the impact of the development) against the type of landscape resource or visual receptor (including the importance and sensitivity of that resource or receptor). These factors are determined through a combination of quantitative (objective) and qualitative (subjective) assessment using professional judgement.

The assessment methodology is summarised as follows:

Landscape Resources/Visual Receptors

- Description of existing character and / or views
- Importance/value
- Sensitivity/susceptibility to proposed change

Landscape/Visual Change (Impacts)

- Magnitude scale of impact
- Nature
- Duration
- Reversibility

Assessment of Effects
Significance

The LVIA considers the potential effects of a project upon:

- Individual landscape features and elements;
- Landscape character; and
- Visual amenity and the people who view the landscape.

11.2.2 Identification of Baseline Conditions

Baseline conditions have been identified and assessed through analysis of;

- Up to date digital copies of OSI maps;
- Aerial photography;
- Kildare County Development Plan 2023 – 2029; and,
- Drawings of the Project.

Site visits were undertaken to assess the existing environment, to establish the existing visual resource and to identify sensitive receptors, i.e. residential properties, scenic viewpoints. Site visits were also used to consider the potential effects on landscape character and visual impacts arising as a result of the Project.

11.2.3 Identifying Effects

Assessing the significance of an effect is a key component of the LVIA and is an evidence-based process combining professional judgment on the nature of a landscape or visual receptor's sensitivity, its susceptibility or ability to accommodate change and the value attached to the receptor. It is important to note that judgments in this LVIA are impartial and based on professional experience and opinion informed by best practice guidance.

The effects of a project are considered to be of variable duration and are assessed as being ~~of~~ either short-term, medium-term or long-term duration, and permanent or reversible. Effects are considered to be long-term during the operational phase of the development, whilst operations and infrastructure works apparent during the construction and initial operating period are considered to be temporary, short-term effects.

The reversibility of an effect is also variable. The effects on the landscape and visual resource that occurs during the construction period such as the use of construction machinery are considered to be reversible.

Where effects arise during the construction period, these are most likely to be as a result of: movement of construction machinery within the landscape; construction of new structures and construction activities within the site boundary all of which are considered to be short term in duration.

To avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

11.2.4 Assessment Criteria

The objective of the assessment process is to identify and evaluate the predicted significant effects arising from a project. Significance is a function of the:

- Sensitivity of the affected landscape or visual receptors, determined through consideration of the susceptibility of the receptor to the type of change arising from the specific proposals and the value attached to the receptor; and
- Secondly its scale or magnitude, derived from a consideration of the size/ scale, geographical extent, duration, and reversibility of the Project.

These definitions recognise that landscapes vary in their capacity to accommodate different forms of development according to the nature of the receiving landscape and the type of change being proposed.

As with any new development, it is acknowledged that, the introduction of a project into the existing landscape or visual context could cause either a deterioration, improvement or neutral impact on the existing landscape or visual resource.

11.2.5 Landscape Impact Assessment

The LVIA firstly assesses how a project would impact directly on any landscape features and resources. This category of effect relates to specific landscape elements and features (e.g. woods, trees, walls, hedgerows, watercourses) that are components of the landscape that may be physically affected by the Project, such as the removal or addition of trees and alteration to ground cover.

The LVIA then considers impacts on landscape character at two levels. Firstly, consideration is given to how the landscape/ landscape character is affected by the removal or alteration of existing features and the introduction of new features. This is considered to be a direct impact on landscape character.

Secondly, the indirect impacts of a project on the wider landscape are considered. The assessment of impacts on the wider landscape is discussed using the surrounding character areas identified in the relevant landscape/ landscape character assessments. It is acknowledged there is an overlap between perception of change to landscape character and visual amenity, but it should be remembered that landscape character in its own right is generally derived from the combination and pattern of landscape elements within the view.

The significance of effects on landscape features and character is determined by considering both the sensitivity of the feature or landscape character and the magnitude of impact.

Consideration of the sensitivity of the landscape resource against the magnitude of impact caused by the Project is fundamental to landscape and visual assessment and these two criteria are defined in more detail below.

11.2.6 Landscape Sensitivity

The determination of the sensitivity of the landscape receptor is based upon an evaluation of the elements or characteristics of the landscape likely to be affected. The evaluation reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted.

GLVIA 3 at paragraph 5.39 states that '*landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgments of their susceptibility to the type of change or development proposed and the value attached to the landscape.*

Susceptibility is defined by GLVIA 3 at paragraph 5.40 as *'the ability of the landscape receptor (whether it be the overall character or quality/ condition of a particular landscape type or area, or an individual element and/ or feature, or a particular aesthetic and perceptual aspect) to accommodate the Project without due* *consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies'*.

The value of a landscape receptor is determined with reference to the presence of relevant landscape designations, such as Areas of Outstanding Natural Beauty (AONB) and their level of importance. For the purpose of this assessment, landscape value is categorised as:

- Very High: Areas of landscape acknowledged through designation such as Areas of Outstanding Natural Beauty (AONB) or other landscape based sensitive areas. These are of landscape significance within the wider region or nationally;
- High: Areas that have a very strong positive character with valued and consistent distinctive features that gives the landscape unity, richness and harmony. These are of landscape significance within the district;
- Medium: Areas that exhibit positive character, but which may have evidence of alteration/degradation or erosion of features resulting in a less distinctive landscape. These may be of some local landscape significance with some positive recognisable structure; and
- Low: Areas that are generally negative in character, degraded and in poor condition. No distinctive positive characteristics and with little or no structure. Scope for positive enhancement.

As previously discussed, landscape sensitivity is influenced by a number of factors including susceptibility to change, value and condition. In order to assist with bringing these factors together judgements regarding susceptibility and value have been used which define the landscape resource as being either, negligible, low, medium, high or very high. Table 11.1 defines the criteria that have guided the judgement as to the overall sensitivity of the landscape resource.

Assessments of susceptibility and value of a particular landscape resource may be different and professional judgement will always be used to conclude on the judgement of sensitivity. For example, value may be high and susceptibility may be low, and a professional judgement will be made to determine whether sensitivity is high, low or in between, supported by a narrative explanation.

Table 11.1: Landscape Sensitivity

Definition		Sensitivity
Landscape resource susceptibility	**Landscape resource value**	
Exceptional landscape quality, no or limited potential for substitution. Key elements / features well known to the wider public. Little or no tolerance to change	Nationally / internationally designated/ valued landscape, or key elements or features of national/ internationally designated landscapes. Little or no tolerance to change.	Very High
Strong/ distinctive landscape character; absence of landscape detractors. Low tolerance to change.	Regionally/ nationally designated/ valued countryside and landscape features. Low tolerance to change.	High
Some distinctive landscape characteristics; few landscape detractors. Medium tolerance to change.	Locally' regionally designated/ valued countryside and landscape features. Medium tolerance to change.	Medium
Absence of distinctive landscape characteristics; presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Low
Absence of positive landscape characteristics. Significant presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Negligible

11.2.7 Magnitude of Landscape Effect

The effect on Landscape receptors and the overall judgement of the magnitude of Landscape effect is based on combining judgements on '*size or scale, the geographic extent of the area influenced, and its duration and reversibility'* (GLVIA3, paragraph 5.48).

Direct resource changes on the Landscape character in the study area are brought about by the introduction of the Project and its impact on the key landscape characteristics. Judgements regarding the magnitude of Landscape/ landscape impact are indicated in Table 11.2 below.

Table 11.2: Magnitude of Landscape Impact

Definition	Magnitude of Impact
Total loss or addition or/ very substantial loss or addition of key elements / features / patterns of the baseline, i.e., pre-development Landscape and/ or introduction of dominant, uncharacteristic elements with the attributes of the receiving Landscape	Large
Partial loss or addition of or moderate alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic with the attributes of the receiving Landscape.	Medium
Minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and or introduction of elements that may not be uncharacteristic with the surrounding Landscape.	Small
Very minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and/or introduction of elements that are not uncharacteristic with the surrounding Landscape approximating to a 'no-change' situation.	Negligible
No loss, alteration or addition to the receiving Landscape resource	No change

11.2.8 Visual Impact Assessment

As outlined in GLVIA 3 (Paragraph 6.1) '*an assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity'.* The assessment of effects on views is an assessment of how the introduction of a project will affect views within the study area. The assessment of visual effects therefore needs to consider:

- Direct impacts of a project upon views of the landscape through intrusion or obstruction;
- The reaction of viewers who may be affected, e. g. residents, walkers, road users; and
- The overall impact on visual amenity.

11.2.9 Sensitivity of Visual Receptors

For visual receptors, judgements of susceptibility and value are closely interlinked. For example, the most valued views are likely to be those which people go and visit because of the available view. The value attributed to visual receptors also relates to the value of the view – for example a National Trail is nationally valued for its access, not necessarily for its views.

Paragraph 6.32 of the GLVIA refers to the susceptibility of different visual receptors to changes in views and states that susceptibility is mainly a function of "*the occupation or activity of different people experiencing the view at particular locations*" and "*the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*."

Other factors affecting visual sensitivity include:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor; and
- The importance of the view.

Judgements on the overall visual sensitivity/susceptibility are provided in Table 11.3 below and overall sensitivity of the visual resource is based on combining judgements on the sensitivity of the human receptor (for example resident, commuter, tourist, walker, recreationist or worker, and the numbers of viewers affected) and judgements on the visual resource value (for example views experienced from residential properties, workplace, leisure venue, local beauty spot, scenic viewpoint, commuter route, tourist route or walkers' route).

Table 11.3: Visual Resource Sensitivity

Definition		Sensitivity
Visual resource Susceptibility	**Visual resource value**	
Views of remarkable scenic quality, of and within internationally designated Landscapes or key features or elements of nationally designated landscapes that are well known to the wider public. Little or no tolerance to change.	Observers, drawn to a particular view, including those who have travelled to experience the views. Little or no tolerance to change	Very High
Views from residential property. Public rights of way, National Trails, Long distance walking routes and nationally designated countryside/ landscape features with public access. Low tolerance to change.	Observers enjoying the countryside from their homes or pursuing quiet outdoor recreation are more sensitive to visual change. Little tolerance to change	High
Views from local roads and routes crossing designated countryside / landscape features and 'access land' as well as promoted paths. Medium Tolerance to change.	Observers enjoying the countryside from vehicles on quiet/ promoted routes are moderately sensitive to visual change. Medium tolerance to change	Medium
Views from workplaces, main roads and undesignated countryside / landscape features. High tolerance to change.	Observers in vehicles or people involved in frequent or infrequent repeated activities are less sensitive to visual change. High tolerance to change	Low
Views from within and of undesignated landscapes with significant presence of landscape detractors. High tolerance to change.	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change. High tolerance to change	Negligible

11.2.10 Photomontages/Visualisations

Images representing views available from the public realm at each of the selected viewpoints have been captured using a digital SLR camera with a full frame sensor in combination with a 50mm fixed focal length lens, mounted on a tripod for horizontal alignment.

Generally, the horizontal angle of view represented within photomontages accompanying this LVIA is 56.5 degrees and has been taken with a 50mm fixed focus lens. For each of the viewpoints represented a record is taken of the light, visibility conditions, camera height above ground, time of day, viewpoint coordinates and the bearing of each view towards the Project site.

A highly accurate 3D computer model of the Project is created directly from architectural drawings. All materials and finishes are modelled as realistically as possible. Rendering is the process by which the computer generates realistic images from the 3D model. All of the information recorded at the time the site photos were taken, that is, camera co-ordinates, angle of view, and direction of view, is used to generate matching renders for each view. Careful consideration is given to the direction of sunlight, time of day, weather conditions and distance of viewer, so that photomontages will match reality in terms of lighting, sharpness, density of colour etc.

At this stage the rendered image of the Project is superimposed onto its matching photograph. The mathematical accuracy is then double checked and verified by ensuring that existing prominent features which are also modelled line up exactly in the photo. Next, the photomontage specialist establishes, which existing features, such as buildings and trees are in the foreground of the Project and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its outline is indicated with a red line.

The resulting photomontage, having gone through this extensive procedure, is an accurate and verifiable representation of the Project as viewed from the viewpoint positions (see EIAR Vol. III Appendix 11.3 Photomontages).

11.2.11 Magnitude of Visual Effects

The magnitude of impact on the visual resource results from the scale of change in the view, with respect to the loss or addition of features in the view, and changes in the view composition. Important factors to be considered include: proportion of the view occupied by the Project, distance and duration of the view. Other vertical features in the landscape and the backdrop to the Project will all influence resource change. Judgements regarding the magnitude of visual impact are provided in Table 11.4 below.

Table 11.4: Magnitude of Visual Impact

Definition	Magnitude
Complete or very substantial change in view dominant involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements	Large
Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the view would alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant	Medium
Minor change in baseline, i.e. pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.	Small
Very slight change in baseline, i.e. pre-development view - change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.	Negligible
No alteration to the existing view	No change

11.2.12 Significance of Effects

The purpose of this LVIA is to determine, in a transparent way, the likely significant landscape and visual effects of the Project. It is accepted that, due to the nature and scale of development, the Project could potentially give rise to some notable landscape and visual effects.

GLVIA3 identifies that '*……… a final judgment is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed 'significant' but LVIAs should always distinguish clearly between what are considered to be significant and non-significant effects'*.

Significance can only be defined in relation to each particular development and its specific location. The relationship between receptors and effects is not typically a linear one. It is for each LVIA to determine how judgements about receptors and effects should be combined to derive significance and to explain how this conclusion has been arrived at.

The identification of significant effects would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects on the landscape and visibility are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision.

The significance of effects on landscape, views and visual amenity have been judged according to a six-point scale: Substantial, Major, Moderate, Minor, Negligible or None as presented in Table 11.5 below, which contains a description of the significance of effect criteria.

Table 11.5: Significance of Effect Criteria

Significance of Effect	Landscape Resource	Visual Resource
None	Where the project would not alter the Landscape character of the area.	Where the project would retain existing views.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.
Major	Where proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) Landscape.	Where proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a Landscape of exceptional Landscape quality (e.g., internationally designated Landscapes), or key elements known to the wider public of nationally designated landscapes (where there is no or limited potential for substitution nationally).	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.

For the purposes of this assessment those effects indicated, in Table 11.6 below, as being Substantial or Major to Substantial are regarded as being significant. Effects of 'Minor to Moderate' and lesser significance have been identified within the assessment, though are not considered significant. For those effects indicated as being of 'Moderate' or 'Moderate to Major' the assessor has exercise professional judgement in determining if the effect is considered to be significant, taking account of site specific or location specific variables which are given different weighting in each instance according to location.

Table 11.6: Significance of effects matrix

Magnitude of Impact	Sensitivity				
	Negligible	Low	Medium	High	Very High
No Change	No Change	No Change	No Change	No Change	No Change
Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor	Minor
Small	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate	Moderate to Major
Medium	Negligible to Minor	Minor	Moderate	Moderate to Major	Major to Substantial
Large	Minor	Minor to Moderate	Moderate to Major	Major to Substantial	Substantial

A conclusion that an effect is 'significant' should not be taken to imply that the Project is unacceptable. Significance of effect needs to be considered with regard to the scale over which it is experienced and whether it is beneficial or adverse.

11.2.13 Cumulative Effects

The methodology for assessment of cumulative impacts has been derived from Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

The purpose of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to consider the landscape and visual impacts of the Project when viewed in context with other similar development.

Cumulative effects consist of direct effects on the physical character of the site containing the development, and indirect, perceived effects on the character of areas from which the developments would be visible. GLVIA3 identifies effects as follows:

- Cumulative effects as *'the additional changes caused by a project in conjunction with other similar developments or as the combined effect of a set of developments, taken together*' (SNH, 2012:4);
- Cumulative landscape effects as effects that *'can impact on either the physical fabric or character of the landscape, or any special value attached to it'* (SNH, 2012:10);
- Cumulative visual effects as effects that can be caused by combined visibility, which *'occurs when the observer is able to see two or more developments from one viewpoint'* and/or sequential effects which *'occur when the observer has to move to another viewpoint to see different developments'* (SNH, 2012:11).

The significance of any identified cumulative landscape and visual effect has been assessed as per the main LVIA methodology. These categories have been based on the same combination of receptor sensitivity and predicted magnitude of impact in order to identify the residual significance of effects.

11.3 Receiving Environment

11.3.1 General Overview

The Project subject lands are in excess of 37ha (38.64 ha) and are located on the western side of the M7 motorway, positioned between Junctions 9a and 10. The site is bound to the north by the R409 road which provides a direct link to the centre of Naas, c.2.5km to the east.

The lands are located between the existing 'M7 Business Park' and 'Osberstown Business Park'. The Osberstown Wastewater Treatment Plant is located nearby to the north. The site is bounded to the east by the M7 motorway and to the west by agricultural lands. The 'Newhall Retail Park' is located to the south of the site, on the east side of the M7 motorway.

The surrounding site character is defined by significant development in the locality in recent years, particularly light industry, logistics and services. The Osberstown Wastewater Treatment Plant is located c. 600m to the north.

The site is currently in agricultural use and comprises a number of fields which are bounded by hedgerows. There is a cluster of farm buildings located within the site, accessed from the R409. There are a number of agricultural entrances to the lands from the R409. The site is flat but falls at an even grade slightly from north to south. The site is bounded by semi-mature hedgerows and tree lines on the north, west and east, and a combined hedgerow and creek to the south.

Two overhead power lines currently cross the site (110kV and 220kV). The 110kV line crosses the north-western corner of the site and the 220kV crosses the eastern part of the site.

1 no. dwelling is located within the site, fronting the R409. As part of the Project the agricultural buildings and the dwelling will be demolished.

11.3.2 Kildare Landscape Character Assessment

Kildare County Council have completed a Kildare Landscape Character Assessment (KLCA) that forms part of the Kildare County Development Plan 2023-2029. The objective of the study was to complete a thorough assessment of the character of Kildare's landscapes in order to provide the basis for policy formulation and informed decision-making regarding landscape management in the County.

The assessment provides an overview of the Kildare County landscape and subdivides the countryside into 16 Landscape Character Areas (LCAs) based upon information on people and place and the combinations of nature, culture and perception which make up each part of the County.

A review of the KLCA indicates that the Project lies within the Northern Lowlands – Naas & Environs LCA.

11.3.2.1 Northern Lowlands – Naas & Environs

This extensive lowland area to the north-east of the County is bisected by the River Liffey valley. The Royal Canal runs along its northern boundary and the Grand Canal corridor follows a northeast to southwest alignment. This area is characterised by generally flat terrain and open lands with regular (medium sized) field patterns. Hedgerows are generally well maintained and low, with scattered trees along the field boundaries that partially screen the lowest lying areas. Nevertheless, the generally low-lying vegetation of the area allows long-distance and extensive visibility. Distant views include the skylines of the Eastern Uplands, the Newtown Hills to the west, and the Chair of Kildare hilltops to the south-west. Soils in the area are dominated by complexes (generally mineral soils) with pockets of Grey Brown Podzolics and Gleys. The area is suitable to moderately suitable for tillage, pasture, and meadow and suitable for forestry.

Critical Landscape Factors

Smooth Terrain - Smooth terrain and the generally flat topography and landform that characterise this landscape character unit, allow vistas over long distances without disruption. As a result, development can have a disproportionate visual impact, due to an inherent inability to be visually absorbed.

Undulating topography - Gently undulating topography is presented at certain areas of this character unit, providing the potential for local visual enclosure thereby absorbing development where it does not break the skyline (i.e. it renders visually unobtrusive of the overall landscape scale). St. Patrick's Hill, Ardrass, Celbridge represents an important topographical feature within the Northern Lowlands area.

Low Vegetation - The grassland, tillage fields and generally low hedgerows of this area provide similar characteristics to smooth terrain in landscape terms, and the two are often interrelated due to soil attributes. Grassland vegetation and agricultural crops are usually uniform in appearance, failing to break up vistas, and allowing long distance visibility. Existing low hedgerows partially screen the lowest land parcels, nevertheless the common low vegetation proves unable to visually absorb new development.

Shelter Vegetation - Shelter vegetation is represented at some stretches of this unit by coniferous plantations, deciduous woodlands and the presence of trees that grow on field hedgerows. In a similar manner to undulating topography, shelter vegetation has a shielding and absorbing quality in landscape terms. It can provide a natural visual barrier and also adds to the complexity of a vista, breaking it up to provide scale and containment for built forms.

Localised River and Canal Views - River valleys and canal corridors are generally visually enclosed and highly localised areas of very distinctive character with a high degree of visual consistency.

This character unit includes sections of the River Liffey and the Grand and Royal Canals. Due to the low-lying nature of this area, many views of the river valley and the canal corridors are available from the local roads and from the viewing points located on bridges.

Overall, taking into account the susceptibility and value attached to the LCA, the sensitivity of this LCA is judged to be low. The LCA is considered to have the scope and capacity for positive enhancement.

11.3.3 Areas of Sensitivity

In addition to completing an LCA, The Kildare County Development Plan has also designated Landscape Sensitivity Areas for each LCA. This is in order to determine the likely perceived impact of a particular development on the landscape.

As mentioned above, the Project site is located in the Northern Lowlands which has been classed as an area of Low Sensitivity. In addition to this, the Kildare County Development Plan has provided guidance on the likely compatibility between a range of land-use classes and the principal landscape areas of the county classified by sensitivity. As the Project is for a Data Centre which is classed as an 'Industrial Project', the development is seen to have a high compatibility with the Northern Lowlands LCA.

Therefore, taking into account the susceptibility and value attached to the LCA, the sensitivity of this LCA is judged to be low. The LCA is considered to have the scope and capacity for positive enhancement.

11.4 Landscape Designations

This section reviews Landscape designations in Kildare. The relevant Plan is Kildare County Development Plan 2023-2029.

11.4.1 Kildare County Development Plan 2023 - 2029

A review has taken place of the Kildare County Development Plan and all zonings and designations that are relevant to this LVIA have been outlined below.

11.4.2 Areas of High Amenity

The County Development Plan has identified several areas that are defined as areas of high amenity as they are seen as special landscape areas. These are:

- Dun Ailinne - Dún Ailinne is located on top of Knockaulin Hill, a short distance from the town of Kilcullen. Excavations and other investigations of Dun Ailinne (the Beautiful Fort) have established that it was the scene of major and regular gatherings going right back to Neolithic times.
- The Curragh and Enviorns - The Curragh, located between Newbridge and Kildare Town, is the largest area of unenclosed natural grassland in the country. It is home to a significant number of archaeological sites and provides a hugely valuable amenity area for the surrounding towns of Kildare, Newbridge, and Kilcullen.
- The River Liffey and the River Barrow Valleys - These are of significance in terms of landscape and amenity value and as such are sensitive to development. They are characterised by smooth terrain and low vegetation, with extensive upland views (i.e. the Chair of Kildare to the west and the Eastern Uplands to the east) and distant views including the neighbouring Wicklow Mountains.
- The Grand Canal and the Royal Canal Corridors - These are extensive water corridors that flow through the county. The canal corridors and their adjacent lands have been landscaped and enhanced along the sections where the canals flow through urban areas and with the development of Greenways and Blueways.
- Poulaphouca Reservoir - The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greylag Goose and Lesser Blackbacked Gull. Located in the western foothills of the Wicklow Mountains, was created in 1944 by damming of the River Liffey for the purpose of generating electricity from hydropower.
- East Kildare Uplands - The elevated nature of this area provides a defined skyline with scenic views over the central plains of Kildare and the neighbouring Wicklow Mountains which further define the skyline and the extent of visibility. The East Kildare Uplands are rural in character with a number of scenic views from elevated vantage points.

Development in these areas will only be permitted where the integrity and natural beauty of the landscape is not threatened. The Project will have no impact on these areas due to the separation distances between the site and these areas.

11.4.3 Special Areas of Conservation

In addition to the Areas of Primary Amenity above, the County Development Plan also identifies several Special Areas of Conservation (SAC) that require protection from inappropriate and insensitive development. These are:

- Pollardstown Fen - This is the largest remaining calcareous spring-fed fen in Ireland, a national nature reserve, Special Area of Conservation, and a Ramsar site of approximately 220 ha. It is recognised as an internationally important fen ecosystem with unique and endangered plant communities.
- Rye Water Valley at Carton SAC - This is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey. The river was arterially drained in the early 1950s but remains the only significant salmon spawning and nursery stream discharging into the River Liffey downstream of Leixlip dam. The Rye Water Valley/Carton SAC is designated for the protection of two molluscs listed on Annex II of the EU Habitats Directive.
- Ballynafagh Lake SAC - This SAC was selected for Alkaline Fens, Desmoulin's Whorl Snail (Vertigo moulinsiana) and Marsh Fritillary (Euphydryas aurinia). Ballynafagh Lake is a shallow alkaline lake with patches of emergent vegetation in the middle, as well as around the shore. Ballynafagh Lake has developed a very natural vegetation with some interesting plant communities, including alkaline fen, a habitat that is listed on Annex I of the E.U. Habitats Directive.
- Mouds Bog SAC - Mouds Bog is significant in terms of its high bog area and geographical location as it is at the eastern extreme of the range of raised bogs in Ireland. It is a site of considerable conservation significance comprising a large, raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland.
- Ballynafagh Bog SAC - The SAC supports the following habitats listed in Annex I of the E.U. Habitats Directive: Raised Bog (Active), Degraded Raised Bog and Rhynchosporion Vegetation. Of particular note is that the bog is one of the most easterly examples of a relatively intact raised bog in Ireland and, together with Mouds bog, is one of only two such systems in Co. Kildare.
- Red Bog SAC - Red Bog is of ornithological significance and breeding birds recorded from the site include Mute Swan, Mallard, Tufted Duck, Coot, Moorhen, Snipe and Black-headed Gull.

It is a policy of the council to protect these areas from inappropriate development and reinforce their character, distinctiveness, and sense of place. However, the Project will have no impact on these areas due to the separation distances between the site and these areas.

11.4.4 Architectural Conservation Areas

There are eleven Architectural Conservation Areas (ACA) that are identified in the Kildare County Development Plan. While The Project site is not located within an ACA, the site is approximately 2.3km west from the Naas ACA. The County Development Plan notes that "*any development, modifications, alterations, or extensions within an ACA are sited and designed appropriately and are not detrimental to the character of the structure or to its setting or the general character of the ACA and are in keeping with any Architectural Conservation Area Statement of Character Guidance Documents prepared for the relevant ACA.*" In addition to this, a recorded monument is located within the south-eastern area of the site: recorded monument Ref. no. KD019-028, classified as a 'Fulacht Fiadh'. There is no obvious visible trace of the monument but remains may still exist underground. There is a 20m radius no dig zone proposed for this part of the site. The Project will not have an adverse impact on the Naas ACA or the recorded monument, but the development design should be sensitive to the area. Further details are provided in Chapter 10 of the EIAR.

11.4.5 Scenic Routes/Views

A number of important scenic routes and views have been identified by the County Development Plan as requiring protection as listed in Chapter 13: Landscape Recreation Amenity of the County Development Plan and illustrated on Map V1-13.3. Any development that would interfere with or adversely impact on these scenic routes and views will not be permitted. There are three protected views in close proximity to the Project site.

These are View of the River Liffey – RL07 from Caragh Bridge (approx. 1.15km northwest of the site), and Views to and from bridges on the Grand Canal GC32 – Ploopluck Bridge (approx. 1.35km east of the site) and GC33 – Limerick Bridge (approx. 1km southeast of the site).

11.5 Characteristics of The Project

The Project is described in detail in Chapter 4 Project Description. Matters are of particular relevance to landscape and visual impact are outlined within this section.

Existing external boundary trees and hedgerows will be retained, protected, and augmented with additional native tree and hedge planting where necessary. Around the eastern boundary of the site to the M7, there will be a 30m wide landscape buffer provided. On other boundaries a minimum 10m buffer will be provided, which will allow for earth mounding and native, screen woodland planting to be provided to help integrate the development into the landscape, mitigate visual effects and increase site biodiversity. The principal elements of the landscape design approach will include the following measures:

- Provision of temporary fencing during construction in accordance with BS5837: 2012 for the protection of all trees, hedgerows and vegetation to the perimeter of the site;
- Retention and utilisation of subsoil and topsoil for the creation of landscape mounding, up to 6.5m high, to the site boundary with the M7 and for reinstatement of disturbed landscape areas;
- Provision of security fencing with native hedge planting to boundaries;
- Provision of mixed, native woodland planting, including evergreen and deciduous tree species, planted to the perimeter landscape buffer and mounding;
- Internal landscape areas will include SuDS features include detention/attenuation basins, swales, biofiltration planters and permeable paving integrated with suitable landscape planting and seeding including native grassland meadows; and,
- Planting and grassland management will follow the All-Ireland Pollinator Plan and Guidance documents, helping to increase site biodiversity, with a maintenance programme for the woodland screen planting to ensure establishment.

11.6 Landscape Effects

The assessment of Landscape effects follows the methodology previously described in Section 11.2 and considers those effects which are predicted to occur during the construction and operational phases of the Project.

The construction phase of the Project will result in additional built elements being introduced into the landscape. The operational phase of the Project will result in vertical elements (buildings) being visible within the surrounding landscape.

In order to avoid repetition, an assessment of construction phase impacts and predicted operational phase impacts is included within the following landscape assessments.

11.6.1 Landscape Character Effects

The Project is located within the Kildare County Council area, and the predicted landscape effect of the Project is set out in Table 11.7 below.

Table 11.7: Landscape Character Effects

Northern Lowlands – Naas & Environs	
Sensitivity	This LCA is characterised by generally flat terrain and open lands with regular (medium sized) field patterns. Hedgerows are generally well maintained and low, with scattered trees along the field boundaries that partially screen the lowest lying areas. The LCA is considered to have the scope and capacity for positive enhancement, and to have a high tolerance to change. Susceptibility of this LCA to the type of development proposed is judged to be low as industrial development is seen to have a high compatibility with the Northern Lowlands LCA. The value of the LCA is judged to be low. Overall, taking into account the susceptibility and value attached to the LCA, the sensitivity of this LCA is judged to be low.
Magnitude of Change	The Project is located directly within this LCA and predicted effects are considered to be direct. The proposal has also been designed to respect the scale of built form in this landscape albeit with newer elements to reflect and respect surrounding built form. The predicted magnitude of impact during the construction phase is considered to be medium, temporary and direct, limited to the immediate site boundaries and those limited portions of the LCA with unobstructed views towards the Project site. This is robust landscape with frequent built elements, movement and constantly changing through developments and construction activities will blend within this context. The predicted magnitude of impact during the operational phase is considered to be direct and medium, limited to the immediate boundaries and those portions of the LCA with unobstructed views towards the Project site. This is a robust landscape with frequent built elements, movement and constantly changing through developments and the operation development will be consistent with this landscape context. The wider landscape resource has the ability to absorb a development of this scale and it is considered that the magnitude of landscape impact during the construction and operational phases is negligible for remaining portions of the LCA.
Significance of Effect	There are predicted to be minor, adverse direct effects upon the development site itself during the construction phase, which are considered to be temporary in duration. There are predicted to be minor, adverse, direct effects upon the LCA during the operational phase. Remaining portions of the LCA are predicted to experience localised, negligible to minor indirect effects during the operational phase.

11.6.2 Landscape Designation Impacts

With regards to Areas of High Amenity identified in the CDP the Project is not located in proximity to this designation. No significant effects are predicted on the Areas of High Amenity designation due to separation distance.

In addition to the Areas of High Amenity the CDP also identifies Areas of Sensitivity. As mentioned above, the Project site is located in the Northern Lowlands which has been classed as an area of Low Sensitivity. In addition to this, the Kildare County Development Plan has provided guidance on the likely compatibility between a range of land-use classes and the principal landscape areas of the county classified by sensitivity. As the Project is for a Data Centre which is classed as an 'Industrial Project', the development is seen to have a high compatibility with the Northern Lowlands LCA that consists of a robust landscape with frequent built elements, movement and constantly changing through developments. The proposal has been designed to respect the scale of built form in its immediate surroundings in this landscape albeit with newer elements. Additionally, the Project use at this site accords with the local land use zoning objective set out in the Naas Local Area Plan 2021 - 2027 which has explicitly identified this location as being appropriate for a data centre. The predicted significance of effect is minor adverse.

The Project is not located within an ACA; however, the site is located 2.3km west of the Naas ACA. Due to separation distance and intervening built for and vegetation no effects are predicted on the ACA.

There are three views within 2km of the Project site, however, due to intervening topography and built form it is not possible to view the Project from these viewpoint locations.

A summary of the predicted landscape and visual effect on landscape designations is provided in the summary Table 11.8.

Table 11.8: Summary of Predicted Landscape Effects

Landscape Character / Designation	Predicted Landscape & Visual Effects (Construction Stage)	Predicted Landscape & Visual Effects (Operational Stage)
Areas of Primary Amenity	Minor	Minor
Areas of Secondary Amenity	None	None
Architectural Conservation Areas	None	None
Scenic Routes/Views	None	None
Northern Lowlands LCA	Minor	Minor

11.7 Visual Effects

A series of 15 representative viewpoints have been selected to illustrate the existing visual context of the Project and as an aid to the visual impact assessment. All the viewpoints have been located on publicly accessible roads, footways, and verges (Please refer to EIAR Volume III Appendix 11.3; VP 1 - 15).

Viewpoints selected as part of the visual effects assessment were selected to meet the following criteria;

- A balance of viewpoints from where the main direction of view is towards the Project;
- A range of views towards the Project from within the study area. Selected viewpoints are all located within the study area associated with the Project; and
- Locations of interest e.g. local access roads and settlement.

Views available from each of the selected viewpoint locations are presented in to EIAR Volume III Appendix 11.3 which should be read in conjunction with the following viewpoint assessments below. The selected viewpoints reflect consultation feedback from Kildare County Council. Potential viewpoints further to the south at the junction of M7/R445 was assessed on site but due to extensive screening from built form and vegetation there are no potential views to the Project and this area was scoped out.

The assessment of the existing environment and the impact of the Project on visual receptors has established that there will be no protected views or scenic views significantly affected by the Project.

Further, there will be no important views from visitor amenity areas or tourist sites significantly affected by the Project due intervening topography, vegetation, and distance of potential views.

11.7.1 Viewpoint 1: View northwest from Osberstown Road (L2006)

11.7.1.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.1.2 Existing View

The viewpoint is located on the Osberstown Road, looking southeast towards the development site. The viewpoint shows the hedgerow along the Osberstown Road in the foreground with mature trees and hedgerow in the background, along the boundary of the open field which dominates the view. There are overhead cables and electricity pylons in the field which are also noticeable in the background of the view. The landscape is flat agricultural land.

11.7.1.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and electricity pylons, forming the main visual draw.

Elements of the Project will be partially visible in the distance from this viewpoint. However, existing mature vegetation and proposed planting will provide good screening, and this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape. Any visible portions of the Project are considered to form a minor addition to the overall view, with other elements of the view such as the electricity pylons and surrounding vegetation remaining as the main visual draw.

The Project will operate as a Dark Site with minimal and controlled lighting at the entrance / parking areas, together with low level lighting around the site only used for emergency; in this context no significant lighting effects are predicted from this viewpoint.

11.7.1.4 Magnitude of Impact:

The magnitude of visual impact during the construction phase of the Project is considered to be localised and medium.

The magnitude of visual impact during the operational phases of the Project is considered to be medium.

11.7.1.5 Significance of Effect:

Moderate, localised temporary effect during the construction phase of the Project.

Moderate, localised effect during the operational phase of the Project.

11.7.2 Viewpoint 2: View northwest from R409

11.7.2.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.2.2 Existing View

The viewpoint is located on the R409 which travels along the northern boundary of the site. The foreground of this viewpoint is dominated by grass verges, mature hedgerow, and signage along the road. Mature trees and vegetation can be seen in the background as well as an opening to field to the left of this viewpoint. The landscape is flat agricultural land.

11.7.2.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and signage, forming the main visual draw.

Elements of the Project will be partially visible in the central point from this viewpoint. However, existing mature vegetation will provide screening to the majority of the development and proposed planting will screen any visible elements of the development. This will allow the Project to integrate into the environment. Any visible portions of the Project are considered to form a medium addition to the overall view, with roadside vegetation and planting (existing and proposed) remaining as the main visual draw.

The Project will operate as a Dark Site with minimal and controlled lighting at the entrance / parking areas, together with low level lighting around the site only used for emergency; in this context no significant lighting effects are predicted from this viewpoint.

11.7.2.4 Magnitude of Impact:

The magnitude of visual impact during the construction phase of the Project is considered to be localised and medium.

The magnitude of visual impact during the operational phases of the Project is considered to be medium.

11.7.2.5 Significance of Effect:

Moderate, localised temporary effect during the construction phase of the Project.

Moderate, localised effect during the operational phase of the Project.

11.7.3 Viewpoint 3: View west from Newhall Road

11.7.3.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.3.2 Existing View

The viewpoint is located on the Newhall Road looking east towards the Project site. Mature hedgerow and fencing can be seen along the roadside, with overhead cables to the left and right of the viewpoint and electricity poles and an electricity pylon also visible. Mature trees and vegetation dominate the middle and background of the view. The landscape is mostly flat, agricultural land which rises to the left of the view.

11.7.3.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and electricity pylons, forming the main visual draw.

The Project will be located within this view but slightly difficult to discern. The existing mature vegetation provides partial screening, and this will allow the Project to integrate into the environment without making major changes to the landscape. Any visible portions of the Project are considered to form a minor addition to the overall view, with other elements of the view such as the electricity pylons and surrounding vegetation remaining as the main visual draw.

The Project will operate as a Dark Site with minimal and controlled lighting at the entrance / parking areas, together with low level lighting around the site only used for emergency; in this context no significant lighting effects are predicted from this viewpoint.

11.7.3.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the operational phase of the Project is considered to be negligible.

11.7.3.5 Significance of Effect:

Negligible to minor, temporary effect during the construction phase of the Project.

Negligible to minor, during the operational phase of the Project.

11.7.4 Viewpoint 4: View west from L2030 / Newhall Road Junction

11.7.4.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.4.2 Existing View

The viewpoint is located at the junction between the local L2030 Road and the Newhall Road, looking east towards the site. The view is dominated by large, flat agricultural land with mature trees and vegetation visible in the background of the landscape which indicate the boundary of the field. The right of the viewpoint shows the L2030 Road which has streetlights and mature vegetation located along the side of the road. Overhead cables, and electricity poles and pylons are also visible from this viewpoint.

11.7.4.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be fully screened from this viewpoint by existing mature vegetation. Construction traffic may be visible on the local road network. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and electricity pylons, forming the main visual draw.

The Project will not be visible at any distance from this viewpoint due to the presence of existing mature vegetation provides total screening.

11.7.4.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

There is expected to be no change in relation to the magnitude of visual impact during the operational phase.

11.7.4.5 Significance of Effect

Negligible, temporary effect during the construction phase of the Project.

No change during the operational phase of the Project.

11.7.5 Viewpoint 5: View southwest from L2030

11.7.5.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and occasional pedestrian. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.5.2 Existing View

This viewpoint is located on a bend along the L2030 Road, looking towards the southern boundary of the Project site. The viewpoint is dominated by mature hedgerow which runs along the L2030 Road and a tree can also be seen in the background. The view is enclosed, and the distant horizon view is obscured.

11.7.5.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be well screened from this viewpoint by existing mature vegetation but partial views of the buildings under construction will be available above hedgerows. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing, dense tree line, forming the main visual draw.

Elements of the Project will be partially visible from this viewpoint. However, existing mature vegetation will provide screening to the majority of the development and proposed planting will screen any visible elements of the development. The Project will also be visibly read with existing buildings and this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape.

11.7.5.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be small.

The magnitude of visual impact during the operational phase is considered to be medium.

11.7.5.5 Significance of Effect:

Minor, adverse, temporary effect during the construction phase of the Project.

Moderate effect during the operational phase of the Project.

11.7.6 Viewpoint 6: View south from R445 Link Road

11.7.6.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.6.2 Existing View

This viewpoint is located on the R445 Link Road and is dominated by flat, agricultural land in the foreground with mature trees and vegetation along the landscape. An electricity pylon and overhead cables are visible to the right of the view and in the horizon.

11.7.6.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be partly screened from this viewpoint by existing mature vegetation but the upper parts of the buildings under construction will be directly visible. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and the electricity pylon, forming the main visual draw.

Elements of the Project will be partially visible in the central point from this viewpoint but read with existing buildings located within the view. The existing mature vegetation will provide screening to the majority of the development and proposed planting will screen any visible elements of the development. This will allow the Project to integrate into the environment. Any visible portions of the Project are considered to form a minor addition to the context of the overall view, with vegetation and planting (existing and proposed) remaining as the main visual draw.

11.7.6.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be minor and adverse.

The magnitude of visual impact during the operational phase is considered to be minor.

11.7.6.5 Significance of Effect

Minor, adverse, temporary effect during the construction phase of the Project.

Minor, effect during the operational phase of the Project.

11.7.7 Viewpoint 7: View southeast from Gateway on R445 Millennium Park

11.7.7.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.7.2 Existing View

This viewpoint is located on the R445 Millennium Park at an entrance to a field, looking north towards the Project site. The M7 can be seen in the background while the foreground of the view is dominated by flat, agricultural land and an electricity pylon to the left. Mature trees and vegetation are visible along the boundary of the field and overhead cables can be seen into the distance along with more electricity pylons in the horizon.

11.7.7.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be almost completely screened from this viewpoint by existing mature vegetation but there will be a slight glimpse view of the upper portions of buildings under construction. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and the electricity pylon and M7 traffic, forming the main visual draw.

Elements of the Project will be partially visible this viewpoint. However, existing mature vegetation will provide screening to the majority of the development and proposed planting will screen any visible elements of the development. This will allow the Project to integrate seamlessly into the environment without making major changes to the landscape. Any visible portions of the Project are considered to form a very minor addition to the overall view, with vegetation and planting (existing and proposed) remaining as the main visual draw.

11.7.7.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be minor and adverse.

The magnitude of visual impact during the operational phase is considered to be minor and positive.

11.7.7.5 Significance of Effect

Minor, adverse, temporary effect during the construction phase of the Project.

Minor, effect during the operational phase of the Project.

11.7.8 Viewpoint 8: View east from Millennium Park Road

11.7.8.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.8.2 Existing View

This viewpoint is located on the R445 Millennium Park, looking west towards the Project site. The view is dominated by large, mature trees and hedgerow in the foreground which runs along the footpath, adjacent to the Millennium Park Road. The view is enclosed, and the distant horizon view is screened by the hedgerow.

11.7.8.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation with just a slight glimpse view of a very small proportion of the Project. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing, dense tree line forming the main visual draw.

The Project will be visible for just a slight glimpse view of a very small proportion of the Project. The existing mature vegetation provides significant screening, and this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape. Any visible portions of the Project are considered to form a negligible addition to the overall view, with other elements of the view such as the surrounding vegetation remaining as the main visual draw.

11.7.8.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the operational phase of the Project is considered to be negligible.

11.7.8.5 Significance of Effect

Negligible to minor, temporary effect during the construction phase of the Project.

Negligible to minor effect during the operational phase of the Project.

11.7.9 Viewpoint 9: View northeast from R409 Motorway Bridge

11.7.9.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and occasional pedestrian. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.9.2 Existing View

This viewpoint is located on a bridge over the M7 on the R409, looking southwest towards the Project site. The foreground of the view shows the fencing of the bridge with the M7 below while there is mature vegetation running alongside the M7 in the middle ground of the view. An electricity pylon and overhead cables can be seen in the horizon.

11.7.9.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation with only a very limited glimpse view of a building under construction available. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and the M7 motorway and R409, forming the main visual draw.

Elements of the Project will be only partially visible in the central point from this viewpoint. However, existing mature vegetation will provide screening to the majority of the development and proposed planting will screen any visible elements of the development. This will allow the Project to integrate seamlessly into the environment without making major changes to the landscape. Any visible portions of the Data Centre are considered to form a very minor addition to the overall view, with vegetation and the M7 motorway and R409 remaining as the main visual draw.

11.7.9.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the operational phase is considered to be negligible.

11.7.9.5 Significance of Effect

Negligible to minor, adverse, temporary effect during the construction phase of the Project.

Negligible to minor, effect during the operational phase of the Project.

11.7.10 Viewpoint 10: View north from Osberstown Business Park

11.7.10.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.10.2 Existing View

This viewpoint is located within Osberstown Business Park, looking southwest towards the site. Footpaths, grass verges, signage and streetlights are the most prominent features in the view. An area of grass, trees and vegetation is visible in the middle of this viewpoint. Mature trees and vegetation, along with overhead cables and electricity pylons can be seen in the background and in the horizon.

11.7.10.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be directly visible from this viewpoint. Such effects are considered to be short term, temporary effects within the overall view, with distinctive features, such as the existing tree line and the entrance to Osberstown Business Park, forming the main visual draw.

Elements of the Project will be directly visible in this viewpoint. The Project is read in the context of the Oberstown Business and road network and in that context does integrate into the environment. Proposed planting will significantly reduce the visibility of new buildings.

11.7.10.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be medium.

The magnitude of visual impact during the operational phase is considered to be medium.

11.7.10.5 Significance of Effect

Moderate, adverse, temporary effect during the construction phase of the Project.

Moderate, effect during the operational phase of the Project.

11.7.11 Viewpoint 11: View north from Osberstown Business Park Entrance

11.7.11.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.11.2 Existing View

This viewpoint is located at the entrance to Osberstown Business Park, looking southeast towards the Project site. The R409 and the mature trees and vegetation along the road are the dominant features of this view along with the entrance to the business park to the right. Overhead cables and electricity pylons can be seen further long the R409 to the right of the viewpoint, however, the background and horizon is well screened by the existing vegetation along the roadside.

11.7.11.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be partially screened from this viewpoint by existing mature vegetation. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line, R409 and the entrance to Osberstown Business Park, forming the main visual draw.

Elements of the Project will be visible to the left of this viewpoint. While, existing mature vegetation and proposed planting will provide screening to the majority of the development, a large element of the development will be partly visible in the viewpoint. However, the Project will not look out of place in the existing landscape and the existing vegetation and electricity pylons will allow the development to integrate into the landscape.

11.7.11.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be medium and adverse.

The magnitude of visual impact during the operational phase is considered to be medium.

11.7.11.5 Significance of Effect

Moderate, adverse, temporary effect during the construction phase of the Project.

Moderate, effect during the operational phase of the Project.

11.7.12 Viewpoint 12: View southwest from Newhall Rest Area

11.7.12.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.12.2 Existing View

This viewpoint is located at the Newhall rest area, approximately 1km southwest from the Project site. Mature trees and vegetation to the left of this view and in the distance are the dominant features of this viewpoint. A large agricultural field also dominates this viewpoint. Electricity pylons and overhead cables can be seen in the horizon and the horizon is well screened by existing vegetation.

11.7.12.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation with just the construction of the upper parts of some buildings visible. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and electricity pylons, forming the main visual draw.

The Project will visible but distance from this viewpoint. The existing mature vegetation provides good screening and combined with the distance of the viewpoint this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape.

11.7.12.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

11.7.12.5 Significance of Effect

Negligible to minor, temporary effect during the construction phase of the Project.

Negligible to minor during the operational phase of the Project.

11.7.13 Viewpoint 13: View east from Millennium Park Roundabout

11.7.13.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.13.2 Existing View

This viewpoint is located at the Millennium Park Roundabout, looking west towards the Project. the dominant feature of this viewpoint is the mature vegetation in the centre and to the right of the viewpoint as well a number of streetlights. The view is enclosed, and the distant horizon view is screened by the mature vegetation.

11.7.13.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be fully screened from this viewpoint by existing mature vegetation.

The Project will not be visible at any distance from this viewpoint. The existing mature vegetation provides total screening.

11.7.13.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be no change.

There is considered to be no change in relation to the magnitude of visual impact during the operational phase.

11.7.13.5 Significance of Effect

No change, temporary effect during the construction phase of the Project.

No change during the operational phase of the Project.

11.7.14 Viewpoint 14: View northwest from R409 Road

11.7.14.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.14.2 Existing View

This viewpoint is located along the R409, looking southeast towards the Project. the viewpoint is dominated by mature vegetation along the roadside and in the distance. A flat, agricultural plot of land is visible to the right of this viewpoint as well as an electricity pole and overhead cables. The view is enclosed, and the distant horizon view is screened by the mature vegetation.

11.7.14.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be almost completely screened from this viewpoint by existing mature vegetation. Such limited effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing tree line and electricity poles, forming the main visual draw.

The Project will be partially visible but distant from this viewpoint. The existing mature vegetation provides almost total screening, and this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape. Any limited visible portions of the Project are considered to form a very minor addition to the overall view, with other elements of the view such as the electricity poles and surrounding vegetation remaining as the main visual draw.

11.7.14.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the operational phase of the Project is considered to be negligible.

11.7.14.5 Significance of Effect

Negligible to minor, temporary effect during the construction phase of the Project.

Negligible to minor during the operational phase of the Project.

11.7.15 Viewpoint 15: View south from M7 Business Park

11.7.15.1 Viewpoint Description and Sensitivity

This view is predominantly available to vehicle users and pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

11.7.15.2 Existing View

This viewpoint is located within the M7 Business Park, looking north towards the Project site. As this viewpoint is located within the M7 Business Park, the view is dominated by commercial buildings, with mature trees visible in the central point of the view as well. The existing commercial buildings and the existing vegetation make the view enclosed and provide screening from the horizon.

11.7.15.3 Predicted Effects

Temporary construction phase activities associated with the construction of the Project will be largely screened from this viewpoint by existing mature vegetation with only limited visibility of the construction of upper portions of some buildings. Such effects are considered to be temporary effects within the overall view, with distinctive features, such as the existing commercial buildings, forming the main visual draw.

The Project be visible from this viewpoint for a very small portion of the total Project but read in the context of the M7 Business Park. The existing commercial buildings as well as the mature vegetation provides almost complete screening, and this will allow the Project to integrate seamlessly into the environment without making major changes to the landscape.

11.7.15.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the Project is considered to be negligible.

The magnitude of visual impact during the operational phase of the Project is considered to be negligible.

11.7.15.5 Significance of Effect

Negligible to minor, temporary effect during the construction phase of the Project.

Negligible to minor during the operational phase of the Project.

Table below summarises the predicted significance of visual effect for each of the previously assessed viewpoints above.

Table 11.9: Summary of Predicted Visual Effect

Viewpoint		Predicted Visual Impacts (Construction Stage)	Predicted Visual Impacts (Operational Stage)
1	View north from Osberstown Road (L2006)	Moderate adverse	Moderate
2	View northwest R409	Moderate adverse	Moderate
3	View west Newhall Road	Negligible to minor adverse	Negligible to minor
4	View west L2030 / Newhall Road Junction	Negligible adverse	No change
5	View south L2030	Minor adverse	Moderate
6	View south R445 Link Road	Minor adverse	Minor
7	View southeast Gateway on R445 Millennium Park	Minor adverse	Minor
8	View east Millennium Park Road	Negligible to minor adverse	Negligible to minor
9	View northeast R409 Motorway Bridge	Negligible to minor adverse	Negligible to minor
10	View north Osberstown Business Park	Moderate adverse	Moderate
11	View north Osberstown Business Park Entrance	Moderate adverse	Moderate
12	View southwest Newhall Rest Area	Negligible to minor adverse	Negligible to minor
13	View east Millennium Park Roundabout	No change	No change
14	View northwest R409 Road	Negligible to minor adverse	Negligible to minor
15	View south M7 Business Park	Negligible to minor adverse	Negligible to minor

11.7.16 Glint and Glare Effects

A Glint and Glare Assessment in respect of the solar PV panels located on the roof of each Data Centre, is provided in Appendix 11.4, Volume II. The results of the related modelling indicate that solar reflections are geometrically possible towards some road receptors on the R409 however the Data Centre roof parapet is predicted to screen the visibility of the solar PV panels. As such, no significant effects are predicted upon aviation operations associated with the nearby airfields (Allenwood Airfield, Millicent Airfield, and Gowran Grange Airfield). No Glint and Glare effects are predicted towards road users travelling along the nearby roads and the residential amenity for nearby dwellings due to the buildings' parapet blocking the views of the panels. Further on this basis no mitigation is recommended.

11.7.17 Lighting Impacts

The Project will operate as a 'Dark Site' where minimal lighting is only used when required in order to avoid light spill beyond the site boundary and disturbance of wildlife.

New external lighting will be provided to the following areas:

- Internal site access roads
- Car parks (at Data Centres and ancillary buildings)
- Site security lighting (including emergency escape lighting)

Visual impact of proposed lighting is minimised by the use of the following: luminaires with good optical distribution, use of glare shields, selecting suitable luminaire height, dimmable light source, good lighting control and by switching the light off for a period (post curfew).

Lighting systems in areas covered by CCTV cameras will be designed and installed to facilitate high-definition images recorded by the video surveillance system. Perimeter lighting will be provided along the full boundary of the site. This will be triggered by movement detections covering the complete perimeter.

A Lighting Assessment Report for the Project is provided in Volume II, Appendix 4.4; a lighting assessment, relevant to proposed works on the R409 is provided in Volume II, Appendix 4.2 I.

The measures set out above will reduce the potential sky glow effect. However, the addition of lighting to existing night views of the Project site will nevertheless result in a slight increase in existing sky glow on the night-time views from areas around the Project although this will be barely perceptible in the context of the level of sky glow in the surrounding landscape. New lights will be read against the background of significant existing lights in the Project area and the wider night-time landscape and the significance of effect is predicted to be negligible adverse for night-time views where such views are available.

11.7.18 Cumulative Effects

11.7.18.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. These projects with which the Project may possibly have cumulative effects have been considered in order to identify the likely cumulative landscape and visual effects, if any.

These projects, that include Solar Farms, Battery Storage projects and a Data Centre, has established that the nearest project to the Project site is a solar farm located approx. 5km. At these large distances and with substantial buildings and strong vegetation located between the Project sites there is no potential for any cumulative landscape and visual effects. The potential cumulative projects are all to remote from the Project to have any potential for cumulative landscape and visual effects.

Overall, when potential construction and operational stage cumulative landscape and visual effects are considered for the Project in combination with permitted and planned projects they will not result in any significant cumulative landscape and visual effects due to a combination of separation distance, intervening development and the nature and setting of the proposals. Construction stage activities involve an increase in construction traffic for all cumulative projects. HGV traffic is frequent feature of this landscape, and the existing wider Dublin road network consists of very busy roads with low potential for significant cumulative visual impacts as a result. The operational stage activities as part of the Project are sufficiently separated from any permitted or planned projects in the area surrounding the Project to avoid potential cumulative effects while permitted or planned developments within the surrounding area or so similar in character that they are difficult to discern from the existing busy context

11.7.18.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The final, detailed design, consent and construction of the required infrastructure works will be the responsibility of GNI in the exercise of their own statutory functions, and therefore Herbata Ltd is not seeking planning consent to carry out these works as part of the Project.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report indicates that the most likely route for the new high-pressure gas distribution pipeline will be from the location of the existing GNI above ground installations (AGIs) at Glebe

West and Naas Town to the Project site following a combination of the existing road network and the route of existing utilities. A large portion of the gas pipeline will likely cross agricultural / open lands will likely require a construction corridor for the works that consists of a 14m wide strip that is normally reinstated to the existing land use. Once constructed and with reinstatement complete a pipeline of this nature will have no cumulative landscape and visual effects as it is below ground. The construction stage will result in activities that will be noticeable but temporary. Construction traffic while visible will blend with existing traffic on the busy road network found in the local landscape with no significant effect. Pipeline work along roads is a common feature in this landscape and temporary and transient in nature and no significant cumulative landscape and visual effects are predicted. Pipeline works on agricultural lands will result in temporary disturbance but will all be reinstated. Overall, when the potential for cumulative landscape and visual impacts are considered there will be no significant cumulative effects for the Project and the GNI Gas Connection.

11.8 Mitigation Measures

Mitigation measures are those taken to help reduce or remedy landscape and visual impacts or compensate for the loss of landscape value created by the development.

11.8.1 Mitigation of Construction Impacts

The clearance of the existing site and subsequent construction works will be restricted to land within the site boundary. A site compound, including site accommodation, together with hoarding, scaffolding, cranes, and other associated temporary works will be required during the construction phase. These features will be visible during the construction phase from areas immediately adjacent to the Project site. Cranes and scaffolding may be visible at a greater distance, though this will be dependent upon view direction and intervening built form. These temporary features will be viewed as a feature of construction in the urban setting. All construction impacts are limited to the construction period and therefore of temporary duration.

11.8.2 Mitigation of Operational Impacts

Please refer to EIAR Volume III Technical Drawings & Figures for details on the proposed hard and soft landscape plans for the Project, which are set on the planning application and described in Chapter 4 of the EIAR.

Only those trees which require removal to facilitate the development will be replaced. All other trees which can be maintained within the Project shall be retained and protected from damage in accordance with BS 5837:2012 (Trees in relation to design, demolition, and construction).

It is important that a landscape management plan is prepared to ensure the healthy establishment of all trees within the Project and the replacement of any dead or dying plants in subsequent years.

11.9 Conclusion

A review of the Kildare County Development Plan 2023-2029 has established that the Project is not located in proximity to any landscape or scenic designations and as such there are no predicted effects on any primary or secondary amenity area and/or scenic views.

Analysis of the landscape character within the immediate environs of the Project site displays typical rural character consisting of largely flat, gently undulating topography with grassland vegetation and agricultural crops. The Project is located within an existing industrial area with other industrial developments in close proximity. Therefore, the Project will not be out of character with the surrounding environment. The LCA is considered to have the scope and capacity for positive enhancement, and to have a high tolerance to change. The value of the LCA is judged to be low. Overall, taking into account the susceptibility and value attached to the LCA, the sensitivity of this LCA is judged to be low.

The Northern Lowlands LCA has been classed as an area of Low Sensitivity in the County Development Plan. Furthermore, the Project is classed as an 'Industrial Project' which is seen to have a high compatibility with the Northern Lowlands LCA. Taking this into account, the Project should not have a detrimental impact to this LCA or the surrounding area.

Of the 15no. viewpoints assessed for impacts, only one will have moderate visual impacts at the operational stage, while the rest of the viewpoints will either have minor changes or no changes at all to the view. This is due to the large amounts of existing mature vegetation and existing built form in the area surrounding the Project site that provides adequate screening to the site. Additionally, the proposal includes planting which will provide further screening.

A Glint and Glare Assessment in respect of the solar PV panels located on the roof of each Data Centre, has been completed and no significant effects are predicted upon aviation operations associated with the nearby airfields (Allenwood Airfield, Millicent Airfield, and Gowran Grange Airfield) and no Glint and Glare effects are predicted towards road users travelling along the nearby roads and the residential amenity for nearby dwellings due to the buildings' parapet blocking the views of the panels.

The potential for impacts from lighting has been assessed and the findings show that new lights will be read against the background of significant existing lights in the Project area and the wider night-time landscape and the significance of effect is predicted to be negligible adverse for night-time views where such views are available.

Overall, when potential construction and operational stage cumulative landscape and visual effects are considered for the Project in combination with permitted and planned projects they will not result in any significant cumulative landscape and visual effects due to a combination of separation distance, intervening development and the nature and setting of the proposals.

Overall, the wider landscape and visual resources of the development's surroundings have the capacity to accommodate a development of this type and scale.

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EIAR
VOLUME I MAIN TEXT – CHAPTER 12 TRAFFIC AND TRANSPORTATION

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12 TRAFFIC AND TRANSPORTATION

12.1 Introduction

This chapter of the EIAR reports on the outcome of the assessment of the Project in relation to Transportation. This chapter describes the consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment.

The assessment reports on the likely environmental effects, the further mitigation measures which may be required to prevent, reduce or offset any adverse effects or further enhance the beneficial effects. The conclusions are provided in terms of the residual effects and whether these are considered significant.

This Chapter, and its associated figures and appendices, is intended to be read as part of the wider EIAR with particular reference to the introductory chapters of the EIAR.

12.2 Methodology

The methodology employed in the preparation of this Chapter is as follows;

12.2.1 Planning Policy Context & Relevant Guidance

The assessment has been undertaken in accordance with the following policy and guidance;

- Project Ireland 2040 – National Planning Framework (2019);
- Transport Infrastructure Ireland (TII) Traffic and Transport Assessment Guidelines;
- Smarter Travel, A Sustainable Transport Future – A New Transport Policy for Ireland 2009-2020;
- Climate Action Plan (2023);
- Design Manual for Urban Roads & Streets (DMURS);
- Transport Strategy for the Greater Dublin Area (2016-2035);
- Kildare County Development Plan (2023-2029);
- Naas Local Area Plan (2021-2027); and
- Naas Sallins Transport Strategy (2020).

The lands on which the Project is located is designated for 'Data Centre' in the Naas Local Area Plan (2021-2027). The Naas Local Area Plan states '*These lands are identified exclusively for Data Centres, to ensure the location of these types of proposals are controlled proximate to service areas of the county. The Council will not consider any alternative use on these lands, other than those associated with Data Centres'* (Objective EDO1.12).

Objective EDO1.12 is contained within Policy ED 1 – Enterprise and Economic Development of the Naas Local Area Plan (2021 – 2027) and states the following *Facilitate the location of the Data Centre development on land designated P:Data Centre at Caragh Road South and Jigginstown for the identified land use only subject to appropriate environmental assessments, heat mapping, transport impact assessments and consideration of the cumulative impact on the electricity network supply capacity and targeted reductions in greenhouse gas emissions*.

This chapter should be read in conjunction with the Transport Assessment and Microsimulation Assessment Report, Appendix 12.1 and 12.2 respectively, contained in Volume II. A Construction Traffic Management Plan has also been prepared and is included in Appendix 4.6 Volume II.

12.2.2 Study Area

The proposed site is accessed via the R409, which is a regional road and the purpose of which is to connect many small towns to each other as well as to the national road network. The R409 provides connectivity to the R445 Millennium Park, which provides direct access to the M7 motorway via grade separated interchanges to both the north and south.

The M7 is part of the Dublin – Limerick route and provides connectivity to the M9 to the south and the N7 to the north. The N7 connects to the M50, providing further connectivity to the M1, M2 and M4 northbound and the N11 southbound as indicated in Figure 12.1 below.

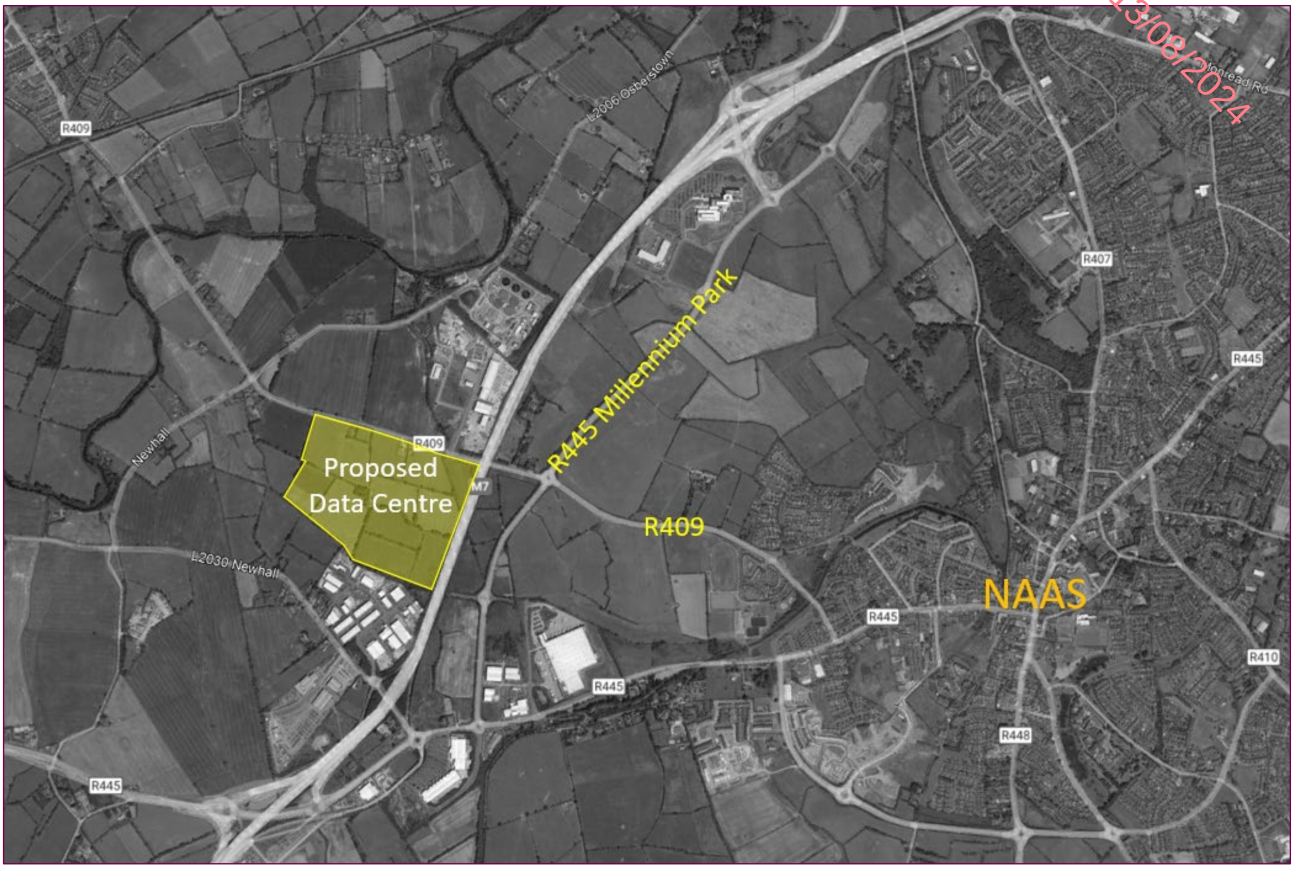

Figure 12.1: Study Area (Road Network)

Therefore, it is clear that the site is well served by both the local and strategic road network which provides good connectivity for both the construction and operational traffic associated with the Project site.

12.3 Characteristics of the Project

The Project comprises of 6no. Data Centre buildings (each building is 2no. storey), a management/administration building, car parking and other associated works. The key characteristics of the proposal are as follows.

- Project Site Area – 38.64 hectares
- 6no. Data Centre buildings following a *template design*, each with a total gross internal area (GIA) of 37.51 ha
- Total of 210 no. car parking spaces comprising of 63 electric car charging spaces and 14 disabled car parking spaces
- Of the 210 total, each of the 6 Data Centre buildings will have 30 car parking spaces (total) and the administration building will also have 30 car parking spaces
- Access to development via R409
- Emergency access only via M7 Business Park
- Pedestrian / Cycling Infrastructure (active travel) on the R409

- Total number of 104 bicycle spaces (16 per each of the 6 Data Centre buildings and 8 for the administration workshop)
- Provision of bus stop on R409 adjacent to the Project

12.3.1 Construction Phase

During the construction phase there will be a construction site access created from the R409 which will provide access to the construction compound.

The proposed construction programme is an estimated 8 years and 9 months. Table 4.1 below provides an indicative construction phase programme for key milestones. A commencement date of January 2024 has been presented, serving as an indicative start date in order to illustrate the construction milestones. A final commencement date will be subject to the timescales for the Project in obtaining all necessary consents.

The construction programme is anticipated to last for 8no. years and 9no. months and is scheduled to begin in January 2025 – it should be noted that a commencement date of January 2025 has been presented, serving as an indicative start date in order to illustrate the construction milestones. A final commencement date will be subject to the timescales for the Project in obtaining all necessary consents.

All buildings are predicted to be completed within full occupancy in September / October 2033. There are 3no. stages for construction.

- Phase 1 – January 2025 – September 2028
  - Enabling works overall construction programme.
  - ESB substation overall construction programme.
  - AGI building overall construction programme.
  - DC1 overall construction programme.
  - R409 road improvements works including pedestrian walkway and cycle lane.
  - DC2 overall construction programme.
- Phase 2 – August 2027 – November 2030
  - DC3 overall construction programme.
  - DC5 overall construction programme
- Phase 3 – October 2030 – September 2033
  - Construct secondary construction compound around the site & remove existing construction car park.
  - DC6 overall construction programme.
  - DC4 overall construction programme.
  - Site wide works overall construction programme.

The proposed working hours during construction are 0800 – 1800hours (Monday – Friday) and 0800 – 1300hours (Saturday) with no working on Sunday or Bank Holidays unless permission is granted by Kildare County Council. During construction the traditional peak hour periods will be avoided as far as reasonably practicable.

The majority of construction related vehicles will be normal sized HGVs that are permissible on the surrounding road network and do not require any special permissions. Should any abnormal loads be required (not anticipated at this stage) then the formal process for abnormal loads will be undertaken in terms of the route being pre-planned and all relevant authorities will be notified.

The peak construction period level of traffic is predicted as ~47no. vehicles per day, outside of these peak construction periods the volumes of construction traffic will be considerably less.

The 47no. vehicles will arrive and depart throughout the day and therefore assuming an 8no. hour working day this equates to an average of 6no. vehicles per hour (1no. vehicle every 10no. minutes).

During the peak construction period it is predicted that a maximum of 1,100no. staff will be required to travel to / from the site per day. This is predicted to result in an average of 425no. vehicle trips per day, with ~175no. vehicle trips occurring during the peak hour periods (AM & PM)

12.3.2 Operational Phase

During the operational phase the Project is anticipated to generate the following staff numbers, these do not account for shift patterns etc.

- 225no. total staff.
- ~125 – 175no. visitors daily (likely to arrive / depart outside of the traditional peak periods).
- 56no. person arrivals during the AM peak hour period.
- 56no. person departures during the PM peak hour period.
- Operational HGVs – 26no. total trips per day (likely to arrive / depart outside of traditional peak periods).

Based on the information presented above and the 24hr operation of the Project it is predicted that the operational phase is unlikely to have a significant impact upon the surrounding road network.

12.4 Baseline

Surveys have been undertaken to determine the existing levels of traffic on the surrounding road network. The surveys have been undertaken at the following locations (which are the approaches to the M7 interchanges to the north and south of the site).

- Location 1 – West Arm of the Bundle of Sticks Roundabout
- Location 2 – North Arm of the Millennium Roundabout; and

These surveys were undertaken on 18th January 2023 between 0700 – 1000 and 1600 – 1900 hours. The surveyed traffic flows are indicated in Table 12.1 (15minute time segments) and Table 12.2 (hourly time segments) below.

Table 12.1: Baseline Traffic Survey Analysis (15minute time segments)

18th January 2023						
Time	**Location 1 – Bundle of Sticks R'about**			**Location 2 – Millennium Park R'about**		
	West	**East**	**Total**	**North**	**South**	**Total**
0700 – 0715	79	78	157	70	69	139
0715 – 0730	104	121	225	82	199	281
0730 – 0745	122	164	286	97	189	286
0745 – 0800	160	214	374	87	182	269
0800 – 0815	178	267	445	97	110	207
0815 – 0830	163	249	412	143	192	335
0830 – 0845	131	248	379	142	206	348
0845 – 0900	173	251	424	121	172	293
0900 – 0915	137	221	358	110	146	256
0915 – 0930	126	198	324	84	125	209
0930 – 0945	133	204	337	75	94	169
0945 – 1000	148	200	348	71	86	157
Total (0700 – 1000)	**1654**	**2415**	**4069**	**1179**	**1770**	**2949**
1600 – 1615	246	220	466	173	137	310
1615 – 1630	233	212	445	181	115	296
1630 – 1645	243	181	424	178	125	303

18th January 2023						
1645 – 1700	196	198	394	140	124	264
1700 – 1715	271	216	487	198	147	345
1715 – 1730	259	238	497	173	154	327
1730 – 1745	245	228	473	156	119	275
1745 – 1800	179	189	368	152	153	305
1800 – 1815	168	152	320	144	146	290
1815 – 1830	157	150	307	118	99	217
1830 – 1845	119	164	283	110	98	208
1845 – 1900	104	129	233	73	89	162
Total (1600 – 1900)	**2420**	**2277**	**4697**	**1796**	**1506**	**3302**

Table 12.2: Baseline Traffic Survey Analysis (hourly time segments)

18th January 2023						
Time	**Location 1 – Bundle of Sticks R'about**			**Location 2 – Millennium Park R'about**		
	West	**East**	**Total**	**North**	**South**	**Total**
0700 – 0800	465	577	1042	336	639	975
0715 – 0815	564	766	1330	363	680	1043
0730 – 0830	623	894	1517	424	673	1097
0745 – 0845	632	978	1610	469	690	1159
0800 – 0900	645	1015	1660	503	680	1183
0815 – 0915	604	969	1573	516	716	1232
0830 – 0930	567	918	1485	457	649	1106
0845 – 0945	569	874	1443	390	537	927
0900 – 1000	544	823	1367	340	451	791
1600 – 1700	918	811	1729	672	501	1173
1615 – 1715	943	807	1750	697	511	1208
1630 – 1730	969	833	1802	689	550	1239
1645 – 1745	971	880	1851	667	544	1211
1700 – 1800	954	871	1825	679	573	1252
1715 – 1815	851	807	1658	625	572	1197
1730 – 1830	749	719	1468	570	517	1087
1745 – 1845	623	655	1278	524	496	1020
1800 - 1900	548	595	1143	445	432	877

As indicated in Table 12.2 above the peak hour period at location 1 (Bundle of Sticks roundabout) occurs 15minutes earlier that the peak hour period at location 2 (Millennium Park roundabout) in both the AM and PM peak hour period.

Further baseline traffic surveys in the form of junction turning counts were undertake at 12no. junctions and Automatic Traffic Counter (ATC) loops were laid at 6no. locations in 2023 to provide a wider understanding of the existing traffic volumes in the vicinity of the site.

This data enabled the provision of a VISSIM model for this road network to assess the impact of the operational phase of the Project upon the surrounding road network and the detailed analysis is presented in the TA in Appendix 12.1.

12.5 Impact Assessment

The Assessment Criteria and Assignment of Significance is based on the thresholds identified within the Traffic and Transport Assessment Guidelines May 2014 published by TII. These guidelines indicate a detailed assessment is required when the following thresholds are exceeded.

- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road;
- Traffic to and from the development exceeds 5% of the traffic flows on the adjoining road where congestion exists or the location is sensitive.

The Guidelines also states that where applications affect National Roads a Transport Assessment should be requested if the following thresholds are exceeded.

- Development traffic exceeds 10% of turning movements at junctions with and no National Roads.
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.

For this assessment there are 2 no. receptor points as follows.

- Bundle of Sticks Roundabout; and
- Millennium Park Roundabout.

The significance of the traffic impacts on these 2 no. receptor points, using the criteria set out above will determine the sensitivity and magnitude of the Project.

12.5.1 Do Nothing Scenario

The Do-Nothing Scenario would result in no increase in traffic upon the surrounding highway network. Traffic in the area would grow by normal background traffic growth and there would be no significant impact on any junctions.

12.5.2 Likely Significant Environmental Effects – Construction Phase

Based on the predicted daily vehicle trips associated with the construction phase of the development there are unlikely to be any significant environmental effects. The volume of HGVs on the surrounding road network is small (47no. per day / 6no. vehicles per hour), and the HGV traffic will, as far as reasonably practicable, avoid the peak hours. The larger traffic volumes associated with staff are likely to be via cars / vans (~175no. in the peak hours).

Therefore, assuming the staff vehicles are split 50% from the north of the site and 50% from the south of the site then this would equate to 88no. vehicles coming from the north and south respectively. Table 12.3 indicates the percentage impact of the peak construction phase vehicles on the 2no. receptor points during the AM and PM peak hour periods respectively (the peak hour for both locations has been assessed for robustness).

Table 12.1: Percentage Impact Analysis – Construction Phase

Impact of Peak Construction Vehicles on Road Network						
Time	**Location 1 – Bundle of Sticks R'about**			**Location 2 – Millennium Park R'about**		
	Total (2-way)	**Construction Traffic**	**% Impact**	**Total (2-way)**	**Construction Traffic**	**% Impact**
0800 – 0900	1660	88	5.30%	1183	88	7.44%
0815 – 0915	1573	88	5.59%	1232	88	7.14%
1645 – 1745	1851	88	4.75%	1211	88	7.27%
1700 – 1800	1825	88	4.82%	1252	88	7.03%

Whilst there will be an increase in traffic on the surrounding road network during the construction period, the percentage impacts during the AM and PM peak hour periods is less than 10% and given the volumes of traffic this section of the network is not currently congested. Therefore, the impact on the surrounding road network falls within the thresholds as set out in the relevant guidance. Given the percentage impact it is unlikely that the construction phase will result in a significant impact upon the surrounding road network.

12.5.3 Likely Significant Environmental Effects – Operational Phase

Whilst there will be a traffic generation associated with the operational phase of the development, this impact will be staff vehicles i.e. cars and therefore any impact upon the surrounding road network is likely to be insignificant. The percentage impacts of the Project upon the surrounding road network during the peak hour periods is less than 5% as indicated in Table 12.4. This assessment is based on the robust analysis of 56no. arrivals and 56no. departures during both the AM and PM peak hour periods with traffic split 50% / 50% between the 2no. receptor locations.

Table 12.2: Percentage Impact Analysis – Operational Phase

Impact of Peak Operational Vehicles on Road Network						
Time	**Location 1 – Bundle of Sticks R'about**			**Location 2 – Millennium Park R'about**		
	Total (2-way)	**Operational Traffic**	**% Impact**	**Total (2-way)**	**Operational Traffic**	**% Impact**
0800 – 0900	1660	56	3.37%	1183	56	4.73%
0815 – 0915	1573	56	3.56%	1232	56	4.55%
1645 – 1745	1851	56	3.03%	1211	56	4.62%
1700 – 1800	1825	56	3.07%	1252	56	4.47%

The VISSUM modelling analysis of the operational phase of the Project indicates that the operational phase is unlikely to have any significant impact upon existing traffic progression on the surrounding road network in the AM peak period. During the PM peak period there is a small increase predicted in total delay, however, the robustness of the assessment must be taken into account when considering any impact on the network.

In terms of journey time analysis, there will be an increase in journey time along the R409 towards Naas, which is expected as this is the arrival / departure point for the Project and therefore the largest increase in traffic. The journey times on the wider network is not predicted to be significantly impacted upon with the Project constructed and operational.

Therefore, the overall impact of the Project upon the surrounding highway network is considered to be negligible.

12.5.4 Mitigation

There is no proposed mitigation upon the surrounding highway network as part of this proposal. The Project is served by existing motorways and regional roads which can accommodate the predicted levels of traffic during the construction and operational phases.

12.5.5 Residual Impacts

The residual impacts will be associated with the operational phase of the Project and will be the traffic impact associated with staff / visitors to the site daily. However, as indicated above this is not anticipated to be a significant level of traffic and therefore the residual impacts are likely to be low.

12.6 Cumulative Effects

12.6.1.1.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. A number of planning applications (permitted, submitted but undetermined and under construction) have been identified within the locale of the Project site.

Overall, when potential construction and operational stage cumulative landscape and visual effects are considered for the Project in combination with permitted and planned projects they will not result in any significant cumulative landscape and visual effects due to a combination of separation distance, intervening development and the nature and setting of the proposals. Construction stage activities involve an increase in construction traffic for all cumulative projects. HGV traffic is frequent feature of this landscape, and the existing wider Dublin road network consists of very busy roads with low potential for significant cumulative visual impacts as a result. The operational stage activities as part of the Project are sufficiently separated from any permitted or planned projects in the area surrounding the Project to avoid potential cumulative effects while permitted or planned developments within the surrounding area or so similar in character that they are difficult to discern from the existing busy context

Many of these projects are associated with the commercial and industrial complexes located to the north and south of the Project site. It is not likely that the Project will result in any negative significant cumulative effects on cultural heritage in combination with these external plans/projects.

12.6.1.1.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The final, detailed design, consent and construction of the required infrastructure works will be the responsibility of GNI in the exercise of their own statutory functions, and therefore Herbata Ltd is not seeking planning consent to carry out these works as part of the Project.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

As identified within the GNI Infrastructure Upgrade Outline Report, there is an extensive network of gas transmission pipes running through Naas with a high-pressure pipe connecting to the existing AGI at Glebe West.

The proposal will likely require a ~300mm diameter high pressure gas pipeline in addition to the existing pipes already in-situ. At this stage it is anticipated that the new pipeline will most likely follow the route of the existing pipeline from Glebe West AGI to the Naas Town AGI. The pipeline will most likely be constructed adjacent to the existing to ensure minimum separation distances are required.

Once the new pipeline has reached the Naas AGI the route to the site is likely to continue to follow the low pressure distribution network along the southern link road to the R445 Newbridge Road.

From the R445 the new pipeline will most likely cross beneath the canal and then follow the public foul sewer network, where wayleaves are already in place. This section of the foul sewer network crosses agricultural lands, heading in a northwest direction.

The gas pipeline will then likely cross under the M7 motorway, most likely, by directional drilling / pipe jacking to reach the west side of the M7, emerging onto the R409 Caragh Road, whereupon it will enter the Project site.

In terms of the construction impacts of the proposed gas pipeline.

- Works within the agricultural land will not result in any significant impacts upon traffic progression on the sounding road network. Access to the works on the agricultural lands will be taken from the public road network in the general location of where the pipeline will cross the public road. During the construction phase a Traffic Management Plan will be agreed with the Council's Roads Department.
- Works within / along public roads are likely to result in a short term low impact upon existing traffic progression, prior to commencement of the construction phase Traffic Management Plans will be agreed with the Council's Roads Department to identify traffic management proposals including safety and signage requirements.
- Construction period is likely to be 7-12 months, however, a considerable portion of the construction period will be working within existing agricultural lands, which will not result in any significant impact upon existing traffic progression.

12.7 Interactions

The traffic and transport chapter interacts with both the Noise and Air Quality Assessments.

MAKING COMPLEX EASY

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HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 13 MATERIAL ASSETS – BUILT SERVICES

NI2615
01
June 2024

13 MATERIAL ASSETS - BUILT SERVICES

13.1 Introduction

This chapter of the EIAR presents findings of the assessment on existing material assets and built services which could be impacted by the Project. The assessment of potential impacts on material assets focuses on resources that are valued and are intrinsic to a place – these may be of either human or natural origin, and the value may arise for either economic or cultural reasons. In this context, this assessment focuses on buildings, built services and existing infrastructure within and directly adjoining the indicative study area.

The matters assessed within this section focus on the environmental effects on utilities and infrastructure.

13.2 Methodology

The baseline environment is defined as the existing environment against which future changes can be measured. This chapter has been prepared having regard to the following guidelines;

- Guidelines for planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018)
- Environmental Impact Assessment of Projects: Guidance on preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, 2022)

13.2.1 Desktop Study

A desktop study to identify baseline conditions has been undertaken to establish the existing provision of services and utilities in the areas. The following sources of information were used in the completion of this assessment:

- Kildare County Council (Drainage and Water Supply Mapping)
- Uisce Éireann Water and Wastewater Utility Plans
- Submission of a Pre-Connection Enquiry to Uisce Éireann
- Gas Networks Ireland (GNI Utility Plans)
- ESB Utility Plans
- EIR Utility Plans
- Virgin Media Utility Plans
- J&L Topographical Survey Drawings
- Metroscan Ground Penetrating Radar (GPR) Survey Drawings.

13.2.2 Consultation

As part of the planning process, the Design Team has attended a number of consultations with authority bodies to confirm and develop the aspects of the design. The following are a list of the formal consultations attended by the Design Team:

- Kildare County Council: 3 No. formal pre planning meetings;
- Uisce Éireann: 1 No. consultation meeting.

13.3 Characteristics of the Project

13.3.1 Description of Site

The Project site is 38.64 ha in extent and is located in the townlands of Halverstown and Jigginstown, on the western side of the M7 motorway, positioned between Junctions 9a and 10, c.2.5km west of Naas, County Kildare. The subject site currently consists of agricultural lands, residential houses and agricultural buildings to the west of the M7 and Naas town.

There are 3 no. existing houses and 5 no. farm buildings locate on the site that are to be demolished as part of the proposed works. To the north and south of the site, the lands are mainly used for commercial/industrial purposes (M7 Business Park & Osberstown Business Park) and agricultural uses. A 2-storey house and farm buildings are located approx. 200m to the west of the site, whilst some bungalow and 2 storey houses are located approx. 250m to the south of the site. There is a bungalow immediately to the north of the site, across the R409.

The site is bound to the north by the R409 road, to the east by the M7 Motorway and to the south by the M7 Business Park, with agricultural land to the west.

13.4 Baseline

This section below describes the baseline environment under the following headings:

- Surface Water
- Foul Drainage
- Water Supply
- Gas Networks Ireland Services
- ESB Utility Services
- EIR Utility Services
- Virgin Media Utility Services

13.4.1 Surface Water Drainage

The existing site is not served by any public or formal surface water drainage system, as is illustrated in Figure 13.1 below which is an extract from the available Kildare County Council / Uisce Éireann public drainage mapping.

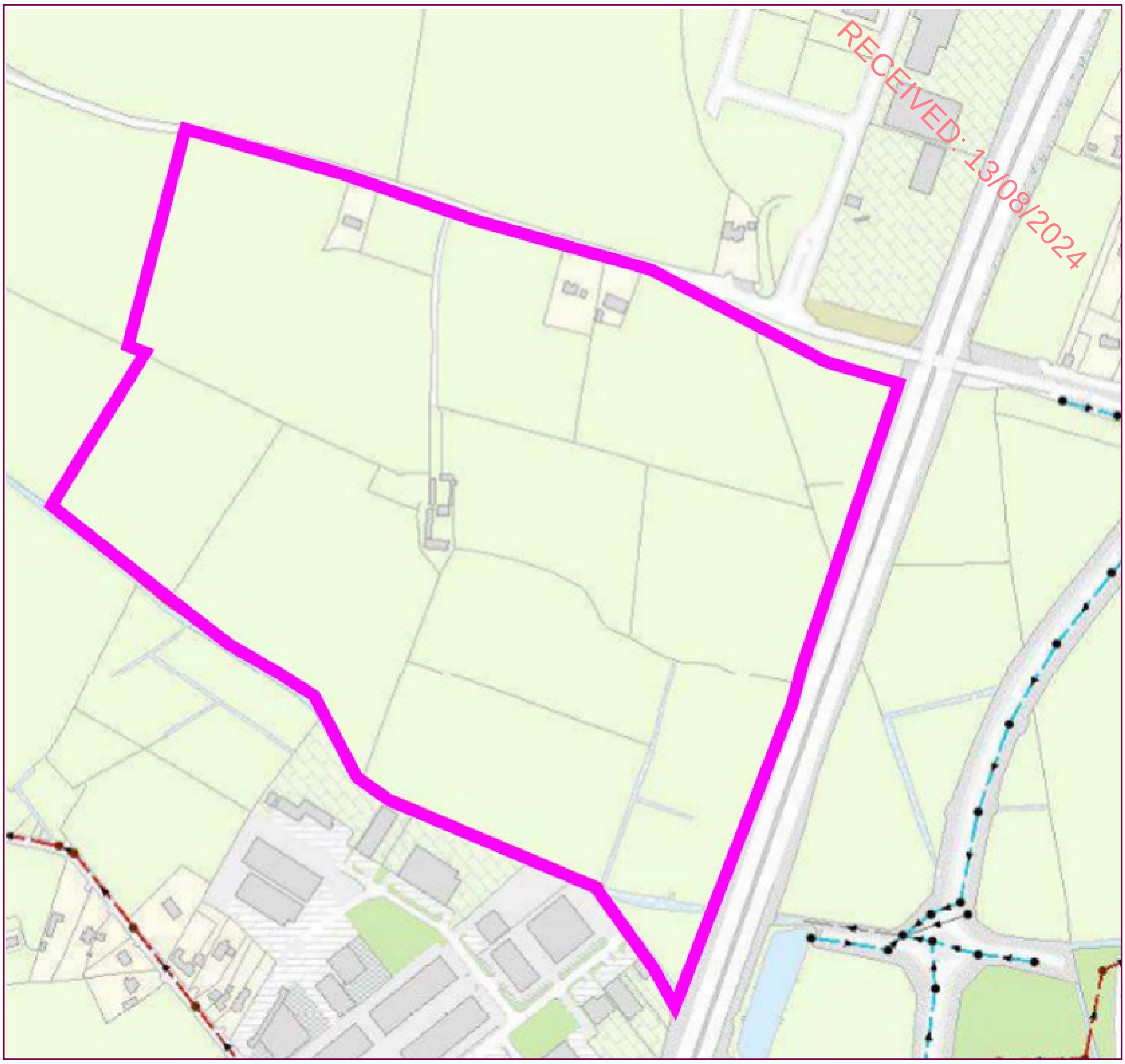

Figure 13.1: Extract from KCC/ UE Public Mapping Indicating Existing SW Services

Currently surface water from rainfall flows across the land and is collected in several ditches which traverse the site and discharge into the Bluebell Stream (also known as the Yeomanstown watercourse) which runs in a northwest direction along the southern boundary of the site. Figure 2 below indicates the extent of the existing field boundaries and existing ditches. For the purposes of the surface water management design, the Design Team have identified below the existing discharges and the natural sub-catchments on the site. Catchment 4, noted in Figure 13.2 below, discharges to open watercourses which traverse the M7 motorway and flows generally southward and discharge to the Bluebell stream to the east of the motorway. An existing 900mm pipe traverses the motorway and conveys flows from east to west below the M7 Motorway, and this existing pipe will be maintained as part of the overall surface water strategy for the site.

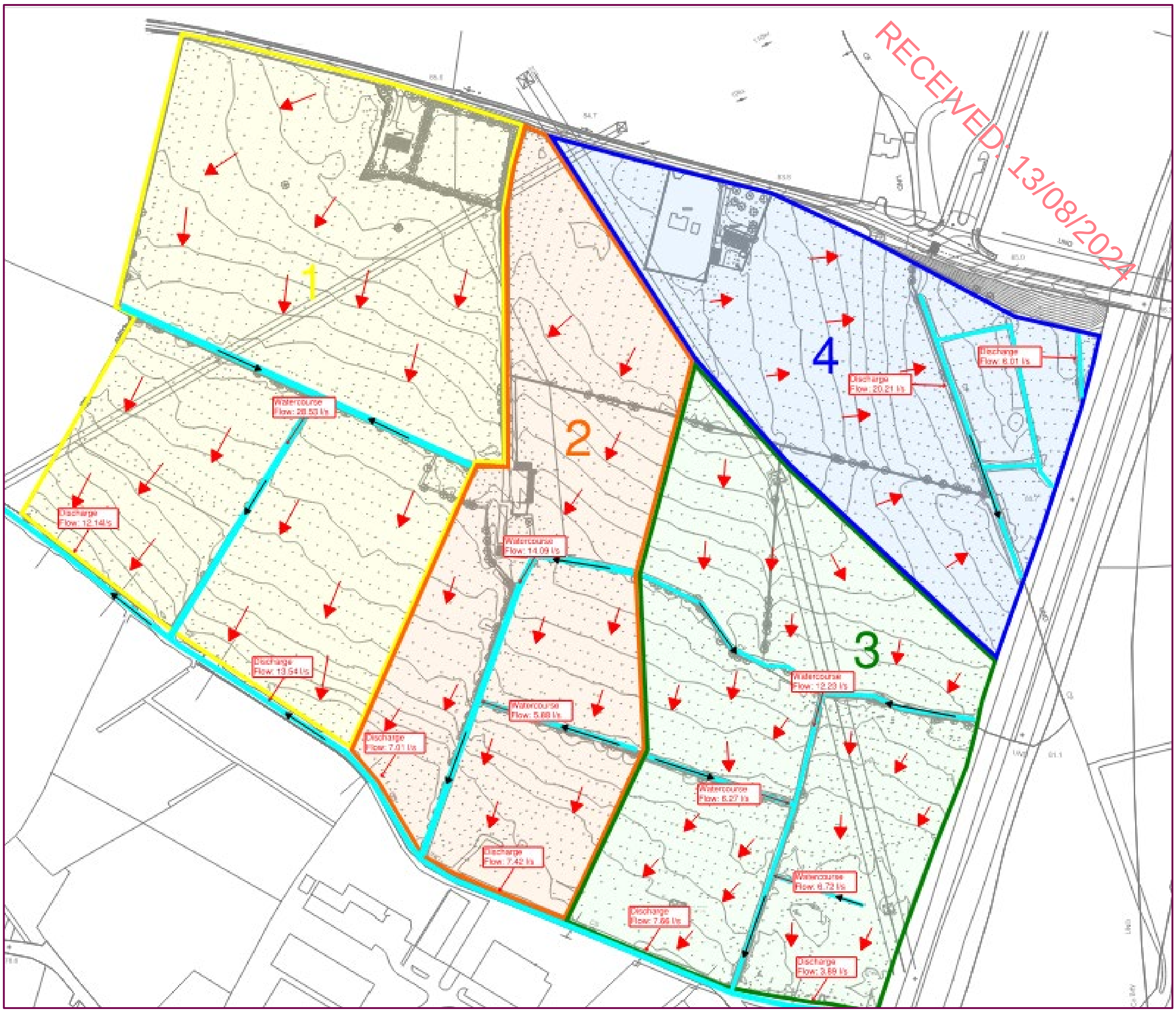

Figure 13.2: Existing SW Catchments and Flow Paths

13.4.2 Foul Water Drainage

The existing site is not served by any public or formal foul water drainage systems. Foul drainage mapping from Kildare County Council and Uisce Éireann illustrate that there is no formal public sewer drainage on the R409, adjacent to the Northern boundary of the site. There are a number of existing properties on and adjacent to the subject site. These properties are served by private, on-site WWTP/ septic tanks.

This mapping indicates the presence of a 300mm diameter sewer along the L2030 Newhall Road to the south of the site which runs in a South East to North West direction towards a pumping station which subsequently conveys flows to the Osberstown Wastewater Treatment plant to the north of the site. Extracts from the Foul Drainage Mapping indicating the Foul Water Drainage arrangement are provided in Figure 13.3 and Figure 13.4 below.

Figure 13.3: Extract from KCC/ UE Public Mapping Indicating Existing FW Services 1

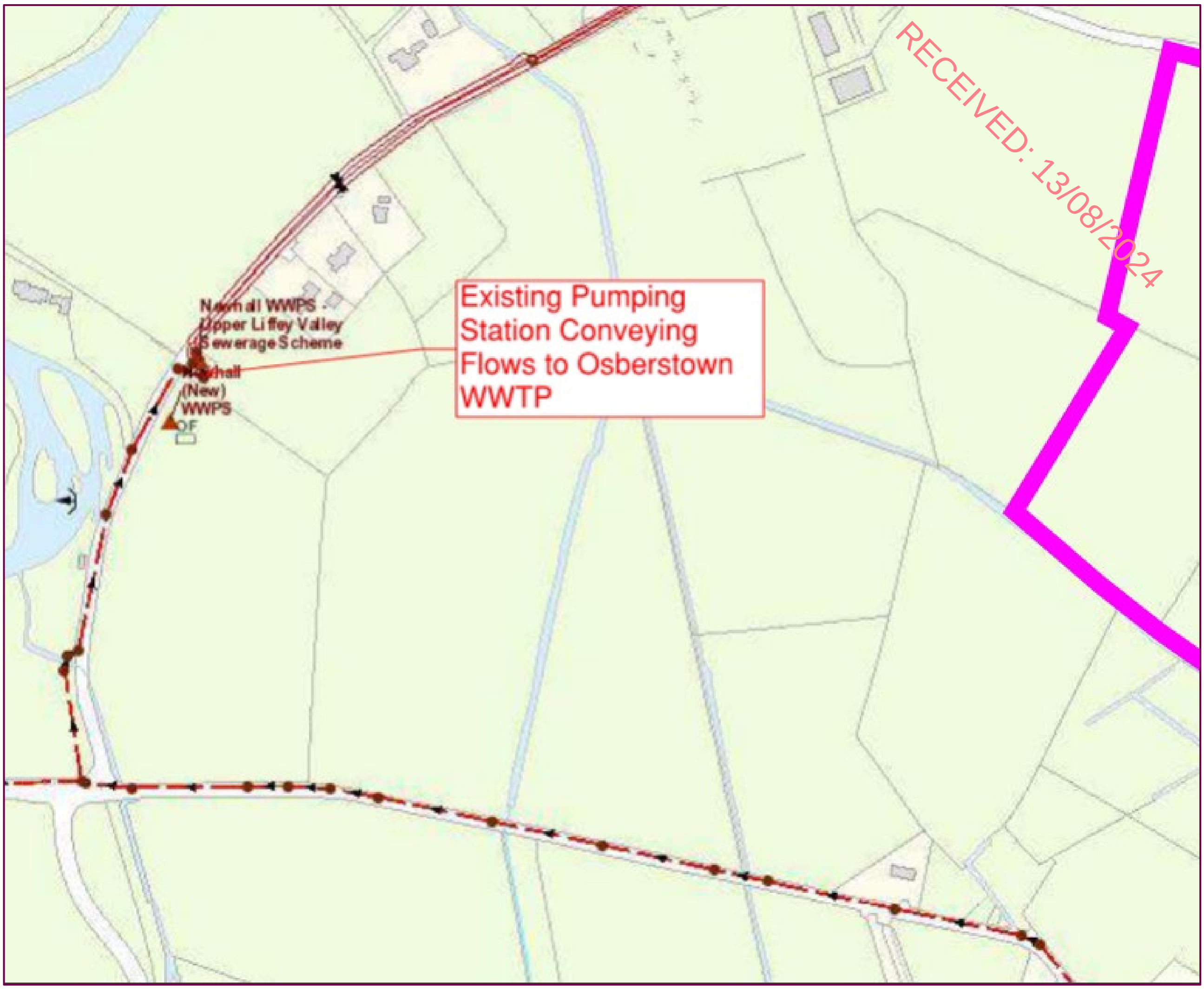

Figure 13.4: Extract from KCC/ UE Public Mapping Indicating Existing FW Services 2

13.4.3 Water Supply

The Uisce Éireann (UE) record drawings indicate the presence of a 225mm dia. HPPE watermain to the north of the site along the R409 as illustrated in Figure 13.5 below. The location of the watermain was verified following a Ground Penetrating Radar (GPR) survey of the existing site and adjacent roads which was commissioned by the Applicant. There is minimal domestic demand from the existing properties on and adjacent to the subject site along the northern boundary. There is also a minimal demand for water on the existing farmyard within the subject site. Water demand is required for the day-to-day operation on the agricultural lands such as animal feeding troughs etc.

Figure 13.5: Extract from KCC/ UE Public Mapping Indicating Existing WM Services

13.4.3.1 Pressure Testing

The Applicant commissioned SES Water Management to carry out Fire Flow Simulation Testing on the nearest existing hydrants to the site. The hydrant was pressure logged for a period of 7 days which determined that the existing flow rate is approximately 26 l/ sec.

FH No.	Surface	Cover / Frame	Pit	Type	Depth	Marker / Plate	Canary Yellow	Spindle	Operating	Comments
1	Grass	Poor	Good	LUG	290	Yes	No	Good		No Plinth
2	Grass	Poor	Good	LUG	370	Yes	No	Missing		No Plinth
3	Grass	Poor	Good	LRT	520	Yes	No	Good		No Plinth

Figure 13.6: Extract from SES Water Management Report indicating Hydrants Tested

13.4.4 Gas Networks Ireland Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. Whilst the Project includes an on-site Above Ground Installation (AGI) to regulate the supply to the turbines, a physical connection to the Gas Networks Ireland (GNI) gas network is required to provide the supply to the gas turbines. There is currently no adequate (high-pressure) gas main close to the site with only a low pressure pipeline located adjacent to the Project site as shown in Figure 13.7 below.

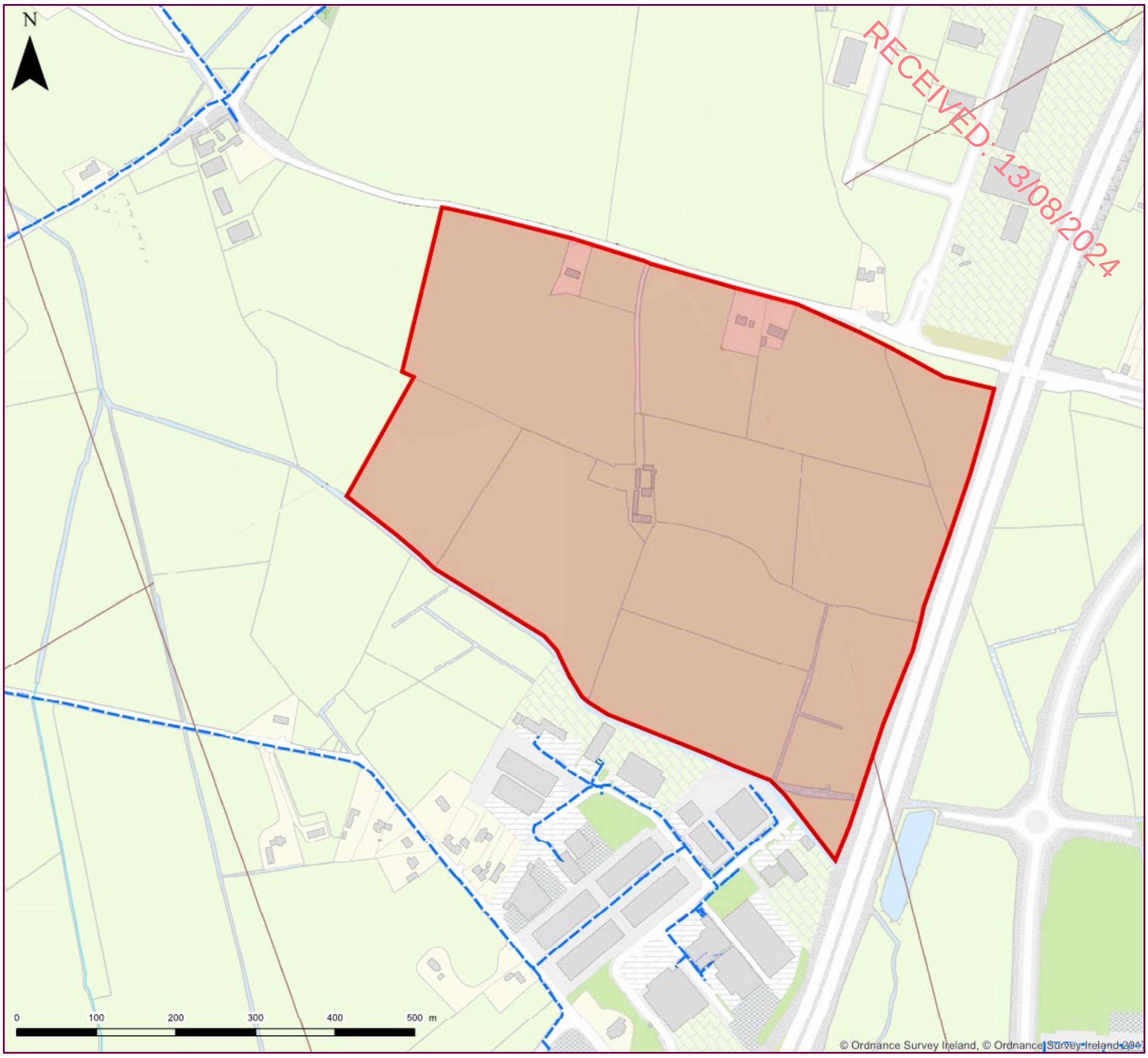

Figure 13.7: Gas Network

GNI will be responsible for providing the required infrastructure works, to construct a new high-pressure gas distribution pipeline, to the Project site boundary (on the R409), from the existing GNI AGI at Glebe West, Co. Kildare.

The final, detailed design, consenting and construction of the required infrastructure works will be the responsibility of GNI in the exercise of their own statutory functions, and therefore Herbata Ltd is not seeking planning consent to carry out these works as part of the Project.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

13.4.5 ESB Utility Services

Currently there are 2 overhead powerlines on site. On the west of the site, there is an existing 110kV overhead powerline which crosses the site in a north easterly direction. This overhead powerline as a single tower on site at the following co-ordinate: northing 686128.8208m, easting 719763.4211m. There are a further 2 towers for this overhead powerline, one located to the southwest of the onsite tower in the adjacent farmers field and one to the northeast of the onsite tower, across the R409 also located in a farmer's field.

In addition to the existing 110kV overhead powerline, there is an existing 220kV overhead powerline to the east of the site. This more substantial overhead powerline crosses the site in a south easterly direction. This overhead powerline has 2 towers on site at the following co-ordinate: Northing 686552.7548m, Easting 686552.7548 and Northing 686635.9805m, Easting 686635.9805m. There are a further 2 towers for this overhead powerline, one located to the northwest of the onsite towers, across the R409, in the adjacent farmers field and one to the southeast of the onsite tower, across the M7 motorway also located in a farmer's field.

In addition to the major overhead powerlines, there are domestic 10kV overhead powerlines which provide power to dwelling 1 and the agricultural buildings. It's currently unknown where the power for dwelling 2 and dwelling 3 is provided from. The 110kV and the 220kV overhead powerlines, as well as the 10kV, are owned and operated by EirGrid.

13.4.6 Fibre Utility Services

There are various options available to the Data Centre occupiers, which will develop over time. Fibre providers that are available in the vicinity are shown in Figure 13.8 below and include the following shown in Table 13.1 below.

Table 13.1: Summary of Potential Fibre Providers

Fibre Provider	Potential Fibre Services	Options / Notes
ESB-T (part of ESB Group)	Fibre is currently routed on the 110kV line crossing site so could be undergrounded and provided as a service from the new Grid substation.	ESB-T also have a Point of Presence (POP) in Monread in Sallins which could be used and then ducted to the Herbata site.
BT Ireland	Currently services are located on the railway line to the North of the Herbata site. Services can be provided from the POP in Naas to the site via new ducting.	
Eircom (Eir)	A POP is available in Naas, so new ducts will need to be laid to service the Herbata site.	Currently there is no Metropolitan Area Network (MAN) in Naas, so backbone upgrades will be required by Eir to provide high speed data services.
euNetworks (formerly Inland Fibre)	Services from euNetworks are currently available in Millennium Park and can be extended to the Herbata site.	
Aurora	High speed data services are available on parts of the Gas Networks Ireland High Pressure gas main infrastructure. With the new gas main being brought to site, discussions are ongoing about provide Aurora fibre along the new installation.	

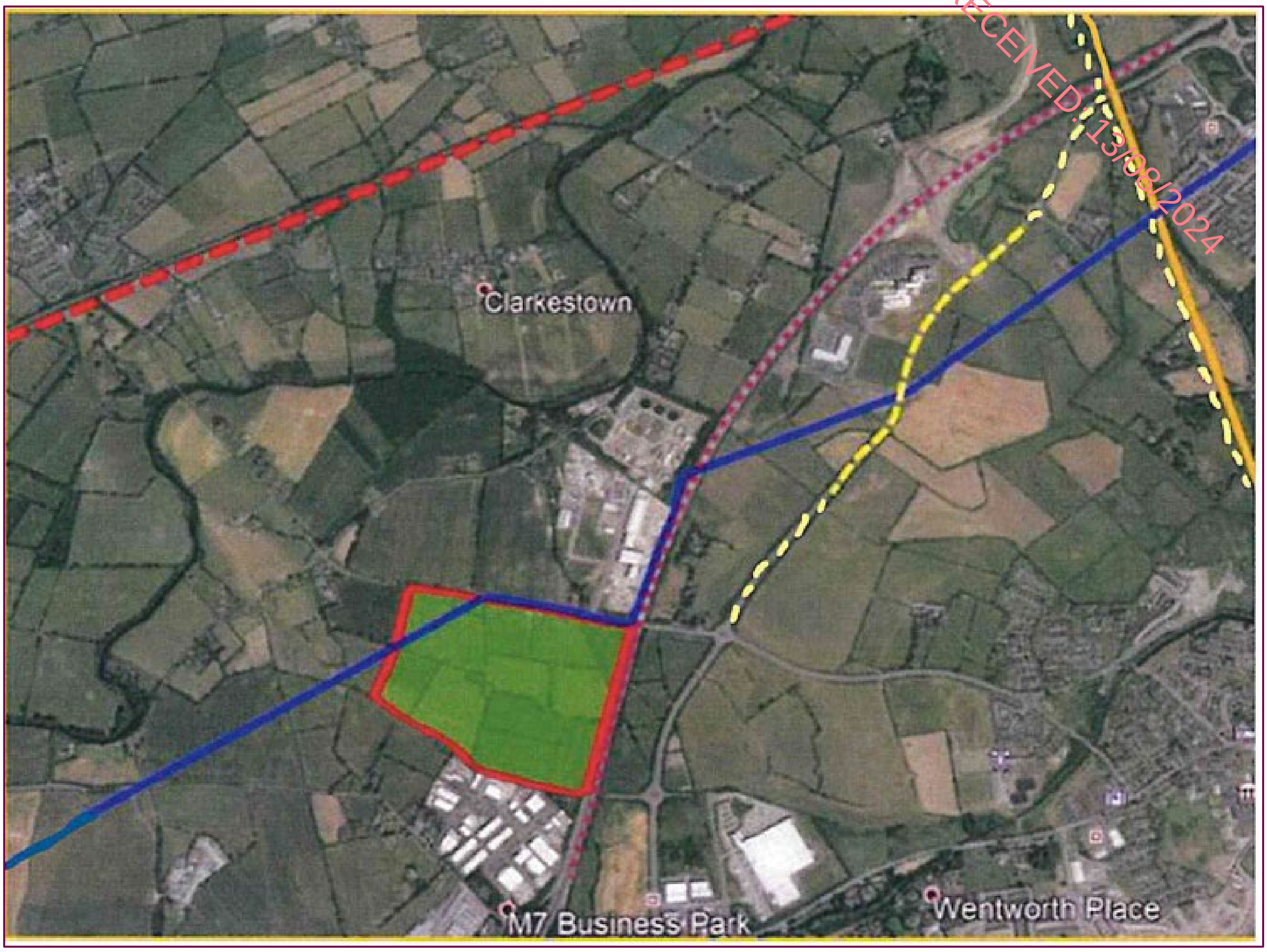

Figure 13.8: Fibre Network

Key:

- ESB-T (Blue continuous)
- BT (Light red dash)
- EIR (Orange continuous)
- euNetworks (Yellow dash)
- M7 Ducting (Dark red dash)

13.5 Impact Assessment

13.5.1 Do Nothing Scenario

If the Project was not undertaken, it is expected that there would be no significant change on the subject site regarding the surface water drainage, wastewater drainage or water supply. The site is zoned for ‘Commercial and Data Centre’ and it is likely that a development of a similar nature would be progressed on the site.

13.5.1.1 Surface Water

In the absence of this Project, surface water runoff from the site would continue to flow to existing onsite traversing watercourses which all ultimately discharge to the bluebell river adjacent to the southern boundary of the site. This would be considered a neutral, imperceptible and long-term effect.

13.5.1.2 Foul Drainage

In the absence of this Project, the existing properties on and adjacent to the subject site would continue to be served by private, on-site WWTP/ Septic Tank systems. There would continue to be no foul drainage discharging from the subject site. This would be considered a neutral, imperceptible and long-term effect.

13.5.1.3 Water Supply

In the absence of this Project, there would continue to be only minimal domestic demand for dwellings along with an additional domestic demand for agricultural usen the water network for the subject site which is a neutral, imperceptible, long-term effect.

13.5.1.4 Gas Networks Ireland

There are no predicted impacts should the Project not proceed. However, it's likely that future expansion of the gas services will be brought along the R409.

13.5.1.5 ESB Utility Services

There are no predicted impacts should the Project not proceed.

13.5.1.6 Virgin Media Utility Services

There are no predicted impacts should the Project not proceed. However, it's likely that future expansion of the fibre services will be brought along the R409.

13.6 Likely Significant Environmental Effects

13.6.1 Assessment of Construction Effects

The following section shall assess the effects of the receiving environment during the construction phase of the Project.

13.6.1.1 Surface Water

During the construction and demolition phase of the development, surface water from the existing development shall continue to discharge to the onsite, traversing watercourse and ultimately to the Bluebell Stream adjacent to the southern boundary of the site.

The following are the potential impacts of the Project during the construction phase:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil, and earth movement/ excavations, which may be flushed into the watercourses currently serving the site.
- Accidental spills of harmful substances such as petrol/ diesel or il during the delivery and storage of harmful substances or by leakages from construction machinery. Construction materials such as concrete and cement are alkaline and corrosive and can cause pollution to watercourses.
- Potential from building materials or silts to be washed into the onsite watercourses and Bluebell Stream adjacent to the southern boundary of the site, causing pollution. Waterborne silts can arise from dewatering excavations, exposed ground, stockpiles and site aul roads. Heavy siltation or grit in the surface water runoff would lead to maintenance issues such as desilting or dredging of the receiving watercourses.

In the absence of mitigation measures, these potential impacts are considered to be adverse, significant and temporary.

13.6.1.2 Foul Water Drainage

During the construction and demolition phase of the development, the contractor shall install temporary and welfare and toilet facilities. The discharge from these facilities shall be removed from the site using tankers. There shall be no effects to the surrounding Foul Drainage networks, particularly on the L2030 Newhall Road. This is due to no formal Foul Drainage Network Currently Serving the site.

13.6.1.3 Water Supply

During the construction and Demolition phase of the development, the contractor shall install temporary facilities on site for construction personnel. The water demands during the Demolition and Construction phase arising from the contractor's welfare facilities on the existing water supply networks are considered to have a neutral and imperceptible effect with a short-term duration.

13.6.1.4 Gas Networks Ireland

It is currently envisaged that GNI will construct the new gas main will alongside an existing high-pressure and low pressure main and then on to the Herbata site via the R409 road, a total distance of approximately 10.5km. It's not envisaged that this enhancement will have a significant environmental impact.

13.6.1.5 ESB Utility Services

The undergrounding of the existing overhead 110kV line will primarily occur on the Herbata site with limited impact to adjacent areas. It's not envisaged that this enhancement will have a significant environmental impact.

13.6.1.6 Fibre Utility Services

It is currently proposed that the new fibre services will be run in ducts in roads, pavements, and verges and then on to the Herbata site via existing roads. It's not envisaged that this enhancement will have a significant environmental impact.

13.6.2 Operational Phase

13.6.2.1 Surface Water

The existing site consists mainly of agricultural land that is currently being farmed. The overall existing surface water runoff discharges to the Bluebell River unattenuated and unthrottled at a combined theoretical rate of 180 l/s.

As part of the surface water development and strategy, the rate of discharge from the overall site was designed to a rate of Qbar (existing Greenfield Runoff Rate) which is 180l/s. The site is proposed to be developed in three phases with 3 no. outfalls to the Bluebell Stream. The rate of discharge from each catchment has been calculated to reflect an apportioned percentage of the overall greenfield discharge rate. Table 13.2 below indicates a summary of each catchment proposed along with the rate and percentage of the overall site discharge.

Table 13.2: Catchment Summary with Proposed Discharge Rates

	Soil Type	Allowable Discharge l/s/ha	Analysed Area	Discharge Rate	Discharge %
Catchment 1	3	6.0	10.020	60.12	33
Catchment 2	3	6.0	8.301	49.81	28

Catchment 3	3	6.0	11.748	70.49	39

The current operational activities on the subject site are predominantly agricultural and farming, Bovine and Sheep enterprises are currently operating with a large number of animals inhabiting the lands. Watercourse traversing the site are the animals' source of water supply, meaning that animals are standing and moving through the watercourses. In addition to this, each watercourse on the site is vulnerable to animal waste entering route. This suggests that the current operations on site result in some water pollution through regular and normal activities.

As part of the Project, the site shall adopt a competent water cleaning train which shall with a minimum two stage strategy of SuDS measures such as swale, filter drains, permeable paving, pond structures, and petrol/ oil interceptors. The proposals for the surface water treatment shall considerably increase the quality of the water entering the Bluebell stream compared to current operations. Figure 13.9 below outlines the proposed treatment train strategy which shall be adopted as part of the Project

The impacts on surface water discharge from the site are considered to be positive, significant and permanent.

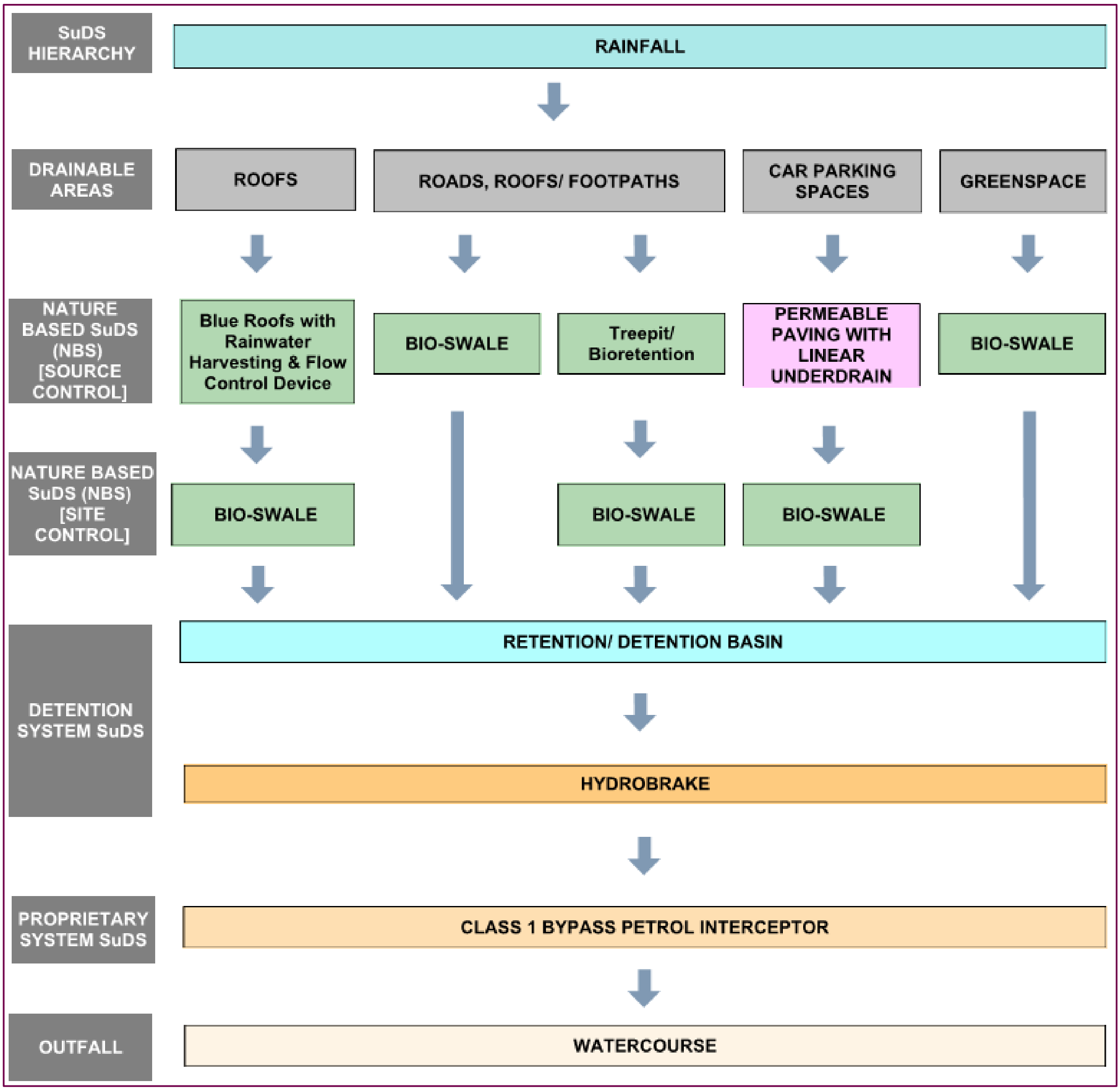

Figure 13.9: Proposed SW Treatment Train Strategy

13.6.2.2 Foul Water Drainage

The proposed foul strategy will be to provide a new foul drainage network to collect effluent from the new development via a local piped network. Each Data Centre building shall be served by its own local foul drainage network which conveys flows to a main gravity line discharging to a pumping station located on the site. There are 2 No. foul drainage catchments on the proposed site. DC Buildings 1,2 and 3 and the adjacent SID Substation (Catchment 1) shall discharge to a pumping station located to the west of the site while DC buildings 4, 5 and 6 and the AGI building (Catchment 2) shall discharge to a pumping station at the Eastern portion of the site.

Foul effluent will be pumped via two separate rising mains (one from each pumping station) and crosses agricultural lands located south of the Bluebell Stream in order to discharge to the main public foul drainage network which is located along the L2030 via a stand-off manhole

Uisce Éireann have advised, through the Connection and Developer Services (CDS) confirmation of feasibility letter, that a connection to the existing public sewer on the L2030 is feasible.

The impacts of Foul Water discharge from the site are considered to be insignificant and permanent.

13.6.2.3 Water Supply

The Water use proposed for the subject site shall be in three various systems. Process water for general operations and system cooling, firefighting water in the event of a fire within the site and potable water for general human consumption etc. It is proposed, as part of the development to supply the site from the existing Uisce Éireann network on the R409 with potable water only. Supply for process water and fire fighting will not be permitted. The below sections outline the extent of water demand/ supply networks proposed as part of the site development.

13.6.2.3.1 Process Water

It is understood from pre-planning consultations held with Uisce Éireann that process water supply from the public water supply system is not permitted. It is proposed to provide water for the industrial processes via rainwater harvesting from the data hall building roofs. Run-off will be collected in a dedicated drainage network, treated in the onsite water treatment works and stored in underground tanks located below the car park to each data hall. Surplus run-off will overflow from this network into the Surface water drainage network. The tanks have been sized to provide full annual storage of 481.5m3 storage per data centre building.

A back-up supply for process demand will be provided by retaining a permanent volume of water in the proposed attenuation ponds on the site that can be used for process water top up. This system will have associated pumping facilities that can supplement the feed to the on-site water treatment facility and be used as a top-up supply to the data centre storage tanks.

The available supply of water via rainwater harvesting therefore greatly outweighs the demand over the course of a year and any surplus rainwater will be directed to the site surface water swales and network serving each building.

13.6.2.3.2 Firefighting Water

The recommended firefighting water demand purposes for the proposed site is 100l/sec per data hall. (4 hydrants operating simultaneously at a flow rate of 25l/sec).

Uisce Éireann have noted that they cannot guarantee a fire-fighting flow of water during summer months and have recommended that the full quantity of water supply for fire-fighting purposes be stored on site. This volume will be provided in a static water storage tank which will be pressure boosted to an internal fire-fighting watermain with 8 No. Fire hydrants located in accordance with Building Regulation requirements around each Data Hall building.

13.6.2.3.3 Potable Water

A new dedicated water supply is proposed to be taken from the existing 225mm diameter public water supply located along the R409 to serve the potable water supply demands of the site. The estimated average hour water demand and peak hour water demand generated by the Project are 0.26l/s and 1.30l/s respectively as calculated in accordance with Uisce Éireann Code of Practice for Water.

Uisce Éireann have advised through the Connection and Developer Services (CDS) confirmation of feasibility letter, that a connection to the water supply network on the R409 is feasible.

The impacts on Water Supply to the site are considered to be insignificant and permanent.

13.6.2.4 Gas Networks Ireland

It is proposed that the development will be serviced by a dedicated high pressure gas supply which will supply the Turbines via a network of on-site gas supply pipework.

13.6.2.5 ESB Utility Services

Excess power from the gas turbines will feed back into the onsite GIS Substation which is part of a separate SID Application.

13.6.2.6 Fibre Utility Services

From the proposed fibre connection to the site will be a network of onsite fibre route which will connect to each of the separate buildings.

13.6.3 Cumulative Effects

13.6.3.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. A number of planning applications (permitted, submitted but undetermined and under construction) have been identified within the locale of the Project site. Many of these projects are associated with the retail and industrial complexes located to the north and south of the Project site. It is not likely that the Project will result in any negative significant cumulative effects on Material Assets - Built Services in combination with these external plans/projects.

13.6.3.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The final, detailed design, consent and construction of the required infrastructure works will be the responsibility of GNI in the exercise of their own statutory functions, and therefore Herbata Ltd is not seeking planning consent to carry out these works as part of the Project.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

A desktop review of the proposed high pressure gas pipeline route was undertaken to assess potential impacts on lands and soils along the most likely route.

A desktop review of the likely pipeline route was undertaken to assess potential impacts on existing built services along the route. This included a review of known public drainage and utility services via service provider online mapping systems. There are extensive drainage and utility services located along the most likely route of the pipeline. Normal best practice techniques for avoiding danger from underground and overhead services and extensive planning and survey works will be required to ensure the proposed pipe avoids clashing with local infrastructure and that adequate separation distances from adjacent and proximate services are maintained. The following key items of services infrastructure have been identified along the most likely route of the new pipeline:

- Running alongside existing 150mm dia. high-pressure gas pipeline from Glebe West AGI to Naas Town AGI.
- Crossing 1270mm dia. watermain in agricultural lands west of Glebe West
- Crossing beneath High Voltage Electrical services in agricultural lands west of glebe west
- Crossing 1600mm dia. watermain in agricultural lands west of Glebe West and south of Punchestown racecourse
- Crossing 450mm dia. watermain along L2023 West of Punchestown Racecourse
- Crossing 1200mm surface water sewer at Ballymore Eustace Road Roundabout
- Running adjacent to existing low pressure gas pipeline in verge of Naas Southern Ring Road from Ballymore Eustace Road Roundabout to Newbridge Road.
- Running adjacent to 600mm dia. foul sewer in verge of Naas Southern Ring Road from Ballymore Eustace Road Roundabout to Newbridge Road.
- Running adjacent to 900mm dia. foul sewer in through agricultural lands from Grand Canal to Caragh Road Roundabout

In conclusion, much of the likely pipeline route will follow existing gas pipelines and other services. It is considered that the new pipeline can be delivered along this route without the need to divert or relocate significant existing infrastructure.

There are no predicted negative significant cumulative effects on Material Assets - Built Services as a result of these associated projects.

13.7 Mitigation

13.7.1 Construction Phase

13.7.1.1 Surface Water

In order to mitigate against the potential impacts outlined in section 13.5.1.1 above, the following measures are proposed for the construction stage of the Project:

Groundwater or run-off that collects in excavations or foundation trenches will be drained or pumped to a construction site water treatment arrangement. The water is to be directed into a proprietary settlement tank, with a proprietary ‘silt bag’ to intercept bulk silt volumes. This process entails sediment-laden water being pumped into a filter bag, which traps the solids inside and allows the filtered water to flow freely out through the Geotextile fabric to disperse into the collection point. The proposed collection point shall be a series of silt trap fences and filter drain arrangements, adjacent to constructed pond which will act as temporary settling ponds during the construction The water and silt within the pond are to be emptied into water vacuum tanker and is to be disposed of off-site toa licenced facility.

Due to the sloping nature of the existing topography, there is a risk of silt/ sediment accumulating/ discharging towards the Bluebell stream. To mitigate against unwanted silt discharge, Silt traps in the form of silt fences or hay bale structures will be adopted across lengths of the site to intercept runoff and provide a stage of treatment and runoff filtration.

Runoff filtered through the silt trap fence shall be then intercepted by a temporary filter drain which will run directly parallel to the downstream side of the silt trap fence. The collected, filtered runoff shall discharge to the constructed ponds which shall act as temporary settlement structures during the construction phase. The use of filter drains and temporary settlement ponds shall further treat any potential contaminated/ polluted runoff prior to discharge to a Silt Bag arrangement which will provide maximum treatment of surface water runoff entering the Bluebell stream.

During the construction phase of the development, all silt/ pollution removal strategy structures shall be constructed/ installed outside the extent of the riparian buffer which has been determined as 10m from the Bluebell Stream bank. A summary of the proposed series of silt/ pollution prevention has been provided in Figure 13.10 below.

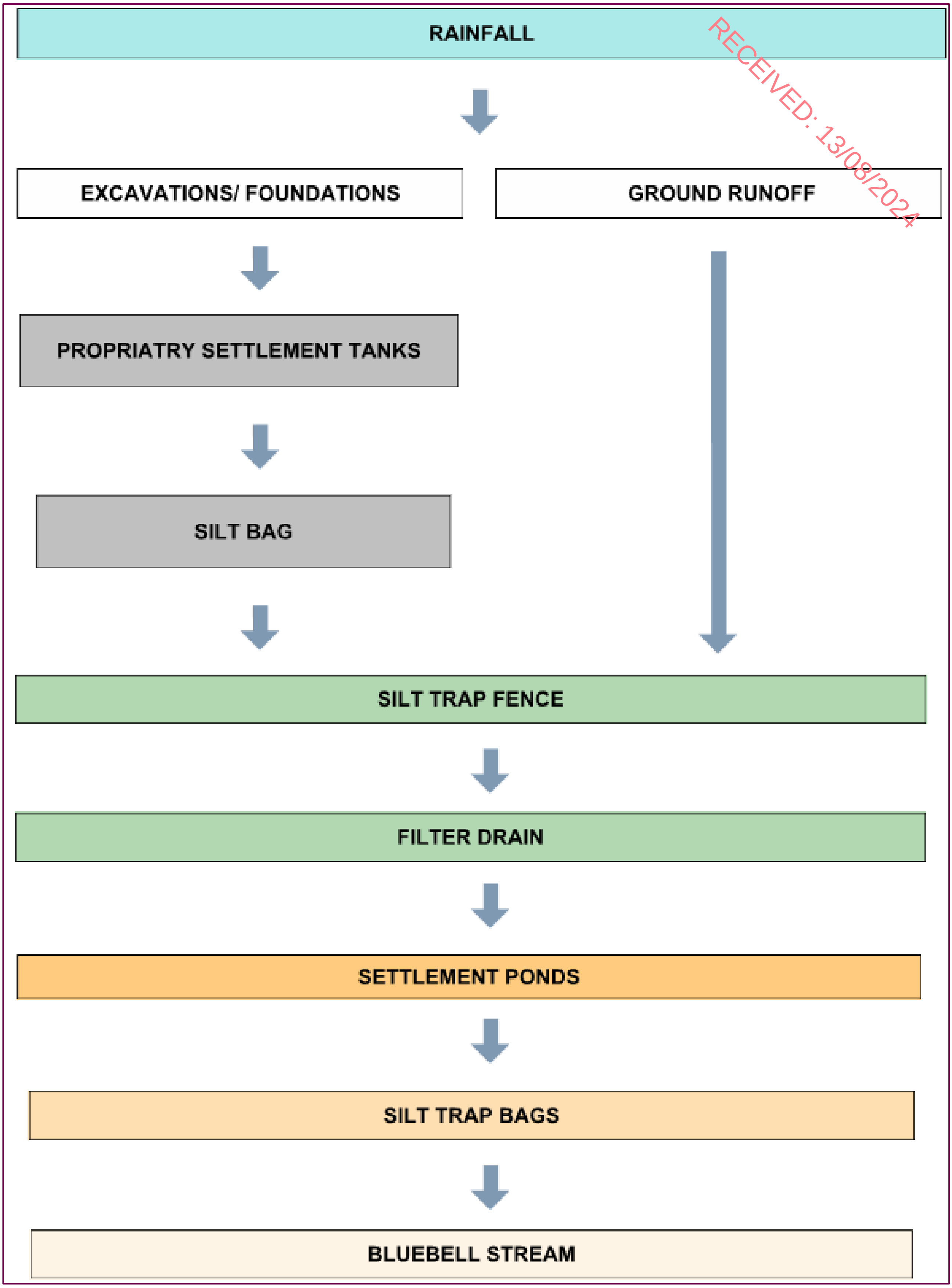

Figure 13.10: Proposed Mitigation SW Treatment Train during Construction

13.7.1.2 Foul Drainage

During construction, all new sewers shall be pressure tested and CCTV surveyed in accordance with the Uisce Éireann Standards to identify potential defects and such defects should they arise, shall be repaired prior to the connection

13.7.1.3 Water Supply

During construction, the watermains shall be tested in accordance with the requirements of Irish Water prior to connection.

13.7.1.4 Gas Connection

During construction, the gas mains shall be tested in accordance with the requirements of GNI prior to connection. The turbines will also be tested in accordance with the manufacturer's specifications.

13.7.1.5 ESB Utility Services

During construction as part of the final testing and commissioning, the overhead lines and underground cables will all be tested in accordance with the requirements of ESB and Eirgrid's standard procedures.

13.7.1.6 Fibre Utility Services

During construction, the ductwork for the fibre network will be CCTV surveyed to ensure no breakages has occurred during installation.

13.7.2 Operational Phase

13.7.2.1 Surface Water

Surface water runoff from the Project will be managed in accordance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS), with surface water attenuation and retention included as part of the main surface water drainage system. The surface water management proposals shall serve to significantly reduce the overall impact of the Project on the existing environment and shall reduce the risk of flooding in the receiving public surface water network. The proposed SuDs strategy shall also provide cleansing of all surface water prior to the discharge to the Bluebell Stream, increasing the sustainability of the design.

13.7.2.2 Foul Drainage

The Project's management company shall carry out operational inspection and maintenance regimes to ensure the system keeps operating within the design specifications.

13.7.2.3 Water Supply

The Project's management company shall carry out operational inspection and maintenance regimes to ensure the system keeps operating within the design specifications.

13.7.2.4 Gas Networks Ireland

GNI shall carry out operational inspection and maintenance regimes to carry out to ensure the system keeps operating within the design specifications.

13.7.2.5 ESB Utility Services

The substation will be managed, operated and maintained by ESB who will carry out operational inspection and maintenance regimes to ensure the system keeps operating within the design specifications.

13.7.2.6 Fibre Utility Services

The Project's management company shall carry out operational inspection and maintenance regimes to ensure the system keeps operating within the design specifications.

13.7.3 Residual Impacts

13.7.3.1 Surface Water

The provision of a Sustainable Urban Drainage System (SUDS) for the Project will provide betterment of the existing scenario. Blue roofs, bio-retention areas, ponds and swales will facilitate a reduction in surface water runoff volumes discharged from the site. Collection of surface water runoff via blue roofs, pervious paving and bio-retention areas provides improvement to water quality. Provision of attenuation storage and flow control will reduce surface water runoff rates discharged from the site. The impact on surface water is a positive, significant and long-term effect.

13.7.3.2 Foul Water

It is considered that the residual effects on the existing foul drainage network on the L2030 network will be neutral, not significant and permanent.

13.7.3.3 Water Supply

It is considered that the residual effects on the watermain network on the R409 will be neutral, not significant and permanent.

13.7.3.4 Gas Networks Ireland

It is considered that the residual effects on the gas enhancements on the R409 will be neutral, not significant and permanent.

13.7.3.5 ESB Utility Services

It is considered that the residual effects on the GIS Substation will be neutral, not significant and permanent.

13.7.3.6 Fibre Utility Services

It is considered that the residual effects on the fibre network on the R409 will be neutral, not significant and permanent.

13.8 Interactions

13.8.1 General

The design team has produced a coordinated design to minimise environmental impacts and to ensure a sustainable approach to the design if the Project. In compiling this chapter, reference has been made to the project description provided by the project coordinators, project drawings and design reports provided by the project architects and engineers and information relating to construction activities provided by the engineers. Reference can be made to the relevant chapters for additional information.

13.8.2 Climate

Climate change has the potential to increase flood risk over time. However adequate attenuation and drainage have been provided to account for increased rainfall in future years as part of the design of the Project, and it has been concluded that the associated impact will be long-term, localised, neutral and imperceptible.

13.8.3 Lands, Soil, Geology & Hydrology

There is an inter-relationship between hydrology and built services. There will be no potential cumulative impacts with no largescale dewatering required and aquifer with little importance regionally. Surface water runoff may have the limited potential to enter soil and groundwater. Implementation of appropriate mitigation measures will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrology.

13.9 References

- The Greater Dublin Region Code of Practice for Drainage Works, 2012, Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council
- Greater Dublin Strategic Drainage Study, 2005, Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council
- I.S. EN752: 2017 Drain & Sewer Systems outside Buildings, 2017, National Standards Authority of Ireland
- I.S. EN12056: 2000 Gravity Drainage Systems inside Buildings, 2000, National Standards Authority of Ireland
- I.S. EN752: 2017 Drain & Sewer Systems outside Buildings, 2017, National Standards Authority of Ireland
- Code of Practice for Water Infrastructure, 2017, Uisce Éireann
- Code of Practice for Wastewater Infrastructure, 2017, Uisce Éireann
- Wastewater Treatment Manuals, 1999, Environmental Protection Agency
- Control of Water Pollution from Construction Sites, 2001, Construction Industry Research and Information Association
- Technical Guidance Document H Drainage & Wastewater Disposal, 2016, Department of Housing, Planning, Community and Local Government
- The SuDS Manual, 2015, Construction Industry Research and Information Association
- Civil Engineering Design Report, 2023, Donnachadh O’Brien & Associates Consulting Engineers
- Construction Management Plan, 2023, Donnachadh O’Brien & Associates Consulting Engineers
- Resource and Waste Management Plan, 2023, Donnachadh O’Brien & Associates Consulting Engineers

HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 14 POPULATION

NI2615
01
June 2024

14 POPULATION

14.1 Introduction

This section of the EIAR assesses the impact of the Project on the population the general area of the Project. Specific aspects that will be examined include population levels, impact on employment and social facilities.

Population assessment is a broad ranging topic and interacts with all other environmental factors to some degree or another. The effects of any development on the environment may impose on humans directly and indirectly, positively, and negatively. Any significant impact on the status of the population that may be potentially caused by a development proposal must, be addressed as in much detail as possible.

In particular, this chapter:

- Presents the existing environmental baseline established from desk-based studies.
- Identifies any assumptions and limitations encountered in compiling the environmental information; and,
- Highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible impacts in the EIA process.

The KCC County Development Plan 2017 – 2023, Chapter 15 Development Management Standards states that “childcare facilities will also be required to be provided in large-scale employment centres with an excess of 100 employees”. The Project will generate more than 100 no. jobs. The provision of c. 225 no. jobs over a c.37ha site in proximity to other low density employment generators is not considered to be a “large scale employment centre”. It is therefore considered that there is no requirement to provide a childcare facility at this location. However, given the absence of clear guidance on what might constitute a large-scale employment centre childcare facilities in the wider locale have been identified as part of this chapter.

14.2 Methodology

The following assessment of the predicted impacts on population was undertaken based on:

- Local population information from the Central Statistics Office’s (CSO) Census of Population and Kildare County Council.
- A desk based assessment to establish residential properties and settlements in proximity to the Project.
- A desk based assessment to establish existing social assets including hospitals, schools and childcare facilities within the wide locale.

With respect to the nature and scale of the Project, it was considered that an assessment of residential properties within a 1km radius and population, employment, and social facilities within a 3km radius of the boundary of the Project site would be appropriate as illustrated by Figure 14.1 below.

Figure 14.1: Catchment Area of the Assessment Defined as 1 & 3km Radius from the Project Site

With regards to the impact on population, the demographic scope of the assessment is determined by overlaying the 3km radius buffer zone from the Project site and the Electoral Divisions National Statutory Boundaries as illustrated in Figure 14.2 below. The Electoral Divisions which have been used in this assessment includes the following:

- Carragh (87019)
- Naas Rural (87070)
- Naas Urban (87071)
- Ladytown (87062)

Figure 14.2: Demographic of the Scope of the Assessment

14.2.1 Limitations

It should be noted that although there is data available from the 2022 Census it has not been made available in a format that facilities spatial interrogation, therefore, the 2011 and 2016 Census data have been used unless stated otherwise.

14.3 Characteristics of the Project

The Project includes two main elements, namely:

(a) The Data Centre, comprising 6 no. two storey Data Centre buildings, an administration/management building, car parking, landscaping, energy infrastructure and other associated works. These elements are the subject of the planning application submitted to KCC, and that application is referred to hereafter as "the Data Centre Application".

(b) The substation, comprising a grid substation and 110kV transmission connection. These elements are subject of the SID application to An Bord Pleanála, and that application is referred to hereafter as "the Substation Application".

14.4 Baseline

14.4.1 Physical Context

The Project is located in the townlands of Halverstown, Jigginstown, Osberstown and Newhall is located on the western side of the M7 motorway, between Junctions 9a and 10, and is bound to the north by the R409 which provides a direct link to the centre of Nass, c.2.5km to the east.

The 'M7 Business Park' is located immediately to the south of the site and the 'Osberstown Business Park' is located to the north of the R409 (Caragh Road). The Osberstown Wastewater Treatment Plant is located further north. The site is bounded to the east by the M7 motorway and to the west by agricultural lands. The 'Newhall Retail Park' is located to the south of the site, on the east side of the M7 motorway. There has been significant development in the locality in recent years, particularly light industry, logistics and services. Lands to the east on the other side of the motorway form part of the Nass Northwest Quadrant.

Figure 14.3 below highlights the towns and settlements within a 3km radius of the Project which includes the towns of Carragh, Clarkstown, Sallins and Naas

Figure 14.3: Towns and Settlements within a 3km radius

Figure 14.4 below identifies the residential properties in close proximity to the Project

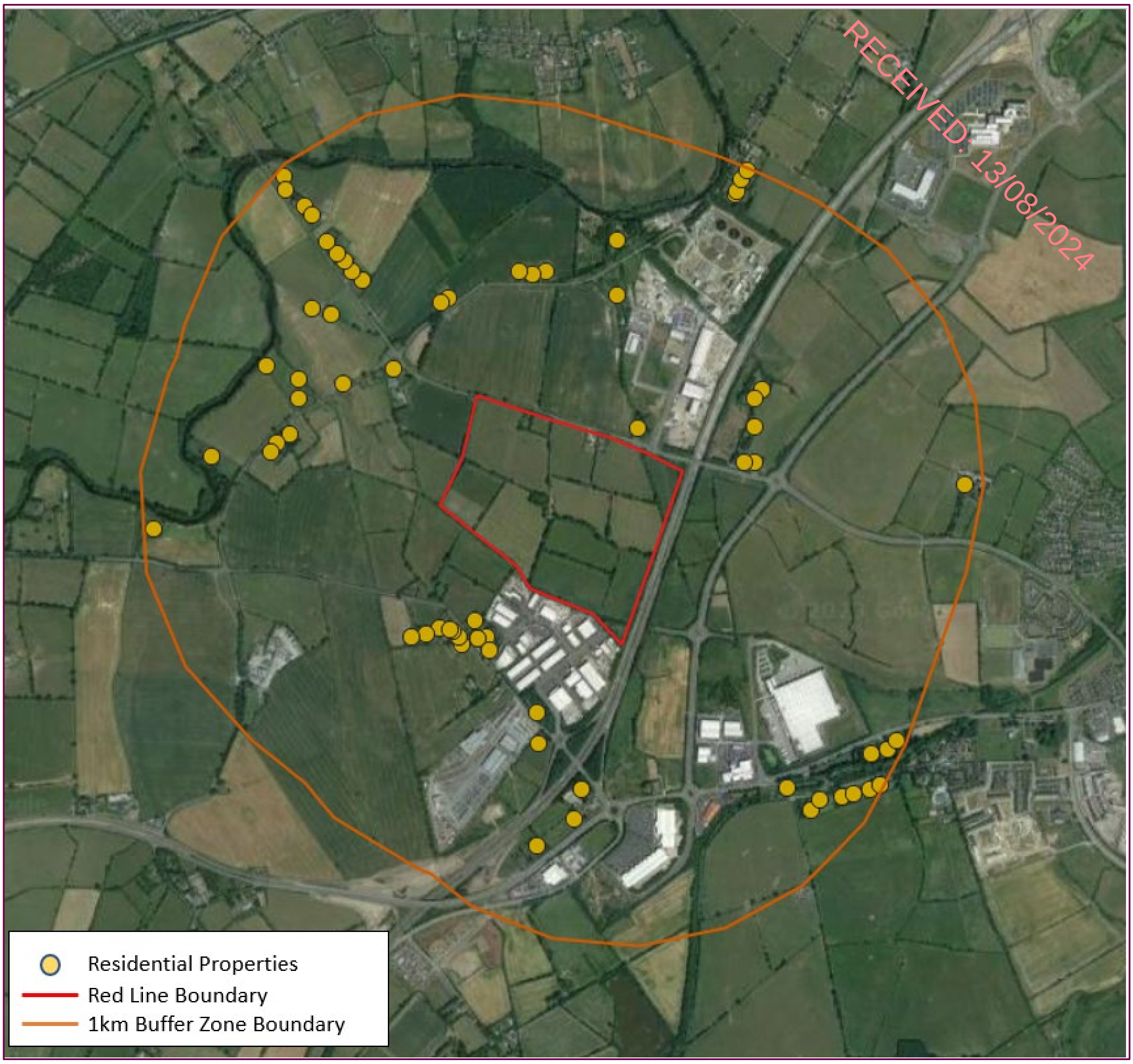

Figure 14.4: Residential Properties within a 1km radius

14.4.2 Demographic Context

14.4.2.1 Population

The latest Census 2022 results show that Ireland's population stood at 5,149,139. This was an 8% increase on the 2016 census. The trend has been represented in Kildare County Council with a growth rate of 11% to 247,774, which means the number of people in the county rose by 25,270 between April 2016 and April 2022. The Census 2022 Data is not available for interrogation at a more local level therefore data from 2016 and 2011 have been used to set out the baseline and assessment for the Electoral Divisions.

Census 2016 results show that the assessment area's population stood at 27,123 in April 2016, which indicates an increase of 5.4% since the last Census in 2011. This is submitted to be in line with the overall demographic trend Kildare County Council. Breaking down the growth into the Electoral Division's, as illustrated in Table 14.1 below, all electoral divisions had a growing population. However, Nass Rural recorded a notable growth rate standing at +16.4%with an actual increase of +386persons over 2011-2016. This is then followed by Carragh (+5.7%), Nass Urban (+4.2%), and Ladytown (+2.4%).

Table 14.1. Population Change in the Assessment Area against the overall Stats of the Administrative Areas, 2011-2016

Area	Census 2011	Census 2016	Actual Change	Percentage Change
Kildare County Council	**210,312**	**222,504**	**25,270**	**+5.8%**
Carragh	1,725	1,823	98	+5.7%
Nass Rural	2,353	2,739	386	+16.4%
Nass Urban	20,713	21,597	884	+4.2%
Ladytown	941	964	23	+2.4%

14.4.2.2 Age

The age profile of a population in the area is an important parameter as it provides a good insight into the potential labour force, the demand for schools and social facilities. Investigating the age profile of Kildare Council and each of the ED's, the more urbanised areas follow the same pattern. Kildare County Council, Naas Urban and Naas Rural illustrates a peak of births in 1980's which shows up in the 30-39 age category, and another peak in the number of births occurred in 2000's and shows up in the 0-9 age category.

Ladytown and Carragh show a lower number of people between the 20 – 39 age categories which can be explained by younger people moving away from these small settlements for work or education.

Overall, the age pyramids indicates a young population residing in the area, which is expected to grow in the coming years.

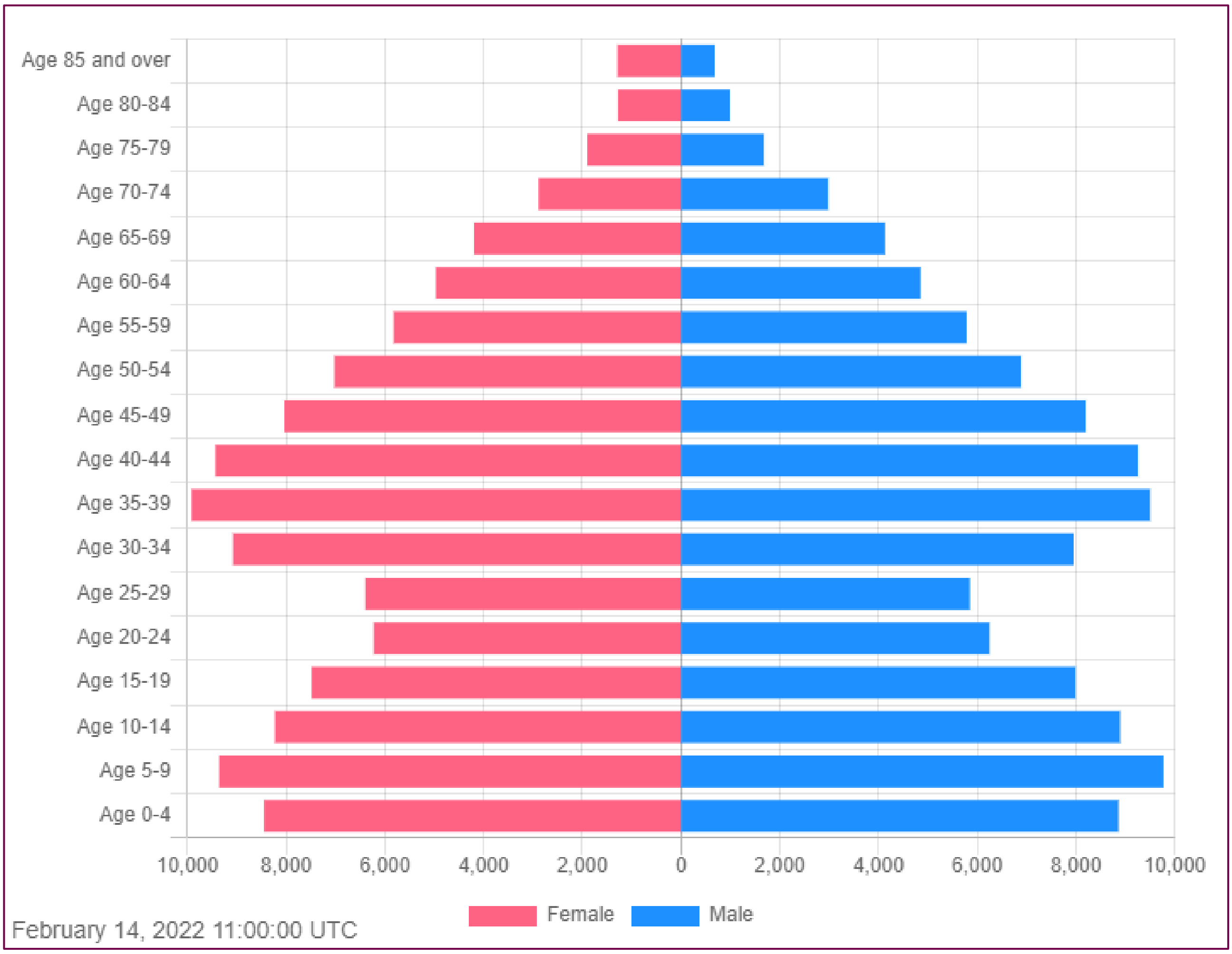

Figure 14.5: Kildare County Council Age Pyramid

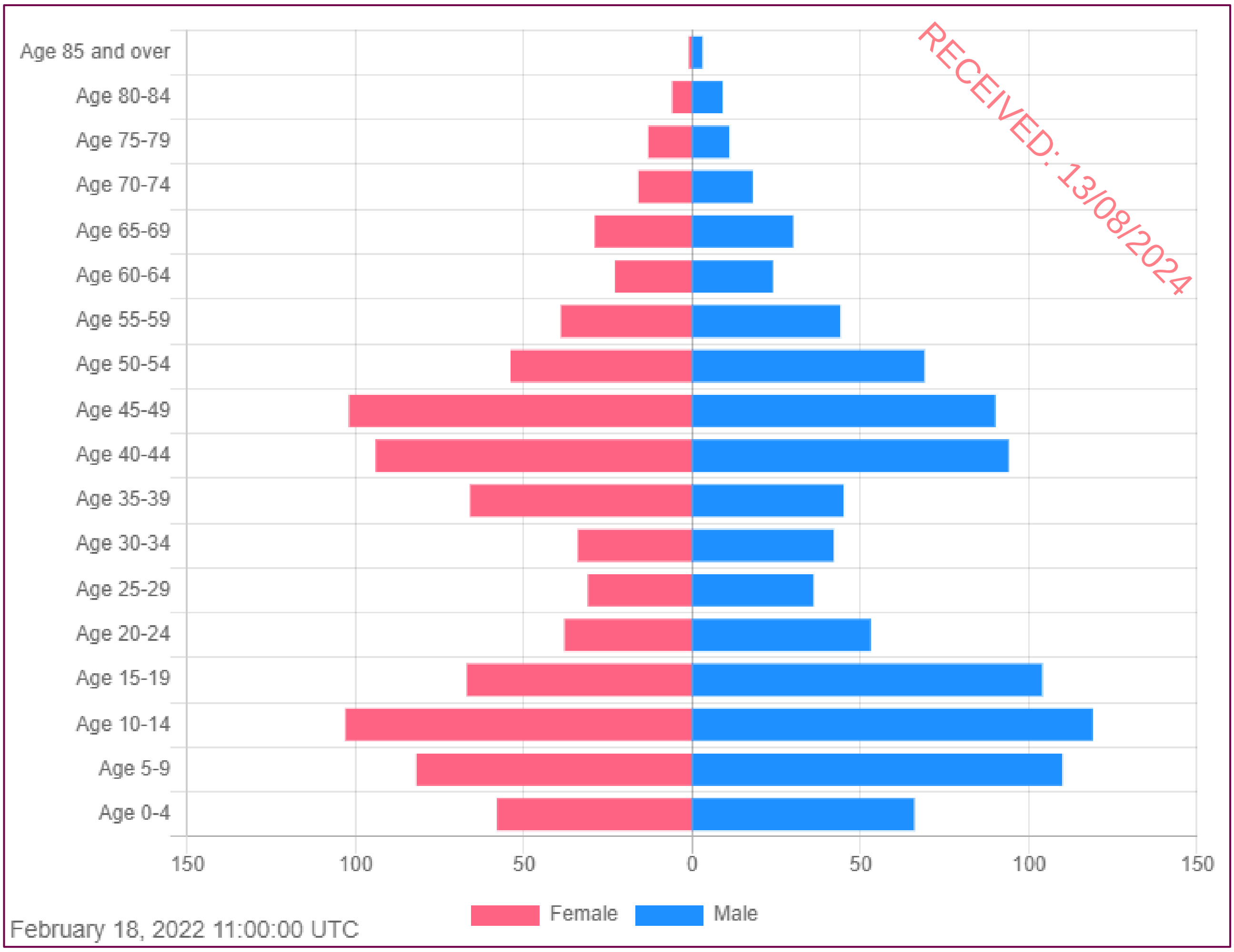

Figure 14.6: Carragh Age Pyramid

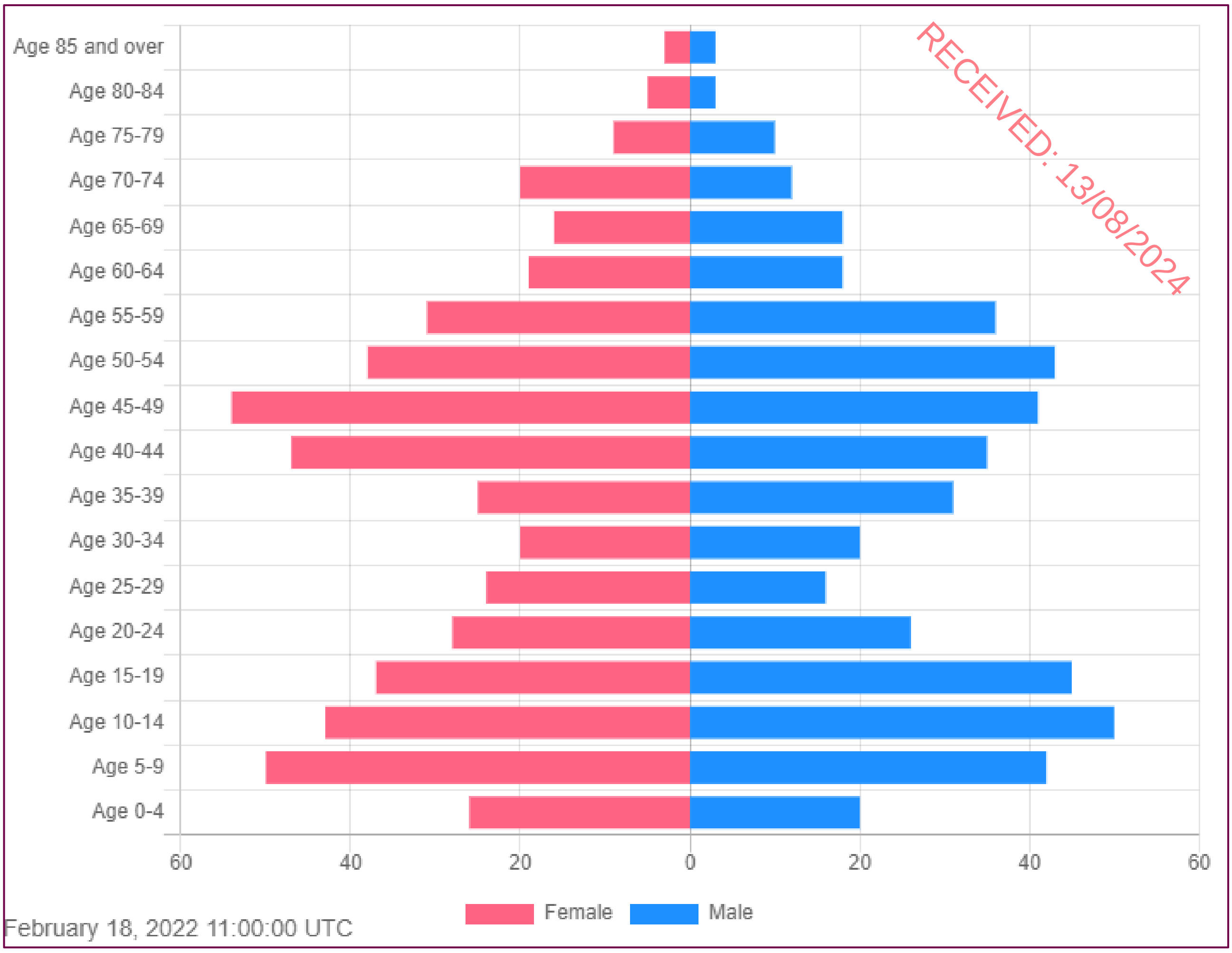

Figure 14.7: Ladytown Age Pyramid

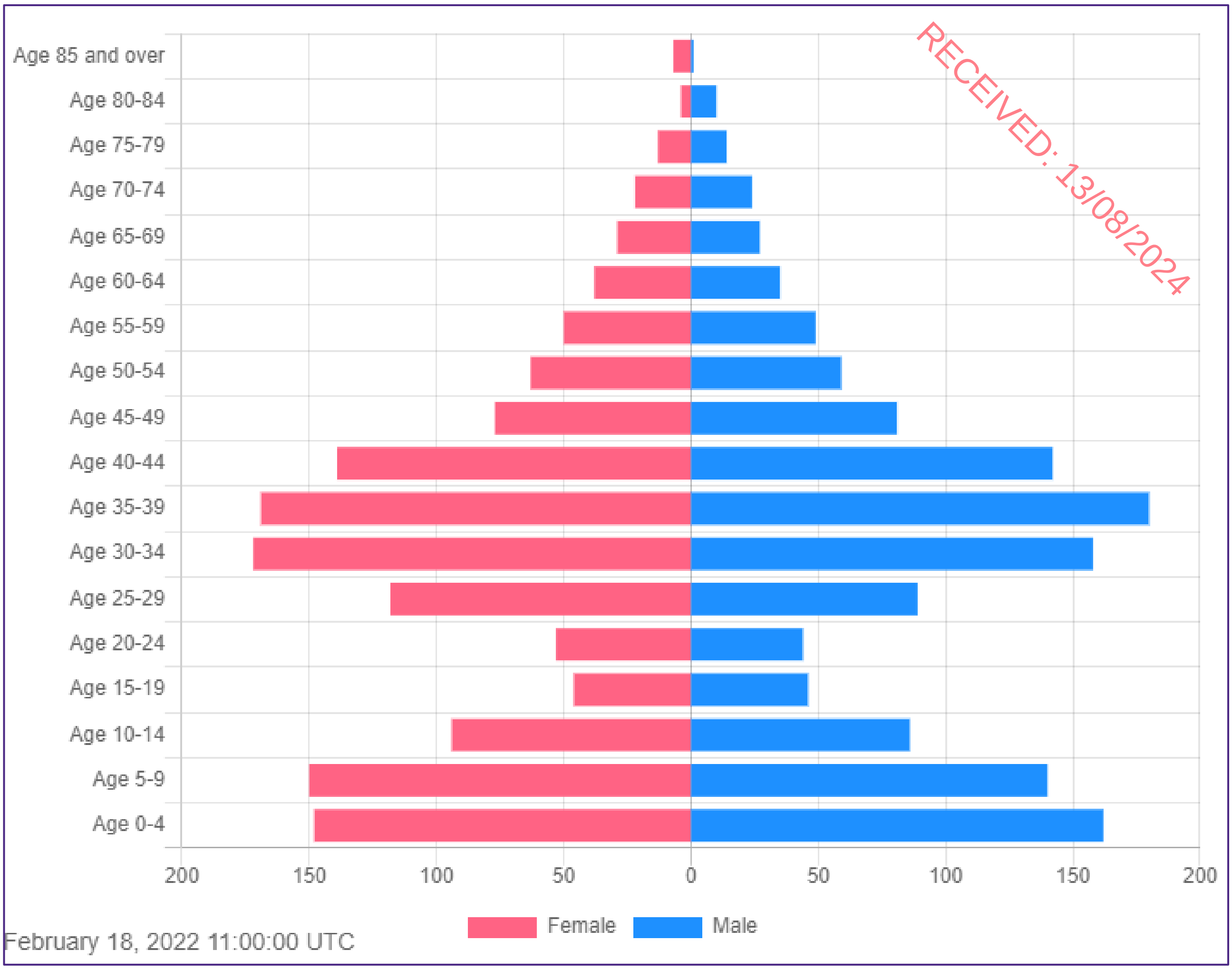

Figure 14.8: Naas Rural Age Pyramid

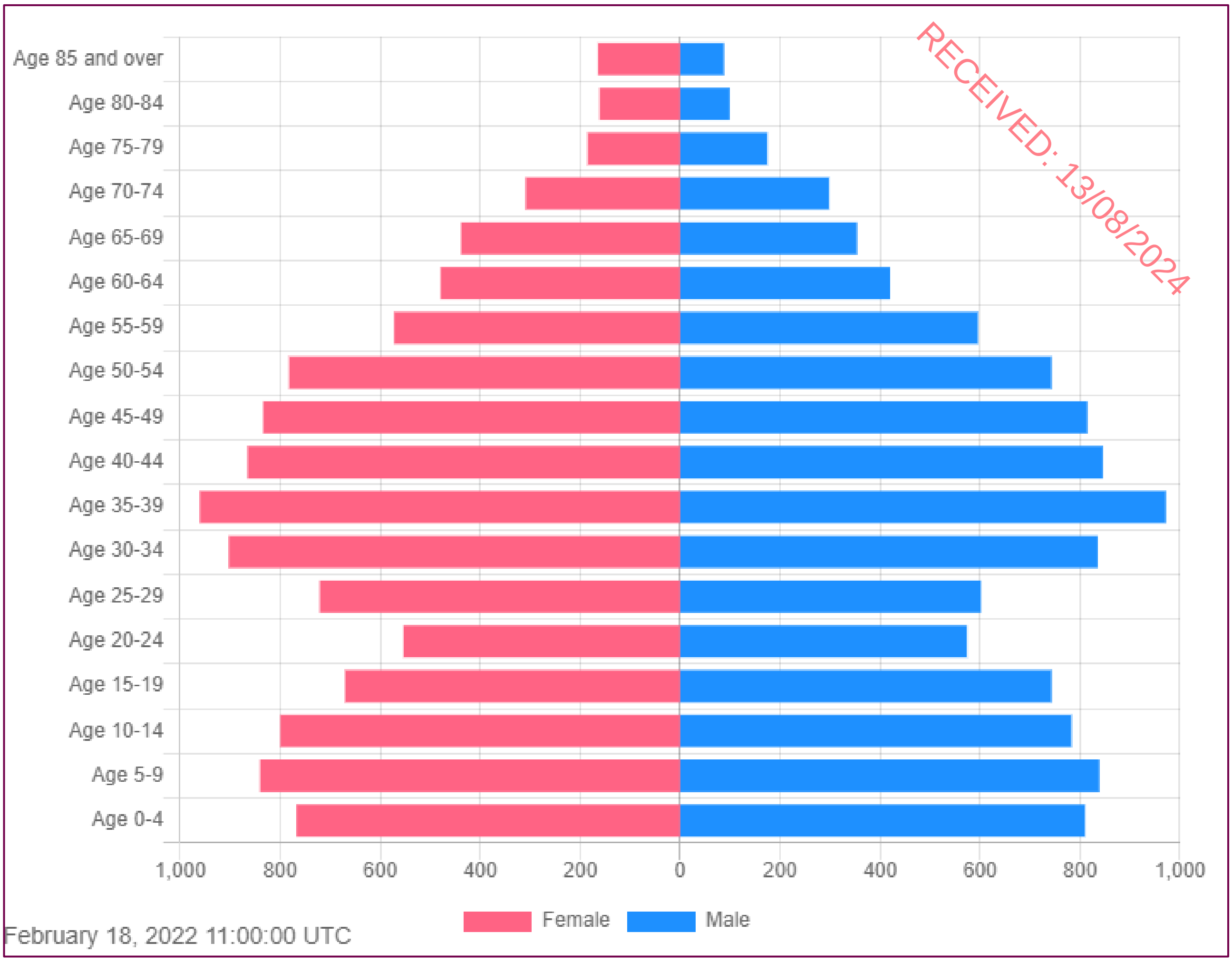

Figure 14.9: Naas Urban Age Pyramid

14.4.3 Employment

The latest Census 2022 results show that overall, in Ireland the number of people aged 15 and over at work in April 2022 stood at 2.3 million, up 16% in six years. In Kildare County there were 114,829 people (aged 15 and over) at work, an increase of 18,882 people (+20%) between 2016 and 2022.

The CSO data from 2011 to 2016 show that there has been an increase in employment levels within the assessment areas and across all four Electoral Divisions as illustrated in table xx below. The most notable increase has been in Ladybarn with a +22% increase, followed by Nass Rural (+16.4%), Carragh (+15%) and Nass Urban (+8%).

Table 14.2. Total Number of Persons aged +15 years at Work in the County and Study Area, 2011-2016

Persons at Work				
Area	**Census 2011**	**Census 2016**	**Actual Change**	**Percentage Change**
Carragh	678	780	102	+15%
Nass Rural	1,206	1,404	198	+16.4%
Nass Urban	9,253	9,990	737	+8%
Ladytown	367	448	81	+22%

14.4.4 Social Assets

The assessment area is well served by Childcare Facilities, Pre-Schools and Schools are illustrated by Figure 14.10 below. These are mainly located in Nass with some located in Carragh.

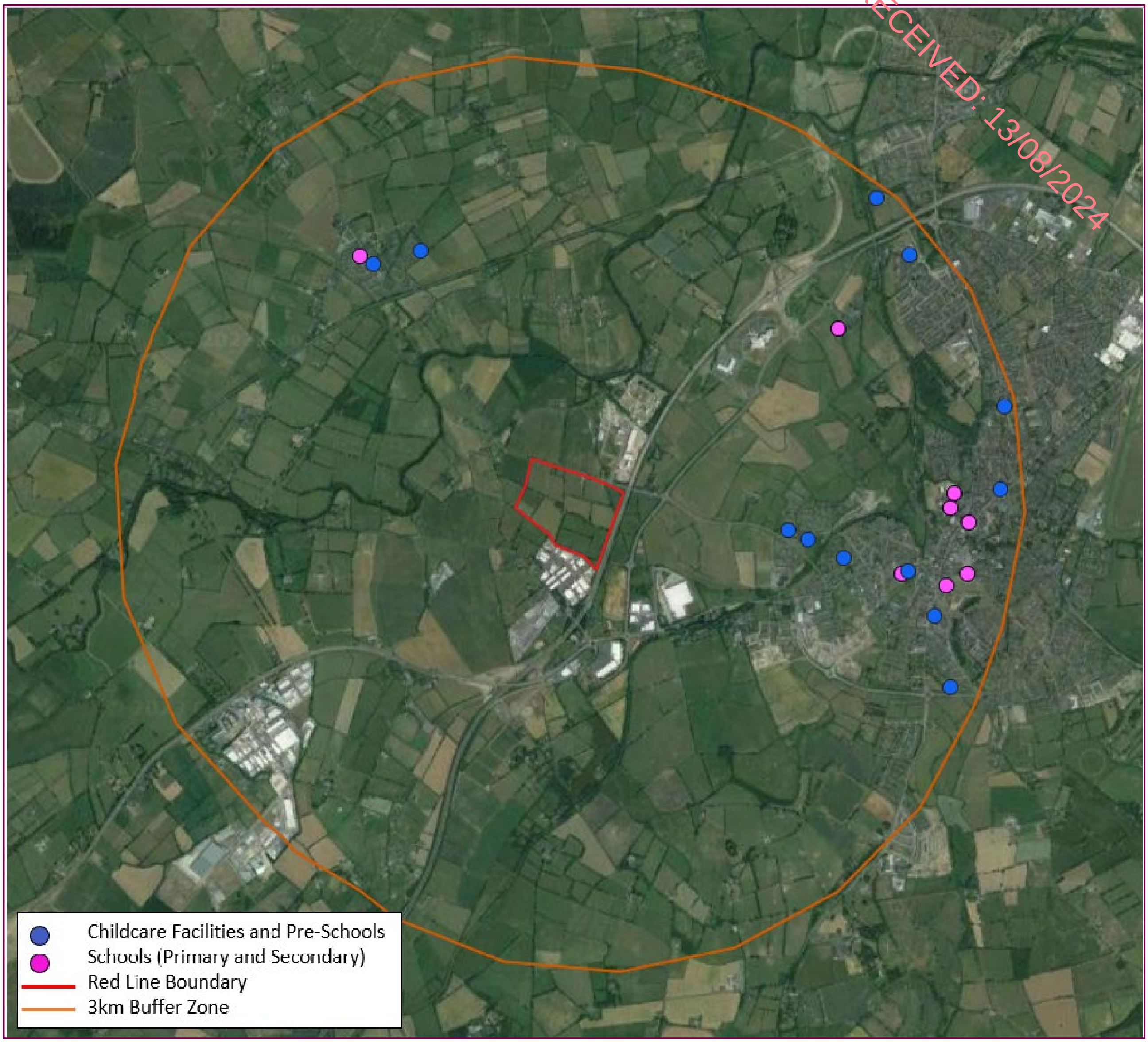

Figure 14.10: Childcare Facilities, Pre-Schools and Schools within a 3km radius

Figure 14.11 below identifies Hospitals within 3m of the Project of which there is only one, Nass General

Figure 14.11: Hospitals Within a 3km Radius

14.5 Impact Assessment

14.5.1 Do Nothing Scenario

A “Do Nothing” scenario is not considered appropriate as the Project aligns with national, regional and local policy supporting the ICT sector and Data Centres as a key component of this sector. At construction and operation phases the Project will generate significant direct, indirect and induced employment. The Proposed Data Centre use at this site accords with the local land use zoning objective set out in the Naas LAP which has explicitly identified this location as being appropriate for a Data Centre.

However, if a do-nothing scenario were to occur, the lands would not be developed and therefore there would be no beneficial or adverse impacts to population. In the event that the Project does not proceed, the lands would remain in its current condition in the short term or until alternative development proposals are granted planning permission.

14.5.2 Likely Significant Environmental Effects – Population

The construction phase of the Project should not have any direct impact on the population of the area or the subject lands. It is expected that the work force will generally travel to the Project site rather than take up residence in the immediate vicinity.

14.5.3 Likely Significant Environmental Effects – Employment

The delivery of c. 225 no. jobs in the IT sector accords with the policy vision for growth in key towns and will help provide employment opportunities for those living in the local area.

The Project will deliver significant new employment at construction and operational stages and support a key sector of the economy in Kildare. As such it is considered that the Project is in accordance with the Kildare County Development Plan 2023-2029 (KCDP) objectives regarding economic and employment growth.

The associated substation (subject to a separate SID application) will deliver an enhanced electricity grid with the potential for importing energy from the proposed Data Centre and will also support the Project of other SME businesses by providing spare 110kV circuits if required.

14.5.4 Likely Significant Environmental Effects – Social Assets

This assessment has focused on social assets in the context of childcare facilities, schools and hospitals.

With regards to childcare facilities, as previously stated the KCC County Development Plan 2017 – 2023, Chapter 15 Development Management Standards states that "childcare facilities will also be required to be provided in large-scale employment centres with an excess of 100 employees". The Project will generate more than 100 no. jobs. The provision of c. 225 no. jobs over a 38ha site in proximity to other low density employment generators is not considered to be a "large scale employment centre". However, the provision of childcare facilities has been considered along with pre-schools and schools. It is concluded that the surrounding area is well served by childcare facilities, pre-schools and schools there are a large number of childcare facilities in the immediate surrounds. Therefore, it is anticipated that there will be no significant effects on childcare facilities as a result of the Project.

14.5.4.1 Mitigation

The Project will generate more than 100 no. jobs. The provision of c. 225 no. jobs over a c.37ha site in proximity to other low density employment generators is not considered to be a "large scale employment centre". It is therefore considered that there is no requirement to provide a childcare facility at this location. The surrounding area is well served by childcare facilities, pre-schools and schools there are a large number of childcare facilities in the immediate surrounds. No further mitigation measures are proposed.

14.5.4.2 Residual Impacts

No other residual negative effects will arise from this development which are significant in magnitude.

14.6 Interactions

The main interactions relating to population are water, air quality, noise, and traffic during the construction phase. Construction activities will have a temporary impact on the landscape of the area by way of visual disturbance. These impacts are not considered to be significant. During the operational phase, the main interactions relating to population are water, air quality, noise, and traffic. These impacts are not considered to be significant. Please refer to the associated chapters for further information on these interactions.

14.7 Cumulative Effects

14.7.1 Other Projects

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. These projects have been considered in regard to population and potential cumulative effects. During construction there are no other construction projects within 350m of the project site. No construction or operational population impacts are anticipated.

14.7.2 Gas Connection

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The final, detailed design, consent and construction of the required infrastructure works will be the responsibility of GNI in the exercise of their own statutory functions, and therefore Herbata Ltd is not seeking planning consent to carry out these works as part of the Project.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report indicates that the most likely route for the new high-pressure gas distribution pipeline will be from the location of the existing GNI above ground installations (AGIs) at Glebe West and Naas Town to the Project site following a combination of the existing road network and the route of existing utilities. The nature and extent of the required works indicate a likely construction programme of 7-12 months, during which there will be an increase in employment opportunities.

Once operational, there will no requirement for additional employment associated with the gas connection, therefore there will be no impacts associated with the gas connection.

Due to the nature of the development, it is not anticipated that there will be any impacts on the social or demographic characteristics of the Population as a result.

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EIAR
VOLUME I MAIN TEXT – CHAPTER 15 HUMAN HEALTH

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15 HUMAN HEALTH

15.1 Introduction

This chapter of the EIAR addresses the potential population health impacts relating to the construction and operation of the Project.

Human Health in Environmental Impact Assessment (EIA) takes a public health approach, meaning it reaches conclusions on the health outcomes to defined populations, rather than the health outcomes of individuals. Guidance explaining that this is the correct approach is set out in Section 15.2.1.

This chapter has been prepared by RPS and meets the EIA requirements in relation to assessing the likely significant, beneficial and adverse effects of the Project on human health. Details and competencies of the specialists who prepared this chapter can be found in Chapter 1 Introduction and Need for EIAR.

The chapter follows guidance and good practice, giving the public health perspective of impacts. In so doing, the chapter:

- Takes a population health approach to assessing physical and mental health outcomes; Population health means '*the health outcomes of a group of individuals, including the distribution of such outcomes within the group*' (Kindig and Stoddart, 2003);
- Considers the wider determinants of health, that may be significantly affected directly or indirectly;
- Assesses the potential for health inequalities to vulnerable groups; and
- Considers opportunities to improve the Project to further benefit population health.

The potential for the Project to change population health outcomes may arise from various health pathways. The effects on physical and mental health link to impacts discussed throughout this EIAR. In particular, the health assessment draws inputs from the following chapters:

- Chapter 4 – Description of the Project and Project Need
- Chapter 6 – Lands and Soils
- Chapter 7 – Water and Hydrology
- Chapter 8 – Air Quality
- Chapter 9 – Noise and Vibration
- Chapter 11 – Landscape and Visual
- Chapter 12 – Traffic and Transportation
- Chapter 14 – Population
- Chapter 16 – Climate Change

The health assessment takes as its input the residual effect conclusions of the EIA Technical Chapters listed above. In this regard the health assessment relies on the mitigation measures set out in those chapters and does not repeat them. This avoids duplication and keeps the assessment proportionate.

Furthermore, the scope of the Human Health chapter has been kept proportionate, considering only those determinants of health with the potential for likely and significant population health effects. The bullet points below summarise the issues covered by this assessment and Table 15.1 summarises issues scoped out of this assessment including justification for scoping out. A watching brief has been kept on other EIAR chapters and it is concluded that they do not require further discussion from a public health perspective. Issues such as land, soils and hydrogeology (Chapter 10: Lands & Soils) include appropriate standard good practice mitigation measures to appropriately break pollution linkage pathways that could pose a risk to population health.

Following guidance on Human Health in EIA (see Table 15.3), the following determinants of health are scoped into the health assessment:

- **Physical Activity**. During the operation and maintenance phase the assessment considers the population health effect of the new operational footpaths and cycleways on physical activity, as well as other opportunities to promote physical activity.
- **Transport modes, access and connections**. During all phases the assessment considers population health implications of changes in road traffic affecting travel times, road safety, accessibility, active travel for local residents (pedestrians and cyclists) and emergency services.
- **Community identity, culture, resilience and influence**. During the operation and maintenance phase the assessment considers the potential effects to community identity from the visual impact of the operational data centre.
- **Education and training**. During the operation and maintenance phase the assessment considers changes to education and training opportunities.
- **Employment and income**. During the operation and maintenance phase the assessment considers the health implications of increased employment and economic opportunities.
- **Climate change and adaptation**. During the operation and maintenance phase the assessment considers climate change health outcomes. These relate to both direct effects of fossil fuel use as a power source, and indirect effects of the data centre supporting carbon emission reductions in other sectors.
- **Air quality**. During all phases the assessment considers the air quality related effects on human health, with a focus on particulate matter (PM) and nitrogen dioxide (NO_2).
- **Water quality or availability**. During the operation and maintenance phase the assessment considers effects to water quality and availability, reflecting the potential for high water use in data centre cooling.
- **Noise and vibration**. During all phases the assessment considers changes in noise, particularly night-time noise, that may be detrimental to population health.
- **Public understanding of electro-magnetic field risk** . Whilst there are unlikely to be actual electromagnetic fields (EMF) exposure risks to public health; during the operation and maintenance phase the assessment considers the potential for a population health effect related to concern about EMF affecting mental health.

Table 15.1 explains issues listed in Human Health in EIA guidance (see Table 15.3), which have been considered, but which are scoped out of the health assessment as not having the potential for likely significant population health effects. This keeps the assessment focused and proportionate in line with EIA requirements.

Table 15.1: Impacts Scoped Out of the Assessment

Potential Impact	Justification
Health related behaviours	
Physical activity	Construction and Decommissioning phases Health promotion within the Project workforces will be considered as a good practice enhancement measure but is otherwise scoped out. There are no existing public rights of way or cycle routes crossing or adjacent to the Project. The nearest cycle route and footpath is located 100 m east of the Project. Construction works are anticipated to occur in a way to avoid disruptions to the use of existing cycle routes/footpaths. As such, it is considered that community physical activity is not affected by construction works.
Risk taking behaviour	All phases The potential for the leisure time activities of the construction and operational workforce to change community behaviours, such as smoking habits or alcohol intake, is considered limited. This reflects the expectation that construction worker accommodation would be relatively dispersed as well as limited as it is expected that construction workers would be mostly recruited from the local and regional area. During operation, numbers are expected to be limited and not sufficient to elicit likely significant effects at the population level. For the same reasons other risk-taking behaviours, including those associated with gambling and sexually transmitted infections, are also scoped out. Although an adverse community effect is unlikely, it would be beneficial for health promotion material to be provided in any community or construction amenities facilities

	on-site, including smoking cessation. Healthy workforce behaviour can be encouraged through a workforce management plan. The Project will operate appropriate measures to safeguard the project workforce and the public in line with Government guidance of the day. Risks are similar to other routine construction activities. There is not considered to be the potential for a likely significant population health effect, this issue is scoped out.
Diet and nutrition	All phases The Project will lead to the reduction in availability or quality of agricultural land as the Project site is located on agricultural land. This is however not considered to be on a scale that could change population diet or food prices and therefore significantly affect population health. This issue is scoped out. Operational and maintenance phase The Project will include a canteen that can be used to store and reheat food and will provide a designated space for meals. Health promotion within the project workforces will be considered as a good practice enhancement measure, including the provision of health promotion material re diet / nutrition, but this topic is otherwise scoped out.
Social environment	
Housing	Construction and Decommissioning phases Housing related issues are scoped out. No new housing is proposed. The workforce will have housing requirements, but it is expected that a high proportion will be resident in the local and regional area, returning to their place of residence when not working. Where temporary accommodation is required, this would be existing B&B/hotel bed spaces, as is typical for the construction industry. It is not expected that use of temporary accommodation would be on a scale to significantly: displace local residents; adversely affect seasonal tourism; or otherwise affect housing availability. There is not expected to be a loss of residential housing or permanent loss of outdoor spaces associated with dwellings. There is not considered to be the potential for a likely significant population health effect associated with changes in the availability of housing during construction. Operational and maintenance phase The same conclusions are reached for the operational workforce. The workforce is expected to be smaller in number and from the local and regional area. The site is located between the existing 'M7 Business Park' and 'Osberstown Business Park' limiting the potential for any widespread adverse effect on housing value or affordability. This issue is scoped out.
Relocation	All phases There are no plans for compulsory land purchases of homes or community facilities. This issue is therefore scoped out.
Open space, leisure and play	Construction and Decommissioning phases Construction activities are not expected to affect access to areas of public open space or result in emissions or disturbance on a scale that could significantly affect use of public open spaces used for leisure and play that could significantly affect population health. Operational and maintenance phase The Project offers the opportunity to incorporate green space with potential to benefit the operational workforce (e.g. outdoor seating areas), however this is not considered to have the potential for significant beneficial health effects at the population level. This impact is scoped out. The potential for Project to affect the use of open spaces near the operational data centre is noted and addressed under physical activity. This issue is therefore scoped out here to avoid duplication.
Community safety	Construction and Decommissioning phases The construction workforce will mainly be local/regional and as such there are not anticipated to be community safety or security issues associated with worker behaviour in local residential areas/towns. The Project would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. This issue is scoped out. Where surface excavations are undertaken these would be within controlled work areas, including use of appropriate fencing and notifications as required. Best practice

	measures would be secured through suitable management plans. The risk to the public from accidental injury, e.g. falls or drowning is scoped out. Electrical risks to the public would be avoided though the design, including fencing of above ground electrical infrastructure. These issues are scoped out. Operational and maintenance phase The operational workforce will be mainly local/regional and as such there are not anticipated to be community safety or security issues associated with worker behaviour in local residential areas/towns. The Project would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. This issue is scoped out.
Community identity, culture, resilience and influence	All phases Due to the nature and size of the construction workforce, demographic changes that could affect community identity are not anticipated, as there would not be a large in-migration or out-migration of workers to local communities. This impact is scoped out. Construction and Decommissioning phases Visual impacts of construction activities, including any temporary lighting, will be limited to the construction phase and are not expected to lead to significant population health effects. Temporary employment opportunities are not expected to have a strong influence on community identity. This impact is scoped out.
Social participation, interaction and support	All phases The Project will not directly affect land used for community interaction (e.g. areas, meeting places, village greens, community centres etc that promote community voluntary, social, cultural or spiritual participation). Any indirect impacts on access to such spaces is addressed under the "Transport modes, access and connection" health determinant. No changes in social participation/increases in social isolation are or associated health outcomes are predicted. This issue is scoped out.
Economic environment	
Education and training	Construction and Decommissioning phases There will be limited direct employment offered during the construction phase. However, the project would support upskilling and career development in relation to its workforces. This may include apprenticeships and adult learning. Given the scale and size of the construction workforce, any benefits to health, including for local and vulnerable groups, are unlikely to be significant at the population level and this impact is scoped out. A large influx of workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out.
Employment and income	Construction and Decommissioning phases Construction of the Project provides opportunities for good quality employment; however, given the nature and size of the development this is unlikely to have significant effects on local population health. This issue is scoped out. Any international supply chain would be expected to operate appropriate policies that safeguard against significant population challenges to equality, health and safety, for both workers and, as appropriate, the public. These issues are scoped out. The Project would operate appropriate employment equality policies but is not expected to influence how employment affects family structures and relationships in local populations. Occupational working conditions include particular risks, which are appropriately managed through health and safety policies and practices. Project activities are not expected to differ from industry norms. These issues are scoped out.
Bio-physical environment	
Climate change	Construction and Decommissioning phases Embodied carbon and climate altering pollutant emissions are not of a scale to have the potential for population level effects associated with climate change. This issue is scoped out.
Water quality	All phases Pollutant spills have potential to affect surface and ground waters, which can result in toxin exposures through dermal contact/waters used as drinking water/contamination of food produced in nearby agricultural lands. However, the Project will adopt standard best practice spill avoidance and response measures that will be secured through

	management plans. This issue is scoped out on the basis of the anticipated effectiveness of such measures. Disruption to public drinking water infrastructure are scoped out on the basis that the existing water utilities network would be avoided, including through diversions if appropriate, see discussion under 'built environment'.
Land quality	All phases Ground condition and soil effects are scoped out. Risks of new or historic pollutant mobilisation, including direct exposure and food contamination, are highly likely to be addressed by standard good practice mitigation measures that will be secured through the CEMP. This topic is scoped out.
Radiation	Construction and Decommissioning phases Works would not include using, or making changes to, active major electrical infrastructure producing EMF. Relevant public and occupational safeguards, secured through management plans, would be followed for the temporary electrical equipment used. Electric and magnetic fields strengths reduce rapidly with distance, often requiring only a few meters separation between the source and receptor, to reach background levels. No ionising radiation sources are proposed. These issues are scoped out. Appropriate fencing will be installed so that working areas of the site would not be accessible to the public. Operational and maintenance phase The 'actual EMF' risks are scoped out on the basis that the project would comply with regulatory requirements and international good practice in relation to EMF, namely: the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines (ICNIRP, 1998). Such considerations are inherent to the detailed engineering considerations of the Project. These guidelines are long standing and have a high safety margin. The levels of exposure that they require would not pose a risk to public health. Actual risks of EMF are therefore scoped out.
Health and social care services	All phases Effects on health and social care are scoped out. The project workforce is assumed to include a high proportion of people who are resident in the local and regional area. The workforce (expected to be composed of ROI residents) would have HSE entitlement irrespective of place of residence. Workers away from their usual place of residence for a prolonged period would be able to register with local primary health/social care on a temporary basis. The expectation is that the great majority of healthcare needs of the workforce will be met either by occupational provision on-site or by their usual healthcare provider when they return to their usual place of residence. The Project will operate appropriate occupational health services. It is not expected that a high proportion of workers would move to the area with dependants requiring social care. Health protection measures such as screening and immunisations are expected to continue from the workers' usual place of residence. Similarly routine dental appointments are assumed to be with the worker's dental practice close to their usual place of residence. Other health services are not expected to be affected as no largescale in-migration is expected. This topic is scoped out.
Institutional and built environment	
Built environment	Construction and Decommissioning phases The potential for the Project's construction and decommissioning activities to affect existing features of the built environment that are supportive of population health has been considered and scoped out. The project would have a relatively low impact; the position of existing services, such as water and sewer systems will be taken into account in planning the Project. Appropriate diversions would occur to avoid disruption to such services. Operational and maintenance phase The Project will introduce new elements in the built environment that will change the nature of the land use and landscape. This is assessed under the 'community identity' health determinant and scoped out here to avoid duplication. The Project includes on-site battery storage. The Project follows best practice for avoidance of risks and this issue is not assessed separately.

Wider societal infrastructure and resources	All phases The Project will provide energy infrastructure and surplus energy to the grid; however, this is unlikely to be at a scale that may have significant benefits to public health. This issue is scoped out.

15.2 Approach to Assessment

15.2.1 Legislation and Guidance

The following legislation in Table 15.2 is relevant to the assessment of the effects on human health.

Table 15.2: Health legislation

Legislation	Description
The EIA Regulations 2018 (Government of Ireland, 2018a)	Sets the requirement to consider the likely significant effects on human health
The Safety, Health and Welfare at Work etc Act 2005 (as amended) (Government of Ireland, 2005)	Sets out general duties on employers, including ensuring, so far as is reasonably practicable, that employees and individuals at the place of work who are not employees are not exposed to risks to their safety, health or welfare.
The Environmental Protection Agency Act 1992 (as amended) (Government of Ireland, 1992)	Governs environmental exposures, including provisions in relation to nuisance.
The Air Quality Standards Regulations 2011 (Government of Ireland, 2011)	Sets the regulatory thresholds for air quality. These are the standards considered acceptable in terms of public health protection in the Republic of Ireland.
Environmental Noise Regulations 2018 (as amended) (Government of Ireland, 2018)	Sets a common approach to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise.

The following guidance in Table 15.3 has informed the assessment.

Table 15.3: Health Guidance

Guidance	Description
Institute of Public Health (IPH), Guidance, Standalone Health Impact Assessment and health in environmental assessment, 2021 (Institute of Public Health, 2021).	Sets current good practice for the assessment of human health in EIA, including assessment methods. This updates the 2009 guidance from the IPH.
Institute of Environmental Management and Assessment (IEMA) 2022 guidance on health in EIA series, effective scoping (Pyper, et al., 2022a) and determining significance (Pyper, et al., 2022b).	EIA practitioner guidance on assessing human health, applicable to Republic of Ireland and Northern Ireland. Guidance sets out principles and methods of assessment.
International Association for Impact Assessment (IAIA) and European Public Health Association. A reference paper on addressing Human Health in EIA (2020), and academic discussion of the same (Cave, et al., 2021).	This international consensus piece informed the IPH 2021 guidance. The publication explains EIA for public health stakeholders and sets out transparent assessment approaches adopted by the IPH.
International Association for Impact Assessment. Health Impact Assessment International Best Practice Principles, 2021 (Winkler, et al., 2021).	Confirms the relationship between HIA and EIA. Confirms the application of HIA principles when undertaking health in EIA.
Environmental Protection Agency. Guidelines on the information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022).	The EPA present a health protection position statement on the coverage of health in EIA. The wider public health remit is covered by the IPH 2021 guidance.

In addition, due regard was given, as appropriate, to World Health Organization advisory guidelines, e.g. (World Health Organization, 2021) and World Health Organization (2018). The application of such guidelines for health in EIA is described by IEMA (Pyper et al., 2022b), IPH (Pyper et al., 2021) and Cave *et al*. (2021).

The conceptual models/tools of the IPH guidance informed the health assessment, specifically Figures T09 (sensitivity), T11 (magnitude) and T12 (significance, including importance and acceptability). This is a robust best practice approach that can be applied consistently and transparently to all determinants of health. Further details are provided in Section 15.3.3.5, Table 15.4, Table 15.5, Table 15.6 and Table 15.7.

15.2.2 Policy Context

The following policies are associated with the Human Health Assessment:

- National Planning Framework (NPF) (Government of Ireland, 2018b)
- Healthy Ireland Framework (HIF) (2019-2025) (Department of Health, 2019)
- Roadmap for Social Inclusion (2020-2025) (Government of Ireland, 2023)
- Local Link Rural Transport Programme Strategic Plan 2018 to 2022 (Transport for Ireland, 2018)
- Local health priority issues, various

15.2.2.1 National Planning Framework

The NPF states that "Good access to a range of quality education and health services, relative to the scale of a region, city, town, neighbourhood or community is a defining characteristic of attractive, successful and competitive places. Compact, smart growth in urban areas and strong and stable rural communities will enable the enhanced and effective provision of a range of accessible services" (p.15).

An overarching aim of the NPF is "*Creating a clean environment for a healthy society*" through three main objectives:

- "*Water Quality Recognising the links and addressing on-going challenges between development activity, water quality and our health.*
- *Promoting Cleaner Air - Addressing air quality problems in urban and rural areas through better planning and design.*
- *Noise Management - Incorporating consistent measures to avoid, mitigate and minimise or promote the pro-active management of noise*" (p.117)

Chapter 6, Healthy Communities states that "*decisions made regarding land use and the built environment, including transportation, affect these health risks in a variety of ways, for example through influencing air and water quality, traffic safety, opportunities for physical activity and social interactions as well as access to workplace, education, healthcare and other facilities and services such as food and alcohol outlets*" (p.82).

15.2.2.2 National Development Plan 2018-2027

The National Development Plan (NDP) states that improving "*energy efficiency will also realise benefits for air quality, health, social inclusion, business competitiveness and better public services, all of which will make a real and positive impact on people's lives*" (p.77).

15.2.2.3 Healthy Ireland Framework (HIF) 2018-2023

HIF states that "*many health and wellbeing indicators are affected by individuals' personal lifestyle choices. … The effects of these risk factors can be minimised if individuals can be motivated and supported to make healthier choices. To be effective, action to control the determinants of health must include developing understanding and skills, and promoting informed health choices*" (p.14) (Department of Health , 2019).

"*Those working in non-health sector disciplines and settings such as educationalists, city planners, housing and transport officials, probation officers and welfare officers, also have a critical role to play in improving health and wellbeing*." (p. 26) (Department of Health , 2019).

This recognises that some of the burden of poor health is due to factors beyond the control of the Project. It also recognises that access to opportunities to be physically active and being able to afford and access health food is paramount to public health. These factors are influenced by the development.

The four goals of Healthy Ireland are relevant and have informed the assessment:

- Goal 1: Increase the proportion of people who are healthy at all stages of life;
- Goal 2: Reduce health inequalities;
- Goal 3: Protect the public from threats to health and wellbeing; and
- Goal 4: Create an environment where every individual and sector of society can play their part in achieving a healthy Ireland.

15.2.2.4 Roadmap for Social Inclusion 2020-2025

The introduction states that "*Education, health, housing, employment and social integration (i.e. a person's sense of "connectedness" with their community) are all factors that contribute to a person's overall sense of well-being or welfare*" (p.10).

15.2.2.5 Draft County Kildare Development Plan 2023-2029

The Regional Spatial and Economic Strategy is underpinned by three key principles: health placemaking, climate action and economic opportunity.

The Growth Strategy for the Region "*supports the transition to low carbon, climate resilient communities and a healthy environment with high quality air and water*".

Chapter 6 Infrastructure and Environmental Services aims to "*create an environment characterised by high quality infrastructure networks and environmental services that complement the overall settlement and economic strategy and ensures the health and wellbeing of those who live and work in the County, also securing the economic future of the County*". This includes appropriate waste management and pollution control.

15.2.3 Local health and wellbeing plans

15.2.3.1 Healthy Kildare Plan 2022-2026

The Healthy Kildare Plan (HKP) (Kildare County Council, undated) sets out a local approach to implement the Healthy Ireland goals in County Kildare and provide a roadmap to help improve health and wellbeing within the county. The HKP states its vision of a "*Healthy Kildare, where everyone can enjoy physical and mental health and wellbeing to their full potential, where wellbeing is valued and supported at every level of society and is everyone's responsibility*".

The HKP states that a number of consistent themes were identified in policy as key priorities for health:

- Increasing participation in physical activity – the HKP references the following goals of the Kildare Local Community and Economic Plan 2016-2021: the health and wellbeing high-level goal to "*strengthen the capacity of Kildare to respond to current and future health needs to support healthy communities across the county*"; the HKP also references the goals of the Kildare Sports Partnership Strategic Plan 2017-2021;
- Supporting children, young people and families;
- Reducing the impact of harmful substances;
- Mental Health; and
- Housing, homelessness and reducing health inequalities for minorities.

15.2.3.2 Kildare Children and Young People's Plan 2019-2021

The plan (Kildare Children and Young People's Services Committee, 2019) aims to "*secure better outcomes for children and young people through more effective co-operation and collaboration by existing services and through interventions at local level*".

The plan works towards five outcomes for children and young people in Ireland:

- Are active and healthy, with positive physical and mental wellbeing;

- Are achieving full potential in all areas of learning and development;
- Are safe and protected from harm;
- Have economic security and opportunity; and
- Are connected, respected and contributing to their world.

15.2.4 Human Health Study Area

The Project is located in the townlands of Halverstown, Jigginstown, Osberstown and Newhall approximately 2.5 km west of Naas town centre, in county Kildare situated in the east of Republic of Ireland. The human health study area has regard to localised health effects and wider health effects. Bio-physical health determinants (such as changes to air quality and noise exposure) are likely to have a localised impact as potential change in hazard exposures are limited by physical dispersion characteristics. Social and behavioural determinants (such as changes to lifestyle and community factors) are likely to have both localised and wider impacts.

The study area for baseline statistics relating to health effects focuses on electoral divisions (EDs), with county Kildare and Ireland averages as comparators. Regard is also given to the study areas of other EIAR chapters and very localised (site-specific) health effects are discussed as appropriate with reference to place names of the GeoHive map viewer, which may extend beyond ED administrative boundaries.

The following geographically defined human health populations are used in the assessment:

- The ‘site specific’ area of Naas Rural and Carragh EDs where the Project works are located. Regard has also been given to Naas Urban ED due to its proximity to the site.
- The ‘local’ area is the local authority area of County Kildare
- The ‘regional’ area is the province of Leinster.
- The ‘national’ area is Republic of Ireland (and beyond for global and transboundary effects).

As study areas do not necessarily define the boundaries of potential health effects, particularly mental health effects, the health chapter uses study areas to broadly define representative population groups, including in relation to sensitivity rather than to set boundaries on the extent of potential effects.

The health assessment has regard to the zones of influence defined by other EIAR chapters that are interrelated technical disciplines for the health assessment. Those chapters provide data inputs to the health assessment. Those zones of influence are relevant and inform the health chapter’s consideration of effect magnitude.

Deprivation statistics have been reviewed and taken into account in considering population sensitivity. For example, the deprivation statistics show that although the site specific ED level has average or low deprivation (marginally above or below average or affluent), there are pockets of greater deprivation at the small area geographic boundary level. Notably small area 087071020 to the east of the project site within Naas Urban ED has marginally below average disadvantage. This small area includes the community of Ploopluck. Higher deprivation in this community has been taken into account by the assessment in determining the level of sensitivity for vulnerable groups. Deprivation in other parts of Naas Urban has also been taken into account.

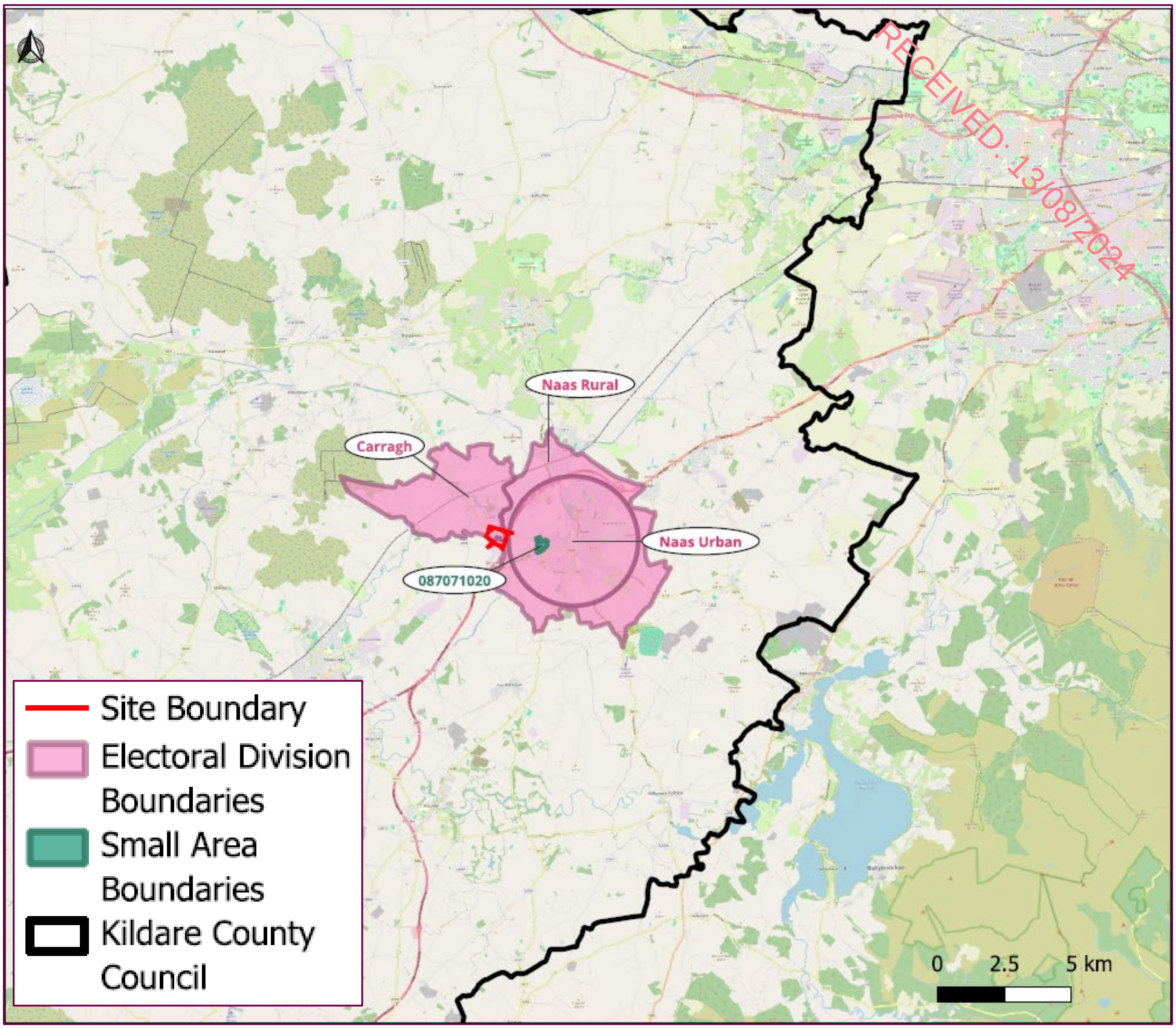


Figure 15.1: Human health study area

15.2.5 Data Sources

Data from the inter-related technical disciplines have been used to inform the health assessment (e.g. Chapter 9 - Noise & Vibration references the GeoDirectory). Data informs the health assessment by identifying potential receptors and community assets for these disciplines, such as schools, residential properties, walking and cycling routes, as well as tourism and recreational amenities. No separate health field surveys have been undertaken. The health analysis is informed by scheme-wide consultation.

The following data sources have informed the health baseline assessment:

- Central Statistics Offcie (CSO) Small Area Population Statistics (SAPS) Interactive Mapping Tool (CSO, 2016)
- CSO StatBank (CSO, n.d.)
- Pobal HP Deprivation Index (Pobal, 2016); and
- Google Earth Pro 2021 aerial and street level photography

Some public health data tools were not available at the time of the assessment. The health baseline (section 15.4.1) was compiled prior to 2022 Census statistics being released as part of the SAPS Interactive Mapping Tool. 2016 statistics therefore remain the more appropriate source and are considered adequate for the assessment's purposes of establishing baseline population vulnerability.

15.2.6 Consultation

The EIA process has been informed by consultation undertaken with KCC and other relevant statutory and non-statutory bodies. Aspects of the Project discussed with KCC included, *inter alia*, landscaping, visual impact, noise monitoring locations and sustainable urban drainage systems. The consultation process and outcomes are summarised in Chapter 3 – Project Scoping and Consultation. No consultation responses were received that pertain specifically to human health.

15.3 Key Parameters for Assessment

15.3.1 Project parameters and design features

Physical Activity

During the operation and maintenance phase the Project would include R409 improvement works, a new footpath, cycleway and new bus stop carriageway. A new 1.8 m width segregated cycleway will be built on the south side of the R409, along the northern boundary of the Project, between the proposed vehicular access junction to the Project and the existing shared pathway located on the western side of the bridge over the M7. It will connect to an existing shared pathway located on the western side of the bridge over the M7. A 2 m shared surface will be provided over the M7.

The proposed new cycle way will extend as far as the existing segregated pedestrian and cyclist infrastructure which currently terminates to the east of the M7 bridge crossing. As such, it will provide jointed cycling and pedestrian infrastructure from the western boundary of the Project site on the R409, to the existing segregated cycleway infrastructure, which currently runs from the R409/R445 roundabout along the R409 to Naas, and in a north-south direction along the R445 to a number of business/industrial parks. Further details are set out in the Appendix 4.2 Planning Engineering Report and Appendix 4.2 L Mobility Management Plan.

As part of the Project, bicycle shelters will be located in the vicinity of each data centre and at the Admin Workshop Area. A total of 104 no. bike parking spaces are provided throughout the site (16 spaces per data centre and 8 for the administration workshop). Further details are set out in the Planning Engineering Report Appendix 4.2 Planning Engineering Report and Appendix 4.2 L Mobility Management Plan.

Transport modes, access and connections

During the construction and decommissioning phases the Project would include ≈ 425 no. vehicles per day during the peak construction period. Further details are set out in Chapter 12 – Traffic and Transportation.

During the operation and maintenance phase the Project would include 56 no. arrivals and 56 no. departures during both the AM and PM peak hour periods and 26 no. total HGV trips per day. Further details are set out in Chapter 12 – Traffic and Transportation.

During the operation and maintenance phase the Project will include a new bus stop located on the north boundary of the site, along the southern side of the R409. It is understood that this will provide an additional bus stop at the Project for the 821 TFI local bus service which currently runs between Newbridge and Sallins train station, thus providing a public transport link to the Project. Further details are set out in Appendix 4.2 L Mobility Management Plan.

Community identity, culture, resilience and influence

During the operation and maintenance phase (50 years duration) the Project would include new visual elements. The Project comprises 6 no. two storey data centre buildings, an administration / management building, car parking, landscaping, energy infrastructure and other associated works. The Project also comprises a grid substation and 110 KVA transmission connection. Further details are set out in Chapter 4: Description of the Project.

Education and training

No measures are included in the Project with regard to training and education opportunities.

Employment and income

During the operation and maintenance phase the Project will generate 225 jobs in the Information, Communications and Technology (ICT) sector directly and support employment in the sector more widely. Further details are set out in Chapter 13 - Population.

Climate change and adaptation

The Project includes a number of design measures to increase the energy efficiency of the buildings and reduce energy demand, including heat pumps, building design, selection of sustainable building materials, goods and services, and orientation to maximise energy efficiency and LED lighting.

Air quality

During the construction and decommissioning phases the Project would elevate dust levels and increase PM and NO_2 emissions due to annual average daily traffic (AADT) changes of 1,000 vehicles or more, and 200 heavy duty vehicles or more. During the busiest construction months there will be an estimated 733 car trips to and from the site per day for construction staff, and 425 car trips per day for site staff Further details are set out in Chapter 8 – Air Quality.

During the operation and maintenance phase the Project will increase PM and NO_2 emissions due to gas power plant emissions and less than 1,000 AADT additional vehicle movements. Further details are set out in Chapter 8 - Air Quality.

Water quality or availability

The Project will comprise a number of design features aimed at managing water supply and water quality, including: surface water drainage; foul water drainage; onsite water treatment plant; implementation of sustainable drainage techniques to treat water prior to discharge; and underground tanked water storage to provide peak day cooling requirements. A minimum of one year water storage will be provided on site for the adiabatic cooling top-up and storage top-up from on-site ponds if required. This water will be obtained from rainfall and/or surface water collection and will not be sourced from the local water supply.

Currently there are no known public surface water connections available to the development. The surface water drainage design aims to collect and attenuate, as far as practically possible, all surface water within a series of swales and ponds, which will discharge into the Bluebell River (subject to regulatory approval) at a rate no greater than greenfield runoff. The foul water design is a gravity-based system which will be collected in two separate foul water pumping stations on site.

Further details are set out in Chapter 4: Description of the Project and Chapter 7: Water Quality and Hydrology.

Noise and vibration

During the construction and decommissioning phases the Project would include noise generating plant, equipment and vehicles within the site boundary and on public highways, including 47 heavy duty vehicle movements per day during peak construction times and 425 car trips on an average day, 175 of which during the traditional peak hours. Further details are set out in Chapter 9 – Noise and Vibration.

During the operation and maintenance phase the Project would include noise generating plant and equipment within the site boundary, including the substation, data hall cooling system and gas power generation elements, and additional vehicle movements on public highways, namely 56 trips during both the AM and PM peak period and 26 daily two-way HGV trips (typically outside peak hours). During the operation and maintenance phase the Project will include measures embedded in the project design to reduce noise, such as selection of plant and equipment, noise control at source, selection of construction materials, building orientation and site layout. Further details are set out in Chapter 9 – Noise and Vibration.

Public understanding of electro-magnetic field risk

During the operation and maintenance phase the Project would include new electrical infrastructure, including the data centre itself, the building design for which would mitigate against external electric field exposures, and a grid substation and 110 KVA transmission connection.

15.3.2 Mitigation measures taken into account

The health assessment is based on the residual effect conclusions of other EIAR assessments. The details of the mitigation measures are set out in those respective assessments, but key features are summarised as follows.

Physical Activity

During operation, the mobility management plan sets out measures and incentives to encourage physical activity and active travel including appointing a mobility manager responsible for the implementation and monitoring of the Mobility Management Plan and for developing measures to encourage a modal shift towards sustainable travel, including: pedestrian and cycling measures such as 'Walk to Work week', 'cycling to work' and other incentives to promote physical activity in the project workforce (see appendix L – Mobility Management Plan).

Transport modes, access and connections

During the construction and decommissioning phases the Project would include an Interim Travel Plan outlining local cycling facilities.

Carach Court Montessori School is situated to the east of the site on the R409. During the construction phase, the following measures are set out in the CTMP to minimise disruption of access to the school and to maximise safety: Regular contact between the Community Engagement Officer and Carach Court Montessori School; and avoidance of HGV movements during school drop off and pick-up. Further details are set out in Chapter 12 – Traffic and Transportation.

Community identity, culture, resilience and influence

During the operation and maintenance phase the Project would include landscaping measures to integrate the Project into the landscape and reduce the visual impact, including earth mounding and native, screen woodland planting. Further details are set out in Chapter 11 – Landscape and Visual.

Education and training

No mitigation measures are proposed with regard to enhancing training and education opportunities.

Employment and income

No mitigation measures are proposed with regard to employment opportunities.

Climate change and adaptation

In addition to the embedded energy efficiency measures stated in section 15.3.1, a number of mitigation measures were considered to reduce operational emissions resultant from the Project, including: gas turbines and associated plant and solar photovoltaic panels. Further details are set out in Chapter 16 – Climate Change.

Air quality

During the pre-construction, construction and decommissioning phases the Project would include a number of measures to mitigate impacts on air quality, including implementation of a Dust Management Plan; implementation of a stakeholders communications plan that includes community engagement; appropriate earthworks and site management measures; and measures to reduce vehicle emissions. Further details are set out in Chapter 8 – Air Quality and Appendix 4.5 Construction Environmental Management Plan (CEMP).

During the operation and maintenance phase the Project would include good design and best practice measures to reduce emissions, including re-use and recycling, use of PV panels LED lighting and tree planting. Further details are set out in Chapter 8 – Air Quality.

Water quality or availability

During construction, measures are set out in the CEMP to mitigate against the risk of surface water pollution, including: on-site groundwater/runoff drainage, storage and treatment, including use mechanism such as silt bag and silt trap fences to intercept bulk silt volumes. A settling pond will be built on site and the water collected within the pond will be disposed of offsite at a licensed facility. All silt and pollution prevention and removal structures will be places at least 10 m from the Bluebell stream. Further details are provided in Appendix 4.5 Construction Environmental Management Plan (CEMP).

Noise and vibration

During the construction and decommissioning phases the Project will include mitigation measures to ensure construction noise and vibration levels are attenuated and reduced, including implementation of best practice measures for management of on-site noise and vibration, temporary noise barriers and communication with residents and local businesses. All mitigation measures will be set out in the CEMP, which will include a noise management plan. Further details are set out in Chapter 9 – Noise and Vibration.

Public understanding of electro-magnetic field risk

During the operation and maintenance phase the Project will include a stakeholder communications plan.

15.3.3 Assessment Criteria and Significance

15.3.3.1 General Approach

This section sets out the methods for assessment of any likely significant population health effects of the Project.

The generic scheme-wide approach to the assessment methodology is set out in Chapter 1: Introduction of the EIAR. This section sets how the generic approach is refined to address the specific needs of the EIA health assessment. Namely criteria for sensitivity, magnitude and significance that inform a professional judgment and reasoned conclusion as to the public health implications of the Project.

Regard has been had to the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022). The guidelines provide generic definitions for significance, but also note that when more specific definitions exist within a specialised factor or topic, these should be used in preference to the generalised definitions. In the case of Human Health, specific definitions are set out by IPH (Pyper et al., 2021) and IEMA (Pyper et al., 2022b).

The methodology outlined in this section follows the IEMA 2022 and IPH 2021 guidance, which sets out best practice for the consideration of health in EIA. The IPH guidance was informed by the international consensus publication between impact assessment and public health practitioners, the IAIA/EUPHA Reference Paper (Cave et al., 2020).

Where significant adverse population health effects are identified, including for vulnerable groups, then mitigation has been proposed to avoid or reduce the effects. Mitigation is secured as part of the Project design or development consent. In line with good practice the Project takes a proportionate approach to identifying opportunities to enhance beneficial population health effects, including for vulnerable groups.

Cumulative effects are considered, including inter-related effects of the Project. This analysis considers how the same geographic or vulnerable group populations may be affected by more than one change in relevant health determinants, for example the combined effects of changes in air quality and noise on population health outcomes.

Where proportionate, the need for monitoring has been considered, including relevant governance.

15.3.3.2 Determinants of Health, Risk Factors and Health Outcomes

The chapter uses the World Health Organization (WHO) definition of health, which states that health is a "*state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (World Health Organization, 1948)

The chapter also uses the WHO definition for mental health, which is a "*state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community*" (World Health Organization, 2022).

Health and wellbeing are influenced by a range of factors, termed the 'wider determinants of health'. Determinants of health span environmental, social, behavioural, economic and institutional factors. Determinants therefore reflect a mix of influences from society and environment on population and individual health.

Impacts of the Project that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility and exposure.

A change in a determinant of health does not equate directly to a change in population health. Rather the change in a determinant alters risk factors for certain health outcomes. The assessment considers the degree and distribution of change in these pathways. The analysis of health pathways focuses on the risk factors and health outcomes that are most relevant to the determinants of health affected by the Project. As there are both complex and wide-ranging links between determinants of health, risk factors and health outcomes, it would not be proportionate or informative for an assessment to consider every interaction.

Typically, the change in a risk factor may need to be large, sustained and widespread within a population for there to be a significant influence on public health outcomes.

15.3.3.3 Population Health Approach and Vulnerable Groups

In line with IEMA and IPH guidance, a population health approach has been taken, informed by discussion of receptors within the other technical chapters of the EIAR.

For each determinant of health, the human health chapter identifies relevant inequalities through consideration of the differential effect to the 'general population' of the relevant study area and effects to the 'vulnerable population group' of that study area. The vulnerable population group being comprised of relevant sensitivities for that determinant of health. The following population groups have been considered:

- The 'general population' including residents, visitors, workers, service providers, and service users; and
- The 'vulnerable group population'.

The methods draw on the list of vulnerable population groups set out in the IEMA guide to effective scoping, Table 9.2 (Pyper et al., 2022a). The following six broad population groups are used to inform a consistent narrative on potential health inequalities across the assessment. People falling into more than one group may be especially sensitive:

- **Young age**: Children and young people (including pregnant women and unborn children).
- **Old age**: Older people (particularly frail elderly).
- **Low income**: People on low income, who are economically inactive or unemployed/workless.
- **Poor health**: People with existing poor health; those with existing long-term physical or mental health conditions or disability that substantially affects their ability to carry out normal day-to-day activities.
- **Social disadvantage**: People who suffer discrimination or other social disadvantage, including relevant protected characteristics under the Irish Human Rights and Equality Commission Act 2014[1] or groups who may experience low social status or social isolation for other reasons.
- **Access and geographical factors**: People experiencing barriers in access to services, amenities and facilities and people living in areas known to exhibit high deprivation or poor economic and/or health indicators.

[1] *For example, disadvantage by reference to the following factors: gender; civil status; family status; sexual orientation; religious belief; age; disability; race, including colour, nationality, ethnic or national origin; or membership of the Traveller community.*

The assessment covers these populations within two groups: The general population for the geographic area, notably residents of Naas Rural and Carragh, and the vulnerable sub-population for this area. The latter is comprised of the vulnerabilities listed above. The differentiation of these two groups, allows a discussion of any potentially significant health inequalities and the targeting of any mitigation.

The following general characterisations of how the 'general population' may differ from 'vulnerable group populations' were considered when scoring sensitivity. These statements are not duplicated in each assessment and apply (as relevant) to the issues discussed for both construction and operation.

- In terms of life stage, the general population can be characterised as including a high proportion of people who are independent, as well as those who are providing some care. By contrast, the vulnerable group population can be characterised as including a high proportion of people who are providing a lot of care, as well as those who are dependant.
- The general population can be characterised as experiencing low deprivation. However, the professional judgment is that the vulnerable group population experiences high deprivation (including where this is due to pockets of higher deprivation within low deprivation areas).
- The general population can be characterised as broadly comprised of people with good health status. Vulnerable groups, however, tend to include those parts of the population reporting bad or very bad health status.
- The general population tends to include a large majority of people who characterise their day-to-day activities as not limited. The vulnerable group population tends to represent those who rate their day-to-day activities as limited a little or limited a lot.
- Based on a professional judgement the general population's resilience (capacity to adapt to change) can be characterised as high whilst the vulnerable group population can be characterised as having limited resilience.
- Regarding the usage of affected infrastructure or facilities, the professional judgement is that the general population are more likely to have many alternatives to resources shared with the Project (e.g. shared routes or community assets). For the vulnerable group population, the professional judgement is that they are more likely to have a reliance on shared resources.
- The general population includes the proportion of the community whose outlook on the Project includes support and ambivalence. The vulnerable group population includes the proportion of the community who are uncertain or concerned about the Project.

15.3.3.4 Temporal Scope

The temporal scope of the assessment is consistent with the period over which the Project will be carried out and therefore covers the construction and operational periods. The proposed, indicative construction programme is an estimated 8 years and 9 months. The assessment does not place an end date on the operations of the Project.

With respect to the duration of impacts, the IEMA (Pyper et al., 2022b) terminology has been used as a guide within this assessment. The terms have been defined by this assessment as follows:

- 'Very short term' relates to effects measured in hours, days or weeks;
- 'Short term' relates to effects measured in months;
- 'Medium term' relates to effects measured in years; and
- 'Long term' relates to effects measured in decades (e.g. the long-term effects on health from long-term employment).

15.3.3.5 Determining Effect Significance

The assessment of EIA health significance is an informed expert judgement about what is important, desirable or acceptable for public health with regards to changes triggered by the Project. These judgements are: value-dependant (underpinned by scientific data, but also informed by professional perspectives); and are context-dependent (judgements reflect relevant social, economic and political factors for the population).

The determination of significance has two stages:

- Firstly, the sensitivity of the receptor affected, and the magnitude of the effect upon it are characterised. This establishes whether there is a relevant population and a relevant change to consider; and
- Secondly, a professional judgement is made as to whether the expected change in a population's health outcomes would be significant in public health terms. This judgement is explained using an evidence-based narrative setting out reasoned conclusions.

Table 15.4, Table 15.5, Table 15.6 and Table 15.7 together summarise the assessment methodology that has been adopted. This approach shows how the general EIA methods of using sensitivity and magnitude to inform a judgement of significance, are applied for human health. The approach uses professional judgement, drawing on consistent and transparent criteria for sensitivity and magnitude. It also references relevant contextual evidence to explain what significance means for human health in public health terms.

The EIA human health assessment uses qualitative analysis following the 2022 IEMA guidance approach (Pyper et al., 2022b). This draws on qualitative and quantitative inputs from other EIAR topic chapters. This reflects the consensus position amongst public health and impact assessment practitioners that qualitative analysis is the most appropriate methodology for assessing wider determinants of health proportionately, consistently and transparently.

The EIA health chapter conclusions are both EIA scores, such as major, moderate, minor or negligible; and a narrative explaining this score with reference to evidence, local context and any inequalities.

Terms in bold in Table 15.4, Table 15.5, and Table 15.7 indicate terms that qualitatively describe levels within criteria that are discussed across the scoring options. For example, high, moderate, low or very low levels of deprivation. These are the terms from the guidance that are used within the assessment narrative.

Table 15.4: Health Sensitivity Methodology Criteria

Category/ Score	Indicative criteria (judgment based on most relevant criteria, it is likely in any given analysis that some criteria will span score categories) *The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):*
High	**High** levels of deprivation (including pockets of deprivation); **reliance** on resources shared (between the population and the project); existing **wide** inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or **concern**; people who are **prevented** from undertaking daily activities; **dependants**; people with **very poor** health status; and/or people with a **very low** capacity to adapt.
Medium	**Moderate** levels of deprivation; **few alternatives** to shared resources; existing **widening** inequalities between the most and least healthy; a community whose outlook is predominantly **uncertainty** with some concern; people who are **highly limited** from undertaking daily activities; people providing or requiring **a lot of care**; people with **poor** health status; and/or people with a **limited** capacity to adapt.
Low	**Low** levels of deprivation; **many alternatives** to shared resources; existing **narrowing** inequalities between the most and least healthy; a community whose outlook is predominantly **ambivalence** with some concern; people who are **slightly limited** from undertaking daily activities; people providing or requiring **some care**; people with **fair** health status; and/or people with a **high** capacity to adapt.
Very low	**Very low** levels of deprivation; **no** shared resources; existing **narrow** inequalities between the most and least healthy; a community whose outlook is predominantly **support** with some concern; people who are **not limited** from undertaking daily activities; people who are independent (not a carer or dependant); people with **good** health status; and/or people with a **very high** capacity to adapt.

Table 15.5: Health Magnitude Methodology Criteria

Category/ Score	Indicative criteria (judgment based on most relevant criteria, it is likely in any given analysis that some criteria will span score categories) *The narrative explains that the change due to the project has (select as appropriate):*
High	**High** exposure or scale; **long-term** duration; **continuous** frequency; severity predominantly related to **mortality** or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; **majority** of population affected; **permanent** change; **substantial** service quality implications.
Medium	**Low** exposure or **medium** scale; **medium-term** duration; **frequent** events; severity predominantly related to moderate changes in **morbidity** or major change in quality-of-life; **large minority** of population affected; **gradual** reversal; **small** service quality implications.

Low	**Very low** exposure or **small** scale; **short-term** duration; **occasional** events; severity predominantly related to minor change in **morbidity** or moderate change in quality-of-life; **small minority** of population affected; **rapid** reversal; **slight** service quality implications.
Negligible	**Negligible** exposure or scale; **very short-term** duration; **one-off** frequency; severity predominantly relates to a minor change in **quality-of-life**; very few people affected; immediate reversal once activity complete; no service quality implication.

Table 15.6: Assessment Matrix (Indicative)

Magnitude of Impact	Sensitivity			
	High	**Medium**	**Low**	**Very low**
High	Major	Moderate or major	Moderate or minor	Minor or negligible
Medium	Moderate or major	Moderate	Minor	Minor or negligible
Low	Moderate or minor	Minor	Minor	Negligible
Negligible	Minor or negligible	Minor or negligible	Negligible	Negligible

Where the matrix offers more than one significance option, professional judgement is used to decide which option is most appropriate.

Table 15.7: Health Significance Methodology Criteria

Category/ Score	Indicative criteria (judgment based on most relevant criteria, it is likely in any given analysis that some criteria will span score categories)
Major (significant)	The narrative explains that this is significant for public health because (select as appropriate): ➢ Changes, due to the project, have a **substantial** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity scores), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show **consensus** on the importance of the effect. ➢ Change, due to the project, could result in a regulatory threshold or statutory standard being **crossed** (if applicable). ➢ There is likely to be a **substantial** change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a **causal** relationship between changes that would result from the project and changes to health outcomes. ➢ In addition, health priorities for the relevant study area are of **specific** relevance to the determinant of health or population group affected by the project.
Moderate (significant)	The narrative explains that this is significant for public health because (select as appropriate): ➢ Changes, due to the project, have an **influential** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show **mixed views**. ➢ Change, due to the project, could result in a regulatory threshold or statutory standard being **approached** (if applicable). ➢ There is likely to be a **small** change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a **clear** relationship between changes that would result from the project and changes to health outcomes. ➢ In addition, health priorities for the relevant study area are of **general** relevance to the determinant of health or population group affected by the project.
Minor (not significant)	The narrative explains that this is not significant for public health because (select as appropriate): ➢ Changes, due to the project, have a **marginal** effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that **no** relevant consultation themes emerge among stakeholders. ➢ Change, due to the project, would be **well within** a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). ➢ There is likely to be a **slight** change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a **suggestive** relationship between changes that would result from the project and changes to health outcomes. ➢ In addition, health priorities for the relevant study area are of **low** relevance to the determinant of health or population group affected by the project.

Negligible (not significant)	The narrative explains that this is not significant for public health because (select as appropriate): ➢ Changes, due to the project, are **not related** to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having **no responses** on this issue among stakeholders. ➢ Change, due to the project, would **not affect** a regulatory threshold, statutory standard or guideline (if applicable). ➢ There is likely to be a **very limited** change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an **unsupported** relationship between changes that would result from the project and changes to health outcomes. ➢ In addition, health priorities for the relevant study area are **not** relevant to the determinant of health or population group affected by the project.

Population health effects that are scored major or moderate are considered significant.

Ultimately a likely significant health effect is one that should be brought to the attention of the determining authority, as the effect of the Project is judged to provide, or be contrary to providing, a high level of protection to population health. This may include reasoned conclusions in relation to health protection, health improvement and/or improving services.

Where significant adverse effects are identified, mitigation is considered to reduce the significance of such effects. Similarly, enhancements are considered where significant and proportionate opportunities to benefit population health are identified.

15.3.3.6 Evidence Assumptions and Limitations

15.3.4 Limitations

This assessment is based on publicly available statistics and evidence sources. No new primary research or bespoke analysis of non-public data was undertaken for the assessment.

Baseline data includes indicators where the available public data is pre-Covid-19, or that have yet to show the full impacts of the pandemic for public health. The baseline is considered sufficient and robust in evidencing that there are vulnerable population groups with high sensitivity in the study area. New data would be unlikely to change that conclusion as a ‘high’ sensitivity is already assigned to vulnerable groups, and any new data would not change this.

The health assessment partially draws from and builds upon, the technical outputs from the other technical chapters of the EIAR. As a consequence, the assumptions and limitations of those assessments also apply to any information used in this chapter (e.g. for modelling work undertaken). It is, however, considered that the information available provides a suitable basis for assessment.

15.4 Description of the Existing Environment

15.4.1 Current Baseline Environment

Different communities have varying susceptibilities to health impacts and benefits as a result of social and demographic structure, behaviour and relative economic circumstances. The aim of the following information is primarily to put into context the local health circumstances of the communities surrounding the Project site, drawing from available statistics. Where possible, data has been collected for the Naas (rural and urban) and Carragh EDs. Where ED data is not available, data for County Kildare has been used to compare with the national average.

It should be noted that the description of the whole population, and the populations within the local and wider study area, does not exclude the probability that there will be some individuals or groups of people who do not conform to the overall profile.

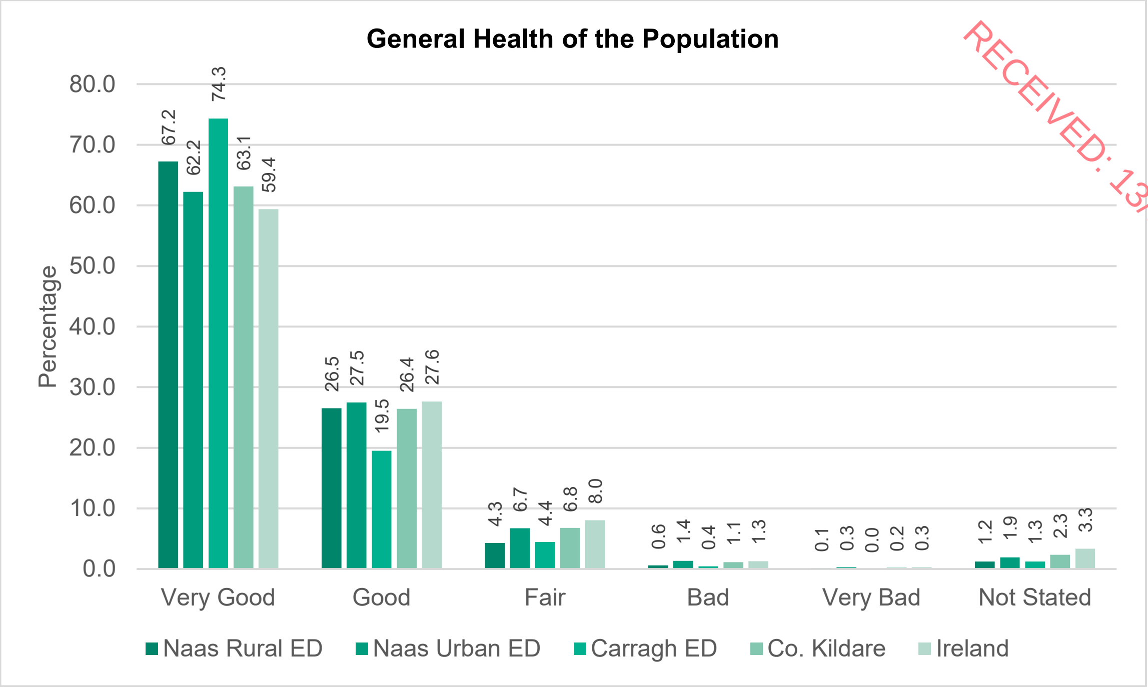


Figure 15.2: General health of the population at ED, county and national level. Census 2016

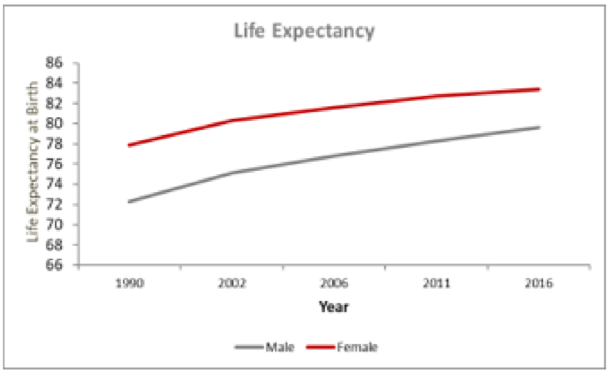
Based on 2016 census statistics (Central Statistics Office, 2016), the general health of the 3 EDs that make up the study area is very good. Consistent with county and national averages, the majority of residents of all 3 EDs report "very good" health: 67% in Naas Rural, 62% in Naas Urban, and 74% in Carragh. Less than 1% of residents in all 3 EDs have reported having "very bad" health, which is consistent with county and national averages.

15.4.2 Human Health Trends

Life Expectancy

Recent (2019) life expectancy statistics are only available at the national (Ireland) level. Life expectancy in Ireland at birth in 2019 was 80.8 years for males and 84.7 years for females (Central Statistics Office, 2019). Life expectancy is increasing with male life expectancy consistently lower than female life expectancy (Figure 15.3).

Healthy life expectancy (HLE) statistics (i.e. the number of years a person is in good health) are only available at the national (Ireland) level. Generally, both male and female HLE are increasing, with male HLE also consistently lower than female HLE (Figure 15.3).



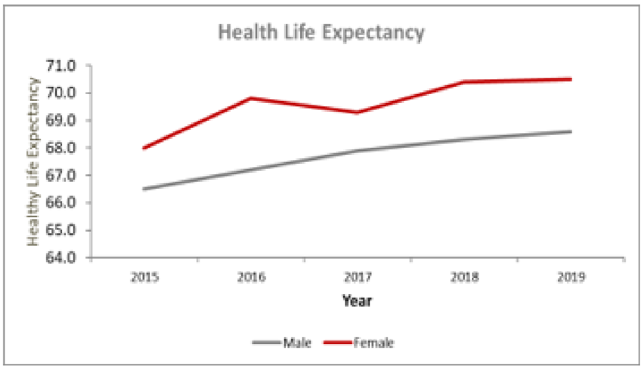


Figure 15.3: Life expectancy and healthy life expectancy in Ireland

Source: (Central Statistics Office, 2020a) (Table VSA30)

Physical Health

Overall, currently available physical health statistics for County Kildare perform better than national averages. There is a slightly higher proportion of people aged 15 years and over reporting good or very good health (89.5%) than the national average (85%) (Central Statistics Office, 2023).

The rate of procedures on the cardiovascular and respiratory systems in County Kildare is illustrated in Figure 15.4 and used a proxy for hospital admissions rates for diseases of the circulatory and cardiovascular system (data for the latter are no longer available). The rate of procedures on the cardiovascular system in County Kildare increased from 89.6 to 93.4 between 2010 and 2020 with a subsequent decrease to 91.8 in 2021. The rate of procedures on the respiratory system has increased from 102.9 to 109.0 between 2010 and 2020, with a decrease to 100.1 in 2021 (Central Statistics Office, 2023).

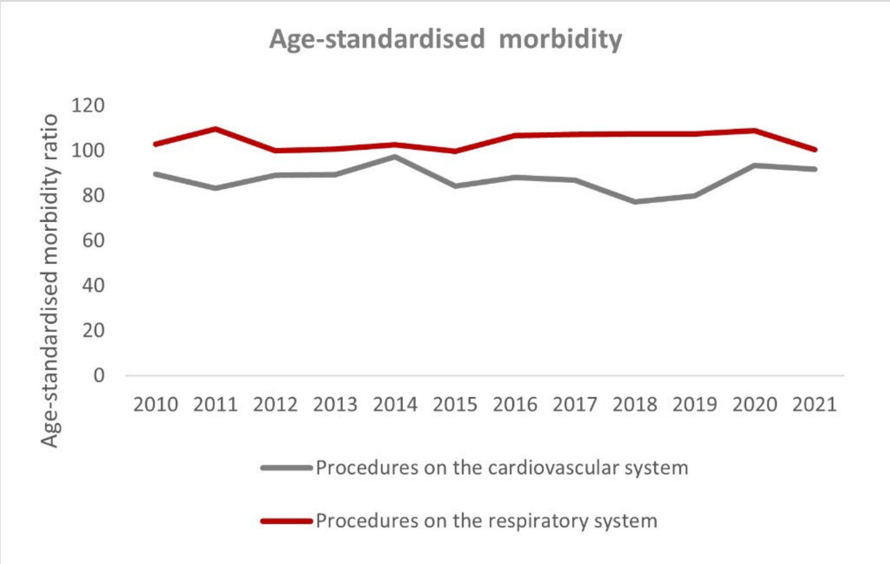


Figure 15.4 Age-standardised morbidity rate for procedures on the cardiovascular and respiratory systems for County Kildare (Statbank – Table DHA60) (Central Statistics Office, 2023)

Overall, the all-age all-cause mortality rate in County Kildare is lower than the national average (654 per 100,000 population).

Mortality from circulatory diseases is consistently lower than national average and is decreasing (Figure 15.6). Mortality from respiratory diseases has fluctuated and is decreasing in most recent figures (see Figure 15.7), showing a similar trend to the national average. Cancer mortality rate has increased in the Human Health Study Area as well as nationally, with most recent available statistics showing a higher rate in the Human Health Study Area (199.7 per 100,000) compared to the national average (191.9 per 100,000) (see Figure 15.8) (Central Statistics Office, 2023).

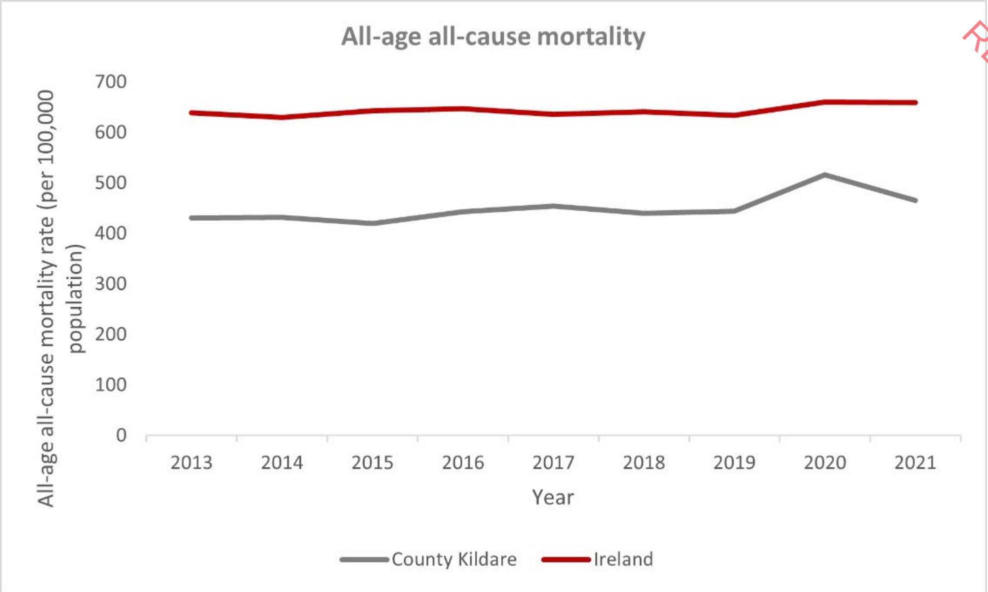


Figure 15.5 All-age all-cause mortality rate (Central Statistics Office, 2021) (Table DHA12)

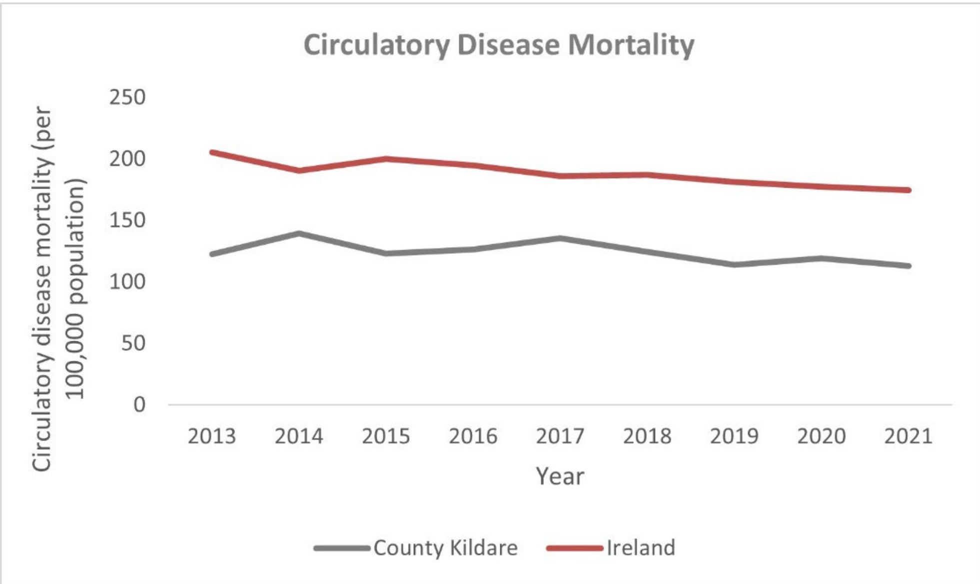


Figure 15.6 Circulatory disease mortality (Central Statistics Office, 2021) (Table DHA12)

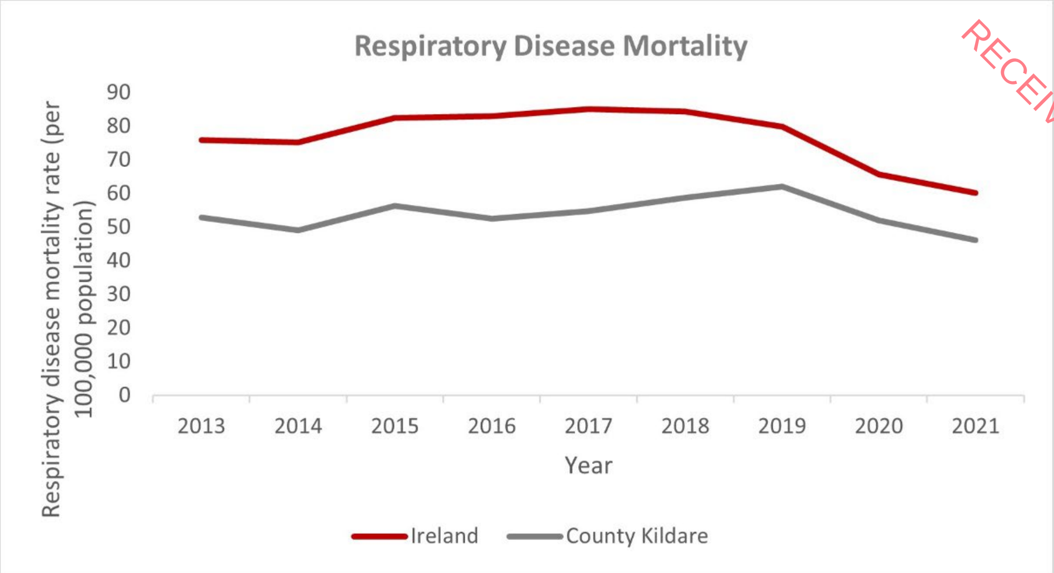


Figure 15.7 Respiratory disease mortality (Central Statistics Office, 2021) (Table DHA12)

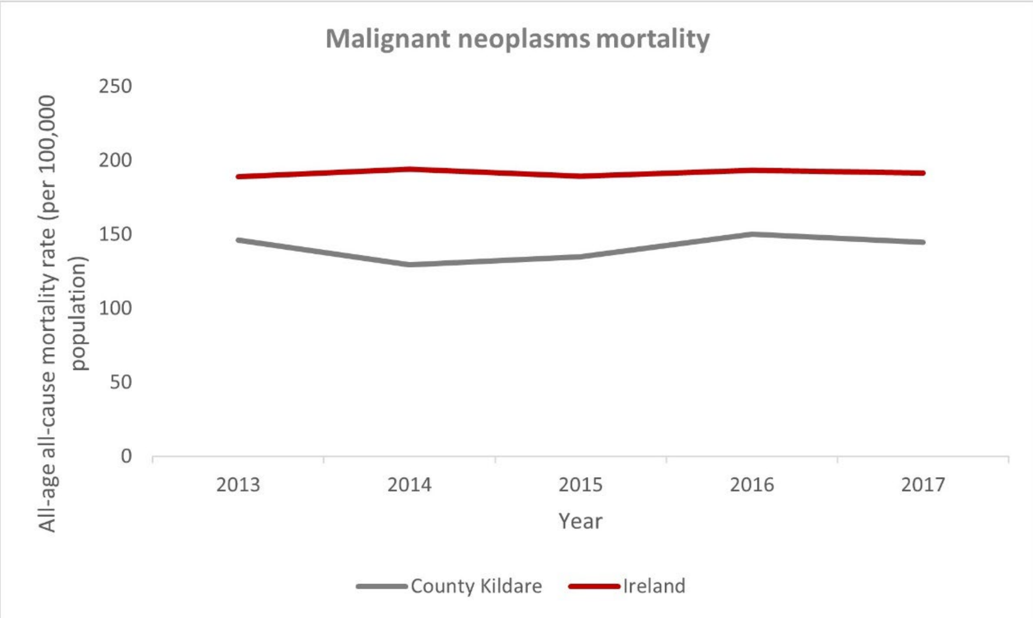


Figure 15.8: Malignant neoplasms mortality (Central Statistics Office, 2021) (Table DHA12)

Mental Health

Self-reported mental health status is only reported at the regional and national levels. Accordingly, the Mid-East region performs similar to the national comparator. In 2019, the percentage of people that reported to have experienced moderately severe to severe depression is 2% in both the Mid-East region and Ireland (Central Statistics Office, 2020b).

Deaths from mental and behavioural disorders is lower in County Kildare (16.8 per 100,000 population) compared to the national rate (35.1 per 100,000). However the suicide rate is slightly higher in County Kildare (10.1 per 100,000 population) compared to Ireland (8 per 100,000) (Central Statistics Office, 2021).

Deprivation

The Project site is located across two Electoral Divisions (ED): ED Naas Rural and ED Carragh, which in the 2022 Pobal Deprivation Index (Pobal, 2023) were classed overall as affluent and marginally above average (deprivation) respectively. Of the seven small areas that comprise Naas Rural and Carragh EDs, 2022 data show that none were classed as marginally below average, three were classed as marginally above average deprivation, four were classes as affluent, and none were classed as very affluent.

The Human Health Study Area uses the most deprived small area within close proximity to the Project as representative of sensitive populations. Of the abovementioned small areas, the most deprived area is Small Area ID 087070002 (within Naas Rural ED). This area has 457 people (2022 data) with an unemployment rate of 4.65% for males and 9.57% females. The lone parent ratio is 7.55%, 2.74% of the population lives in local authority rented housing, and 2.43% of the population has only primary education.

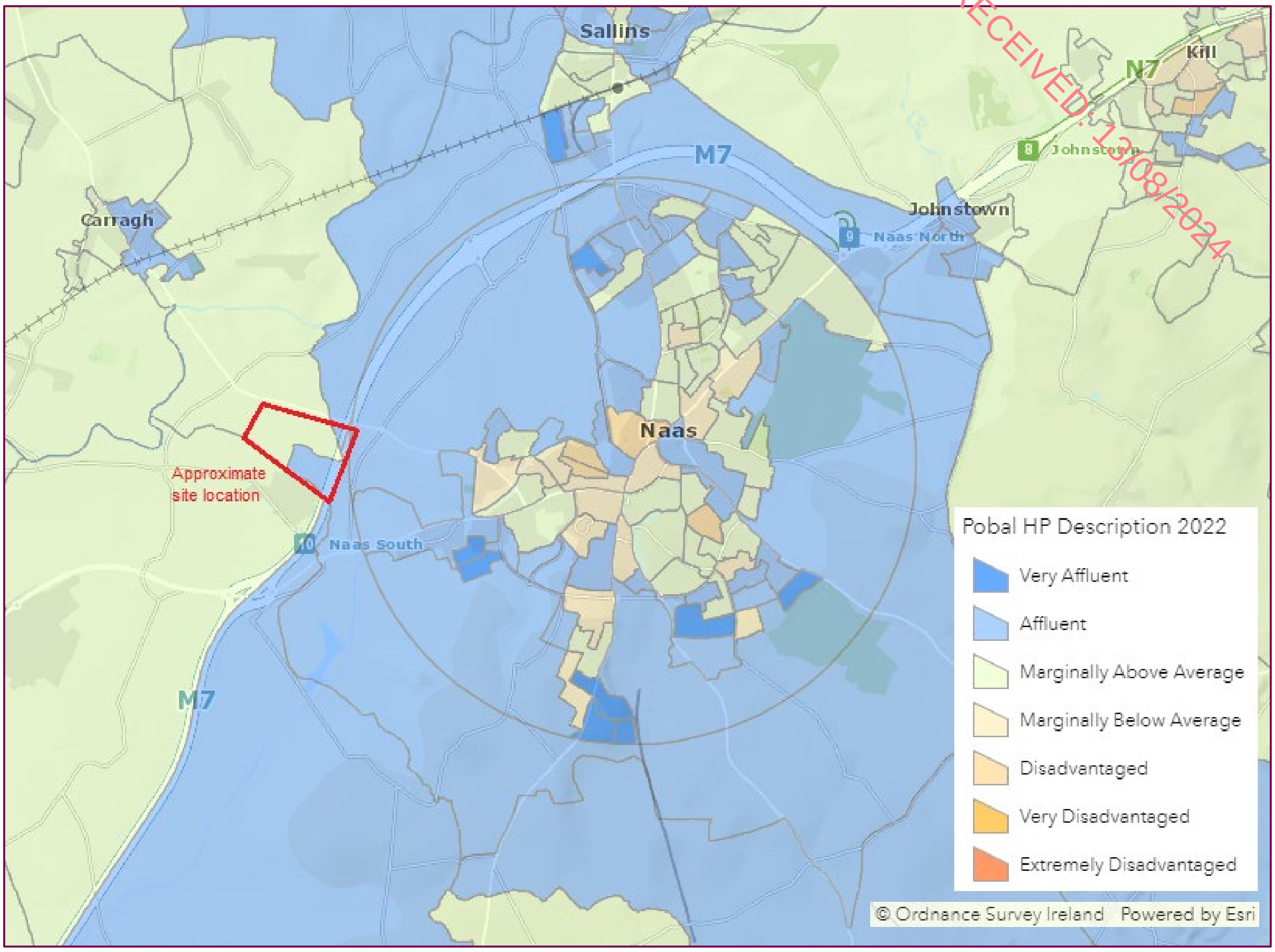


Figure 15.9: Deprivation map for Carragh, Naas Rural and Nass Urban (circular area) Electoral Divisions (Source: Pobal, 2022)

15.4.3 Evolution of the Environment in the Absence of the Proposed Scheme

Longer term trends and interventions in population health may influence the future baseline. Health and social care, public health initiatives and government policies aim to reduce inequalities and improve quality of life. The historic success of such interventions is increasingly challenged by national trends such as an aging population, rising levels of obesity, the COVID-19 pandemic, cost-of-living crisis and climate change. The implications of these pressures for public health will take years to be reflected within statistical data releases, but it is expected that they will exacerbate public health challenges. These factors disproportionately affect vulnerable groups, including due to age and ill-health.

Climate change may exacerbate physical and mental health risk factors, particularly around flooding, extremes of temperature and uncertainty for future generations. The baseline indicates that the population of Naas and Carragh is for the most part relatively affluent and would be expected to therefore be relatively resilient to climate change stresses. Typically, low resource groups, e.g. in areas of high deprivation, are most sensitive to the adverse health effects of climate change.

To reflect these trends the assessment scores all vulnerable groups as having high sensitivity for all determinants of health. This appropriately captures any increase in sensitivity within the future baseline.

It would not be proportionate (or consistent with the qualitative assessment approach taken) to quantitatively model the population’s future health. This reflects the complexities of interactions between the wider determinants of health, as well as the potential for macro-economic changes in the next decade that are hard to predict. Any prediction would have such wide error margins that it would greatly limit the value of the exercise.

15.5 Assessment of Effects

15.5.1 Physical Activity

Operations and maintenance

This section considers the population health effect of the new operational footpaths and cycleways on physical activity. Section 15.5.2 assesses transport modes, access and connections and considers how walking and cycling may be affected by the Project’s vehicle traffic on the road network. Supporting people to be active is an important determinant of physical and mental health. The Project includes the provision of new footpaths and cycleways connecting the Project to the existing road network, and on-site cycle storage facilities. Active travel health effects may relate to physical health (e.g. cardiovascular health) and mental health conditions (e.g. stress, anxiety or depression) associated with obesity and levels of physical activity.

This section has been informed Chapter 12 – Traffic and Transportation, which sets out relevant assessment findings and mitigation measures that have been considered.

The potential health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is new footpaths and cycleways promoting active travel and physical activity near the Project.
- The pathway is changes in amenity for pedestrians and cyclists and behavioural change in levels of physical activity.
- Receptors are residents and commuters in the local communities and businesses near the Project.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The ‘site-specific’ geographic population of Naas Rural and Carragh.
- The sub-population vulnerable due to:
  - Low income, specifically people who would benefit from new active travel and improved physical activity opportunities or means of transport.

- Poor health, specifically conditions where physical activity would be beneficial to physical or mental health.
- Access and geographical factors, specifically the population who will have improved access to work / employment locations accessed by the routes provided by the Project.

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in Section 15.3.3.3 of this report. The general population comprise those members of the community who are unlikely to make regular use of the new public footpaths, cycleways or leisure facilities provided by the Project and would likely have *alternative* routes for active travel or physical activity opportunities.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of those receiving care due to poor health who may benefit from the improved active travel facilities that may facilitate walking/cycling to and from work. The population may be more *reliant* on the improved route, with greater likelihood that any improvement could impact physical activity behaviours.

Magnitude of impact

As reported in Chapter 12: Traffic and Transportation and summarised in section 15.3, the Project will include extension of the existing segregated cycling and walking infrastructure on the southern side of the R409. As a result, the Project site will be connected to Naas and to other business parks in the vicinity by segregated cycling and walking infrastructure, and bicycle parking will be provided at the Project site in the vicinity of each data centre and at the Admin Workshop Area. A total of 104 bike parking spaces are provided throughout the site.

For population health the magnitude of change due to the Project is **low**. The scale of change is considered *small.* The additional infrastructure would be *permanent* and similar or higher in quality as compared to the existing infrastructure. Effects would range from be experienced *occasionally to frequently* over the *long-term* for users of the new routes and facilities. Only *minor changes* in morbidity related to cardiovascular and mental wellbeing outcomes would be expected for a *small minority* of the population.

Significance of effect

The significance of the population health effect for this determinant of health is **minor beneficial** (not significant).

The Project extends an existing active travel route, and this would be beneficial in the promotion of physical activity. Whilst physical activity is a *specific* local public health priority and the scientific literature shows a causal relationship between the benefits of physical activity and beneficial health outcomes; the professional judgement is that there would be only a *slight* beneficial change in the health baseline for the local population. The changes are likely to have a *marginal* influence on the delivery of health-related policy.

15.5.2 Transport modes, access and connections

Construction, Operational and maintenance, and Decommissioning phases

This section considers population health implications of changes in construction and operational road traffic affecting: health-related travel times and accessibility (including emergency services); road safety and; active and sustainable travel for local residents (bus users, pedestrians and cyclists).

- Construction works and constructed-related vehicles and traffic have the potential to disrupt local vehicle traffic (private and public transport) as well as some sustainable travel (bus routes) and active travel (pedestrians and cyclists). This may include health-related journey times, community severance or road safety; and
- There is also potential for increases in vehicle movements during the operational phase, relating to the movement of materials and people to and from the Project site, which may cause delays in local vehicle traffic and health-related journey times and disruptions in active travel.

This section has been informed by Chapter 12 – Traffic and Transportation, which sets out relevant assessment findings and mitigation measures that have been considered.

With regard to health-related travel times and accessibility, health effects may be associated with emergency response times or non-emergency treatment outcomes associated with delays or non-attendance. With regard to active and sustainable travel, health effects may be associated with reductions in levels of active travel, including physical health (e.g. cardiovascular health) and mental wellbeing (e.g. increased stress and anxiety). With regard to road safety, health effects may be associated with the severity or frequency of road traffic incidents.

The potential effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is the presence of construction and operational vehicles and traffic restrictions on the existing network,
- The pathway is changes in health-related travel times / accessibility, changes to levels of active travel due to increased vehicle traffic, and changes to road safety.
- Receptors are local road users, including those using motor vehicles as well as pedestrians and cyclists, and emergency services using the road network.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh;
- The 'local' population of County Kildare.
- The sub-population vulnerable due to:
  - Young age vulnerability (children and young people as potentially more vulnerable road users).
  - Old age vulnerability (older people as potentially more vulnerable road users)
  - Poor health vulnerability (people with existing poor physical and mental health in relation to health trip journey times)
  - Low-income vulnerability (people living in deprivation, including those on low incomes for who travel costs or alternatives may be limiting)
  - Access and geographical vulnerability (people who experience existing access barriers or who rely on the affected routes, including healthcare and other amenities).

The scientific literature indicates that there is an association between the transport changes, road safety and accessibility. The literature does not identify particular thresholds for effects. The assessment has had regard to the population groups identified in the literature that may be particularly sensitive. For example, children, pregnant women and cyclists (particularly older cyclists) are generally more vulnerable in terms of road safety. People with lower socio-economic status typically face more transportation barriers in accessing health care.

Sensitivity of the population

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in Section 15.3.3.3 of this report. This reflects that most people in the local area (County Kildare) would only make *occasional* use of the affected section of the road network. It also includes those for whom the road network affords *many alternative* routes. The general population comprise those members of the community with a *high capacity* to adapt to changes in access, including changes in healthcare access, for example due to greater resources and *good* physical and mental health.

The sensitivity of the vulnerable group population is **high**. Vulnerability in this case is linked to mode of travel, including pedestrians and cyclists being more sensitive to road safety changes. It also relates to age (young people and older people) being more vulnerable to accident severity, those *reliant* on services accessed on affected sections of the road network (e.g. traveling to schools), and those in areas of greater deprivation. Deprived populations may already face more access barriers compared to general population and therefore be more sensitive to access changes. Low incomes may compound access barriers by *limiting* adaptive response. Vulnerability also includes those accessing health services (emergency or non-emergency) at times and locations affected by congestion. Ambulance services (and the recipients of their care) are particularly sensitive to delays in response times (time taken to arrive and stabilise the patient). Ambulances are generally less affected by congestion due to the priority given to them travelling under blue lights, but journey times may benefit from the road improvements. People in poor or very poor health may be more frequent users of healthcare service and therefore be more sensitive to access changes.

Magnitude of impact

Chapter 12 -Traffic and Transportation concludes the impact on the surrounding road network falls within the thresholds as set out in the relevant guidance. Given the percentage impact it is unlikely that the construction phase will result in a significant impact upon the surrounding road network. Operational traffic impacts on the surrounding highway network are assessed as negligible.

For population health the magnitude of change due to the Project is **low**.

- In relation to health-related travel times and accessibility. During construction and decommissioning, the scale of change in delays is expected to be *small*, with the duration of such change medium-*term*. The frequency with which health related journeys may be affected is likely to be *occasional.* During operation and maintenance, the scale of change in delays is expected to be *negligible*, with the duration of such change *long-term*. For all phases, most delays would not affect health outcomes, though for a very few people, severity could relate to a *small change* in risk for morbidity or mortality. Any health service implications are likely to be *slight*.
- In relation to active/sustainable travel. During construction and decommissioning, the scale of change in use of active or public transport due to disruption and additional vehicle movements on the roads is considered *small* and over the *medium-term*. This reflects the temporary nature of construction and decommissioning work and ability of people to adapt to known planned roadworks. During operation and maintenance, the scale of change over the *long-term* is anticipated to be *negligible.* In all phases, any changes relate to those making *frequent or occasional* use of active travel or public transport modes. Any changes, slight incentivising or disincentivising the use of these modes, would be expected to make only a very minor contribution to quality-of-life and morbidity for cardiovascular and mental health outcomes for a *small minority* of the population. Sustained behavioural change due to the Project change is not expected.
- In relation to road safety. During construction and decommissioning, a *small* scale of change in road traffic would have a corresponding very small increase in accident risk (simply as a function of traffic volumes). Such events would remain *occasional* over the *medium-term* for the construction and decommissioning phases. During operation and maintenance, the scale of change is likely to be *negligible,* with *occasional* events over the *long-term.* For all phases, severity relates to a very minor change in risk of injury or mortality (with outcome reversal gradual or permanent). Very few people would be affected, with no or slight implications for healthcare services.

Significance of effect

The significance of the population health effect for this determinant of health is **minor adverse** (not significant). The professional judgment is that there would, at most, be a *slight adverse* change in the population health baseline. This conclusion reflects that road safety and access to health supporting services are *specific* public health priorities and there is *causal* association that is supported by the scientific literature. However, the change due to the Project is appropriately mitigated by standard good practice measures that minimise disruption and disturbance, as described in Chapter 12. The change is unlikely to result in significant differential or disproportionate effects between the general population (low sensitivity) and the vulnerable sub-population (high sensitivity). Consequently, *no widening of health inequalities* would be expected, and no influence is expected on the ability to deliver local or national health policy.

15.5.3 Community identity, culture, resilience and influence

Operational and maintenance phase

This section considers the potential effects to community identity from the visual impact of the operational data centre. Community identity is a determinant of wellbeing and is influenced by aesthetic elements of the landscape. A range of responses may be expected depending on people's outlook. Some people may experience ambivalent or positive effects while other people may experience negative effects due to a greater degree of built form within their views. To take a conservative approach this section considers the latter response.

This section has been informed by Chapter 11: Landscape and Visual which sets out relevant assessment findings and mitigation measures that have been taken into account.

The potential health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is the data centre infrastructure as a new visual element;
- The pathway is visual change triggering psychological responses; and
- Receptors are local communities with frequent near views of the Project.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh
- The sub-population vulnerable due to:
  - low income, specifically people who have fewer resources to adapt to change.
  - poor health, specifically people with existing health conditions or high stress or anxiety levels who feel strongly about the changes associated with the Project.
  - Access and geographical factors, specifically the population with the greatest visual change due to proximity and direct views.

Sensitivity of the receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 15.3.3.3. The general population comprise those members of the community in *good* physical and mental health and with greater resources to respond to change. Given the existing screening including hedgerows, the proposed high mounds to be installed as visual buffers and the distance to the residential area of the Project, the visual impacts would not affect most residents. *Occasional* or passing views of the data centre from roads, footpaths or cycleways are not expected to affect population health.

The sensitivity of the vulnerable group is **high**. This reflects that the sub-population includes those with *existing* poor mental health or who have *high degrees* of concern or *uncertainty* about the Project. This sub-population also includes those who have *less capacity* to adapt to the changes due to near views of the Project from their homes. This vulnerable sub-population may experience disproportionate effects.

Magnitude of impact

During the operation and maintenance phase the Project would include new visual elements, including 6 no. two storey data centre buildings, an administration / management building, car parking, landscaping, energy infrastructure and other associated works. The Project also comprises a grid substation and 110 KVA transmission connection.

Chapter 11: Landscape and Visual concludes that the Project will not be out of character with the surrounding environment. Of the 15 viewpoints assessed, only one will have moderate adverse visual impact at the operational stage: viewpoint 11 (View north from Osberstown Business Park Entrance) is predominantly available to vehicle users and pedestrians. The remaining viewpoints were assessed as no change, negligible or minor adverse. Additionally, the Project's planting scheme will provide further screening. The assessment concluded that the wider landscape and visual resources of the development's surroundings have the capacity to accommodate a development of this type and scale.

For population health the magnitude of the change due to the Project is **low**. Occasional and partial views from vantage points of a transitory nature whilst passing the data centre are not expected to affect population health outcomes. Although this change would be experienced over the *long-term* on a *frequent* basis (albeit not permanent), there are not widespread changes in near views from dwellings to a degree that would indicate the potential for a population level effect. There is potential, at most, for a *minor* change in quality of life for a *small minority* of the population. A degree of adaptation to views would be expected over time, and *no health service* implications would be expected. For a *very few* people there may be greater changes in setting, for example where there are near views of the Project. Such individual level effects are noted and targeted mitigation may be appropriate, however population level health effects are not expected.

Significance of the effect

The significance of the population health effect for this determinant of health is **minor adverse** (not significant). The professional judgement is that there would be a *very limited* adverse change in the health baseline for the local population, reflecting the level of visual change is limited by the site context. Whilst the scientific literature establishes that there can be an association between visual change and health outcomes, this is not a public health priority issue, and the Project would not result in a scale of changes that would affect the delivery of local or national health policy on this issue. The degree of visual change is not disproportionately greater for more health deprived populations, as such *no change in health inequalities* is expected.

15.5.4 Education and training

Operational and maintenance phase

This section discusses changes to education and training during operation of the Project. The Project provides opportunities for career development and upskilling.

Changes in training opportunities have socio-economic effects that impact upon health and mental well-being.

A potential population health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is upskilling and career development opportunity.
- The pathway is good quality education and skills development which is influential for health.
- Receptors are local communities particularly young people and people of working age.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The local population of County Kildare
- The regional population of Leinster province
- The sub-population vulnerable due to:
  - Young age vulnerability (young people), particularly young adults early in their career.
  - Poor health vulnerability (people with existing poor physical and mental health) who would disproportionally benefit from access to opportunities.
  - Low-income vulnerability (people living in deprivation, including those on low incomes for whom upskilling and career development may be particularly beneficial).

Sensitivity of receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 15.3.3.3. This reflects that most people in the local area would make use of *alternative* educational or training opportunities or have *existing* educational attainment appropriate to their vocation and career progression.

The sensitivity of the vulnerable group population is **high**. Vulnerability in this case relates to young adults, in relation to apprenticeship opportunities, and children or young people, in relation to educational support initiatives. Both these groups, particularly those who are from disadvantaged backgrounds, would be particularly sensitive to educational interventions that provide knowledge, new skills or personal development.

Young people leaving education or early in their careers may have the most to gain from an increase in training opportunities as a pathway into good quality local employment.

Magnitude of Impact

For population health the magnitude of change due to the Project is **low**. The change would be *long term* and *small-scale*. Any upskilling and training opportunities associated with the operational employment opportunities are likely to be associated with *minor* changes in morbidity and quality of life for a *small minority* of the population due to improved socio-economic status.

Significance of effect

The significance of the population health effect for this determinant of health is **minor beneficial** (not significant). The professional judgment is that there would be a *slight* beneficial change in the health baseline for the local population. This conclusion reflects that the scientific literature establishes a clear relationship between career development and factors that promote health or are protective against poor health, particularly mental health. The scale and nature of career development is expected to be *marginal* in narrowing health inequalities locally, and more generally supporting delivery of health policy to improve local population health.

15.5.5 Employment and income

Operational and maintenance phase

This section considers the health implications of increased employment and economic impacts during operation. Employment is an important determinant of health and well-being both directly and indirectly by making health-promoting resources available to an employee and any dependants. The socio-economic benefits associated with employment are improved living conditions and the potential to make healthier choices, e.g. eating a healthier diet and undertaking more physical activity. If members of the community are employed, this can also generate indirect economic activity.

This section has been informed by Chapter 14 – Population, which sets out relevant assessment findings and mitigation measures that have been considered.

The potential health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- Source: direct and indirect job creation and economic activity, including access to employment.
- Pathway: level of income and employment linked to spend on health supporting resources.
- Receptor: people of working age (and their dependants).

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The ‘local’ population of County Kildare.
- The ‘regional’ population of the province of Leinster.
- The sub-population vulnerable due to:
  - Young age vulnerability (young adults as employees or apprentices, and children and young people as dependants).
  - Old age vulnerability (older people as dependants).
  - Low-income vulnerability (people living in deprivation, including those on low incomes for whom good quality employment may be particularly beneficial).
  - Poor health vulnerability (people with existing poor physical or mental health, including as dependants).

Sensitivity of the receptor

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been considered and are listed in section 15.3.3.3. This reflects that most people would already be within stable employment that would be unaffected by the Project (or being a dependant of such a person).

The sensitivity of the vulnerable sub-population is **high**. The health of vulnerable groups is particularly sensitive to employment. Vulnerability in this case relates to people and their dependants who are on low incomes or who are unemployed. Young people, including leaving education or early in their careers may have the most to gain from an increase in good quality job opportunities. Future young or older people may also come to rely on those employed. Improved access to employment opportunities may particularly benefit those on low incomes.

Magnitude of impact

During operation, the Project will generate approximately 225 jobs in the IT sector and will indirectly support the development of other small and medium enterprises. Chapter 14 – Population concludes that the Project will “deliver significant new employment” and “support a key sector of the economy in Kildare”.

For population health the magnitude of change due to the Project is **low**. The scale of direct and indirect new employment generated by the Project is considered to be *small* in the local and regional economy context. General employment benefits linked to improved access to job opportunities are predominantly expected to be filled by existing skilled residents extending their commuting range (rather than causing an influx of new residents to communities). The effects are expected to be greatest at the local level, but also extend to the regional level. Overall benefits of the Project to the local economy are considered greater. New good quality *medium-term* roles (in terms of renumeration, working hours, working conditions and job security) are considered particularly likely to contribute to long-term population health benefits. Benefits are likely to relate to *minor* changes in quality of life and morbidity for a *small minority* of the local and regional population (including through indirect benefits to dependants).

Significance of effect

The significance of the population health effect for this determinant of health is **minor beneficial** (not significant). The professional judgment is that there would be a *slight* beneficial change in the health baseline for the local population. This conclusion reflects that the scientific literature establishes a clear relationship between good quality employment and factors that promote health or are protective against poor health, particularly mental health. The scale and nature of employment is *not expected to widen or narrow existing health inequalities.*

15.5.6 Climate change and adaptation

Operational and maintenance phase

The Project utilises natural gas (a fossil fuel) as its primary source of energy. Combustion of natural gas is associated with emission of greenhouse gases, a driving factor of climate change. The Project will also operate on the basis of a minimum of 30% energy from off-site renewables including solar and wind energy and will contain carbon mitigation measures embedded in the project design, including selection of sustainable / low embodied carbon materials and the sourcing of goods, services or works with reduced lifecycle impact. These initiatives have the potential to impact beneficially by enabling the reduction of carbon emissions in ancillary sectors, such as digitisation and dematerialisation (swapping of high carbon products for low carbon alternatives), improved data collection and communication system; system integration and optimisation of processes (Whitehead et al., 2014).

The population health effects associated with climate change include heat-related disorders (e.g. heat stress and lower work capacity), respiratory disorders (e.g. worsened asthma), infectious diseases, migration, food insecurity (e.g., lower crop yields) and injury and mental stress associated with natural disorders (e.g. flooding or fires). This section has been informed by Chapter 16 – Climate which sets out the relevant assessment.

The potential health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- Source: non-renewable energy generation and indirect carbon savings in other sectors;
- Pathway: release of climate altering pollutant emissions;
- Receptor: national and global population, particularly deprived populations in low- and middle-income countries.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'national' population of Ireland, and international population for global effects.
- The sub-population vulnerable due to low incomes, including where this overlaps with being a dependant (children, older adults and people with poor health requiring care) and/or other social disadvantage or deprivation.

Sensitivity of the receptor

The sensitivity of the general population is **low**. Common factors that differentiate that sensitivity of the general population and the vulnerable group population have been taken into account and are listed in section 15.3.3.3. The general population comprise those members of the community in good physical and mental health and with greater resources to respond to climate adaptation.

The sensitivity of the vulnerable group population is **high**. This reflects the sub-population on low incomes for whom climate adaptation or the adverse effects of climate change pose a greater risk. This is particularly the case for dependants on issues such as health risks of temperature extremes, including heatwaves and cold weather.

Magnitude of impact

Chapter 16 – Climate discusses the whole life operational GHG emissions relative to Ireland's Carbon budget, concluding a minor adverse effect would be expected following mitigation. Chapter 16 acknowledges there would be a considerable scale of emissions.

The magnitude of change for population health due to the Project is **low**. This reflects the contribution to increasing climate altering pollutant emissions, which is a *small* scale of change in the context of the wider energy and industrial sectors, but with implications for the health outcomes of a global population. Increases in adverse effects of climate change are associated with a *minor change* in risks for population mortality (e.g., increase in excess winter deaths) and morbidity (e.g., exacerbation of respiratory and mental health conditions). Such effects may have a *slight implication* to healthcare services by increasing capacity burdens.

The score also reflects the contribution of the Project to reducing global climate change health effects through the use of facilitating carbon emission reduction in other sectors, which is a *very small scale* of change nationally and internationally, but with implications for a global population. Reducing adverse effects of climate change provides a *minor* reduction in risks for population mortality (e.g., increase in excess winter deaths) and morbidity (e.g., exacerbation of respiratory and mental health conditions). Such effects may bring *slight* benefits to healthcare services by reducing capacity burdens.

Significance of the effect

The significance of the population health effect for this determinant of health is **minor adverse** (not significant). This assessment conclusion reflects that whilst the scientific literature establishes a causal effect relationship between climate change and health outcomes, the changes would result in a *slight effect* on the health baseline of the local population. The Project would not result in a scale of change that would affect the delivery of local or national health policy on this issue. The Projects net contribution to climate change, taking into account emissions directly generated as well as emissions indirectly avoided, suggests that the Project would have, at most, a marginal effect on health inequalities.

15.5.7 Air quality

Construction, Operational and Maintenance, and Decommissioning phases

This section discusses changes to air quality during construction, operation and maintenance, and decommissioning of the Project, and related effects on population health. Construction and decommissioning of the Project has the potential to result in dust effects from demolition and construction activities and construction compounds, as well as vehicle emissions from construction traffic. Operational activities of the Project have the potential to result in emissions from the combustion of natural gas during electricity generation and vehicles operating at the site, as well as operational vehicle traffic movements to and from the Project. Combustion of natural gas is associated with emissions of air pollutants including nitrogen oxides particularly nitrogen dioxide (NO_2) and particulate matter ($PM_{2.5}$ and PM_{10}).

The scientific literature indicates that there is an association between air quality emissions and health and wellbeing effects. Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges that for PM and NO_2 there are non-threshold health effects (i.e. when there is no known exposure threshold level below which adverse health effects may not occur) (European Environment Agency, 2022). There are population groups that may be particularly sensitive to air quality effects. For example, young children are particularly susceptible to air pollution because of their developing lungs, high breathing rates per bodyweight, and amount of time spent exercising outdoors. Other vulnerable groups include the sick (e.g. people with type 2 diabetes), the elderly, and pregnant women.

This section has been informed by Chapter 8 – Air Quality, which sets out relevant assessment findings and mitigation measures that have been taken into account.

Potential effects on human health are considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is air pollutants, particularly NO_2, $PM_{2.5}$ and PM_{10} from construction/decommissioning and operation activities, including plant/vehicle emissions and emissions associated with operational electricity generation.
- The pathway is diffusion through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh.
- The sub-population vulnerable due to:
  - Young age vulnerability (children and young people).
  - Old age vulnerability (older people).
  - Poor health vulnerability (people with existing poor respiratory or cardiovascular health).
  - Access and geographical vulnerability (people for whom close proximity to Project change increases sensitivity).

Construction and operational activities that produce dust relate to the coarser fractions of PM_{10} and potential nuisance from dust deposition on property. The great majority of anthropogenic $PM_{2.5}$ and NO_2 health effects relate to combustion related processes, particularly use of fossil fuels (natural gas) in electricity generation, changes in transport patterns, and solid fuel burning from space heating.

Whilst the focus of discussion in this health chapter differentiates between coarse PM during construction and fine PM during operation, the health outcomes of PM_{10} and $PM_{2.5}$ are not distinguished in this assessment. This reflects that both are typically present (though the relative proportions change) and that the evidence base does not consistently distinguish their effects particularly given that $PM_{2.5}$ is a subset of PM_{10}. However, generally, elevated concentrations of $PM_{2.5}$ are considered of greater concern due to their greater potential to interact within the body.

For dust emissions, the main health outcomes are likely to relate to exacerbation of existing conditions, such as asthma or chronic obstructive pulmonary disease (COPD) (i.e. airway inflammation by coarse PM) and to reductions in wellbeing associated with annoyance or reduced amenity. Whilst other outcomes (e.g. cardiovascular events) may be relevant in the event of brief high concentrations, such elevated exposures are expected to be avoided though the embedded standard good practice mitigation discussed in Chapter 8 – Air Quality.

Sensitivity of the population

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group have been taken into account and are listed in Section 15.3.3.3 of this report. The general population comprise those members of the community who live, work and study at a distance where high levels of dispersion and deposition would greatly limit the effects of any change in exposure due to the Project. Furthermore, most people enjoy *good* respiratory health (e.g. are not asthmatic) and are not a life stage (e.g. infant or frail elderly) with particular sensitivity to air quality.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of dependants, both children, elderly and those receiving care due to poor health. For example, *existing* respiratory conditions including asthma and chronic obstructive pulmonary disease (COPD) and type 2 diabetes would increase sensitivity. People likely to be most affected by the Project are those either living or working close to the construction compounds (see receptors listed in Chapter 8 – Air Quality).

Magnitude of impact

This section has been informed by Chapter 8 – Air Quality, which sets out relevant assessment findings for PM_{10}, $PM_{2.5}$ and NO_2 as well as mitigation measures that have been taken into account. During construction, the risk of impact from dust emissions was assessed as low risk to human receptors. Air quality impacts during operation were assessed as negligible. As described in section 15.3.2, a comprehensive set of mitigation and monitoring measures, including a Dust Management Plan, will be implemented to further minimise impacts to air quality.

For population health the magnitude of change due to the Project is **low** for all phases of the Project.

With regard to the construction and decommissioning phases, occasionally, weather conditions may coincide with activities to generate higher levels of dust. This can cause temporary annoyance, and for people with existing poor health, higher levels of coarse dust in the air can exacerbate some conditions (e.g. asthma). Coarse PM is larger and heavier and so it is deposited more quickly. This means that the concentration of coarse PM in the air reduces rapidly as it gets further from the source. The potential for nuisance-type dust effects is therefore expected to be *occasional* and *limited* in extent. Deposition rates are slower for finer PM and affect a wider area and thus, potentially, a greater number of people. However, exposure is expected to be *very low* due to the finer PM being typically a relatively small component of dusts and the effects of dispersion, and adequate dust management through the Dust Management Plan would reduce concentrations over distance. At these levels it is unlikely that there would be discernible changes in the risk of developing a new health condition or of exacerbating an existing condition. Such changes would be *medium-term*, with a *minor* influence on quality of life and/or morbidity risk for respiratory and cardiovascular conditions for a *very few people*. Most effects would *rapidly* reverse, with *no discernible* influence for healthcare services.

Any health effect due to operational activities would relate to a *negligible* to *very low* change in exposure to air pollutants, which may occur on a *frequent* basis over the *long-term*. The potential for non-threshold effects of NO_2 and $PM_{2.5}$ (even below WHO advisory guidelines) to population health is noted and has been taken into account in determining the significance of potential air quality effects. Additional exposure due to the Project would represent an incremental addition to the existing baseline conditions resulting in a *very minor* change in morbidity and mortality related population health risk, e.g. associated with respiratory and cardiovascular health outcomes. Any health effect due to a very slight change in risk factors is likely limited to a *small minority* of the study area population and the effect on routine health service planning is likely *negligible*.

Significance of effect

Construction and operational air quality effects are considered **minor adverse** (not significant). The minor adverse (rather than negligible) score represents a conservative assessment finding given scientific uncertainty (and emerging evidence) about non-threshold health effects of NO_2, and $PM_{2.5}$. The score takes into account WHO advisory guidelines, and also reflects that air pollution is a *specific* local public health priority. The level of change in the health baseline due to the Project is likely to be *very limited*, with at most a *marginal* effect on the delivery of health policy and inequalities. This is a public health acknowledgement of the very small incremental contribution to air pollution that the Project would make, but also recognition that at the Project level this should not be considered a significant effect on population health or health inequalities.

15.5.8 Water quality or availability

Operational and maintenance phase

This section discusses management of water quality during operation of the Project, and related effects on human health. The Project includes management of large volumes of water on-site for cooling purposes stored in underground tanks and a surface pond.

This section has been informed by Chapter 7 – Water and Hydrology, which sets out relevant assessment findings and mitigation measures that have been taken into account.

Potential effects (beneficial and adverse) on human health are considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is cooling water;
- The pathway is quality or availability of potable water; and,
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh; and,
- The sub-population vulnerable due to:
  - Young age vulnerability (children and young people);
  - Old age vulnerability (older people);
  - Poor health vulnerability (people with existing poor health); and
  - Access and geographical vulnerability (people for whom close proximity to Project change increases sensitivity).

The scientific literature identifies the following general points relevant to potential exposures and health outcomes. Recreational exposure to natural toxins by skin contact, accidental swallowing of water or inhalation can cause a wide range of acute or chronic illnesses. Climate change is likely to affect the infectious disease burden from exposure to pathogens in water used for drinking and recreation. Drinking water supplies from both surface water and groundwater sources may be contaminated during flooding events. Use of spray irrigation with contaminated water is a risk factor for contamination fruits and vegetation. Avoiding contamination of irrigation water and soil, is effective for the prevention and control of produce contamination.

The safety of water supplies is if paramount health importance. Good hydration is vital to health and wellbeing. There is increasing evidence of the links between water intake and physical disease and cognitive performance. Although microbial contamination is the largest contribution to waterborne disease and mortality at a global scale, chemical contaminants in water supplies also can cause disease, sometimes after long periods of exposure. Water supplies often include mixtures of chemical contaminants at negligible concentrations that vary in time and space. However, drinking-water quality is regulated, and monitoring is conducted routinely. This ensures that drinking water guidelines are not exceeded.

Sensitivity of the population

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable population have been taken into account and are listed in Section 15.3.3.3. This reflects many people would make limited use of areas where exposures to pollutants would potentially occur and do not make regular use of waters that could experience contamination due to the Project. The potential for any effect to public water supplies (surface or ground water sources) is considered *very limited*, with the great majority of people having water supplies that would be unaffected. The general population also includes those who are in *good* health and less likely to be adversely affected by contaminants. This also includes people with *high capacity* to adapt including greater resources to respond to change.

The sensitivity of the vulnerable group population is **high**. Vulnerability in this case relates to people more sensitive due to life stage or health status. For example, children and young people may spend more time outdoors and due to developmental stage or relative body size have increased risks from a given toxin exposure. Increased sensitivity to exposure may also apply to older people and those with existing poor health (e.g. long-term illness). These groups would be more sensitive to accidental *short-term* exposure to any ground or waterborne pollutants or changes in potable water availability.

Magnitude of impact

A minimum of 1 year water storage is provided on site for the adiabatic cooling top-up and storage top-up from on-site ponds if required. In addition, a highly efficient surface water management design mitigates rain run off combined with rain harvesting, to ensure minimal water wastage on site.

This section has been informed by Chapter 7 – Water and Hydrology, which sets out relevant assessment findings and mitigation measures that have been taken into account. Mitigation measures to prevent impacts on water quality during the operational phase include a highly efficient surface water management design to mitigate rain run-off combined with rain harvesting design measures aimed at ensuring adequate drainage and treatment of site/stormwater runoff before discharge to the nearby watercourse. In addition, oil interceptors will be used in the drainage design as appropriate (see section 15.3.1 for details of the design elements pertaining to water management and water quality). Chapter 7 concludes that following implementation of the above design measures, the operation and maintenance of the Project would result in imperceptible impacts on storm water runoff, foul water and hydromorphology.

For population health it is concluded that the magnitude of the change due to the Project is **negligible**. Both ground and water contaminants pose a very low exposure risk to the community, whether by direct contact, waterborne or airborne pathways. As described above, detailed mitigation has been incorporated into the engineering design of the Project to prevent and minimise potential impacts on the water environment. Assuming implementation of all design mitigation and that any discharges would be covered by permits as required, any exposure would be *short-term* and given the design measures to prevent and treat storm water runoff, likely to be *one-off frequency*. Additional population level exposure to water contaminants due to the Project, or demand pressures on potable water availability, if any, would represent a *very minor* change in morbidity related population health risk, e.g. associated with very low dose temporary toxicological exposures. Any health effect from a pollution incident would likely be limited to *very few people* of the study area population, with at most a *slight* effect on routine health service planning.

Significance of effect

The professional judgement is that the significance of the population health effect would be up to **minor adverse** (not significant). The conclusion reflects minimal risk to public drinking water supplies, with water quality expected to be maintained well within regulatory thresholds. Demand pressures on potable water supplies are expected to be avoided through use of direct air cooling, and collection of surface waters for use in the cooling system at peak times. Although the scientific literature establishes causal pathways by which health outcomes could plausibly be affected, in practice the proposed mitigation and best practice design measures mean there are very limited potential pathways by which any contaminants released by the Project could affect population health to a meaningful degree. Any change in the health baseline due to the Project is likely to be *very limited*, with at most a *marginal effect on health inequalities* and delivery of health policy. The minor adverse (rather than negligible) score represents a conservative assessment finding.

15.5.9 Noise and Vibration

Construction, Operational and maintenance, and Decommissioning phases

This section discusses changes in noise exposure during construction and operation of the Project, particularly night-time noise that may be detrimental to population health where sleep is disturbed to a high degree. Changes in the distribution of day-time noise are also considered. The latter may include the potential to change levels of traffic noise near to residential communities.

This section has been informed by Chapter 9 – Noise and Vibration, which sets out relevant assessment findings and mitigation measures that have been taken into account. Chapter 9 – Noise and Vibration concludes that following application of mitigation measures, the noise impact of construction activities is assessed as temporary minor to moderate.

Potential effects on human health are considered plausible because there is a theoretical source-pathway-receptor relationship:

- The source is noise generated by construction activities.
- The pathway is pressure waves through the air.
- Receptors are residents and long-term occupiers of nearby properties and community buildings.

Furthermore, the source-pathway-receptor linkage is considered potentially applicable to the context of this development.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh
- The sub-population vulnerable due to:
  - Young age vulnerability (children and young people).
  - Old age vulnerability (older people).
  - Poor health vulnerability (people with existing poor physical or mental health).
  - Low-income vulnerability (people living in deprivation, including those on low incomes may have fewer resources to adapt, e.g. seek respite or install insulation furthermore, those who are economically inactive may spend more time in affected dwellings).
  - Access and geographical vulnerability (people for whom close proximity to the proposed changes increases sensitivity).

During construction, there is potential for noise to temporarily arise from construction works and movement of construction related vehicles.

The literature highlights cardiovascular effects, annoyance and sleep disturbance (and consequences arising from inadequate rest) as being the main pathways by which population health may be affected. The literature also notes the potential for chronic noise to have a detrimental effect on learning outcomes (e.g. noise distracting and affecting communication within classrooms). Whilst the literature supports there being thresholds at which effects (such as annoyance and sleep disturbance) are likely, it also acknowledges the subjective nature of responses to noise. In this regard noise effects can be considered to have non-threshold effects, with characteristics other than sound levels also determining the influence on health outcomes. The assessment has had regard to the population groups identified in the literature that may be particularly sensitive. For example, children, the elderly, the chronically ill, people with a hearing impairment, neurodiverse people, shift-workers and people with mental illness (e.g., schizophrenia).

Sensitivity of the population

The sensitivity of the general population is **low**. Common factors that differentiate the sensitivity of the general population and the vulnerable group population have been taken into account and are listed in Section 15.3.3.3 of this report. The general population comprise those members of the community in *good* physical and mental health and with resources that enable a high capacity to adapt to change. Additionally, most people live, work or study at a distance from the site boundary and affected parts of the local road network where construction and operational noise and vibration would be unlikely to be a source of concern.

The sensitivity of the vulnerable group population is **high**. This reflects that the sub-population includes a high representation of dependants, both children, elderly and those receiving care due to poor health. This sub-population may experience existing widening inequalities due to living in areas with increasing noise and greater deprivation, with limited capacity to adapt to changes. Vulnerability particularly relates to those living close to the construction activities and construction compounds, including those spending more time in affected dwellings during operation e.g. due to low economic activity, shift work or poor health. People who are concerned or have *high degrees* of uncertainty about construction noise and the unpredictable and distinct tonal character of the data centre noise and its effect on their wellbeing may be more sensitive to changes in noise.

Magnitude of impact

With regard to the construction and decommissioning phases, the noise and vibration impacts from construction activities and construction traffic will be mitigated through the use of appropriate construction hours, noise barriers and best practice measures agreed through the CEMP, which will include a Noise Management Plan. As reported in Chapter 9 – Noise & Vibration, construction of the Project will involve activities at the site that would generate noise and vibration such as demolition works, construction works and vehicle movements. The highest noise levels, where thresholds at nearest receptors would be exceeded, would not occur throughout the entire construction phase but would only be for a very *short term*. Prolonged periods of construction noise at night or daytime disruption of educational activities at schools are not anticipated. Chapter 9 – Noise & Vibration sets out mitigation including noise barriers, and best practice construction noise management measures that reduce the potential for large magnitude effects. The residual effect conclusion is of temporary minor to moderate effects. The noise assessment has included 42 properties in the vicinity of the Project as noise-sensitive receptors. All receptors at a greater distance from the Project are expected to experience a lower noise impact than the 42 receptors included in the noise impact assessment.

For population health the magnitude of change due to the proposed construction works is **low**. This reflects that in terms of population health, the *small scale* of change in noise levels is likely to predominantly relate to a *minor* change in quality of life for a *small minority* of the community, and a *very minor change* in cardiovascular and mental wellbeing morbidity for the very few people of the community closest to construction activities. The changes would be of *short-term* duration and relate to *frequen*t construction related noise exposures.

In relation to the operation and maintenance phase, the noise and vibration impacts from operational activities will be mitigated through the use of appropriate design measures as detailed in Chapter 9 – Noise and Vibration and summarised in section 15.3.1. As reported in Chapter 9 – Noise & Vibration, the operational noise effects of the Project, taking into account the Project's embedded design measures to reduce noise, will be negligible. Operational noise will be generated by plant and equipment, operational road traffic and car parking. Operational plant and equipment noise will occur continuously and long term (day and night). The operational noise-modelling results show that background noise levels at sensitive receptors (residential properties) will not be exceeded during the day or the night-time and effects will be negligible. Similarly, the increase in road traffic noise, and car parking noise as a result of the Project were both assessed as not significant for all receptors. Operational noise is therefore predicted to be within limits set to be protective of health and the environment. The residual effects reported in Chapter 9 – Noise and Vibration are anticipated to only result in negligible to low effect on noise-sensitive receptors.

For population health the magnitude of change due to the Project's operational activities is **low**. In terms of population health, the *small scale* of change in noise levels is likely to predominantly relate to a *minor* change in quality of life for a *small minority* of the community, and a *very minor change* in cardiovascular and mental wellbeing morbidity only for a *very few people*. The changes would be of *long-term* duration and relate to *continuous* operational related noise exposures.

Significance of effect

Construction and operational noise impacts of the Project are considered to result in a **minor adverse** (not significant) effect on population health. Based on the detailed mitigation measures the residual effect is characterised as being adverse in direction, direct, and *short-term* for the construction and decommissioning phases and long term for operation and maintenance effects. Although the scientific literature indicates a clear association between elevated and sustained noise and vibration disturbance and reduced health outcomes, the changes would result in a *very limited* effect in the health baseline of the population. In line with IEMA and IPH guidance, the individual level effects to a very few people are noted, and are appropriately targeted for mitigation, but would not result in a population health effect. The level of effect is not expected to affect the ability to deliver local or national health policy.

15.5.10 Public understanding of electro-magnetic field risk

Operational and maintenance phase

This section presents findings on the potential for a population health effect related to concern about electromagnetic fields (EMF), affecting mental health and wellbeing, rather than the likelihood of an actual risk to public health.

As noted in section 15.2.1 the Project would implement relevant design guidelines of the International Commission on Non-ionizing Radiation Protection (ICNIRP). Such guidelines are deemed sufficient for avoiding actual EMF risk. The focus of this assessment section is therefore not on the actual risk, which is considered appropriately mitigated, but on people's understanding of risks (risk perception). This relates to the potential for community concern about their proximity to the electrical infrastructure, including the data centre infrastructure to affect mental health, even where relevant public EMF exposure guideline limits are met. Further detail on the electrical infrastructure relating to the Project is given in Chapter 4 - Project Description.

Project features and expectations about a project can be understood in different ways by different people. This assessment considers these views, ways that health and well-being might be affected and a course of action. The aim is to find a way to address and allay concerns that people might have, inform communications and consultation elements of the Project, and contribute towards reducing anxiety.

A potential population mental health effect is considered plausible because there is a theoretical source-pathway-receptor relationship:

- Source: public understanding of risks can differ from the actual risks that are derived from scientific studies.
- Pathway: anxiety, stress and a sense of powerlessness can have adverse effects on health and mental well-being while a sense of control is beneficial to health and well-being.
- Receptor: people living and working close to the Project's electrical infrastructure, notably the substation, who may perceive a risk.

Furthermore, the potential mental health effects are probable as no highly unusual conditions are required for the source-pathway-receptor linkage. An effect on the population's physical health associated with the actual exposures or risks is unlikely as mitigation breaks the pathway between sources and receptors.

The population groups relevant to this assessment are:

- The 'site-specific' geographic population of Naas Rural and Carragh:
- The local population of County Kildare.
- The sub-population vulnerable due to:
  - Low-income vulnerability (people with fewer resources may feel less able to adapt to changes that concern them).
  - Poor health vulnerability (people with existing poor mental health may be more sensitive to changes that concern them).
  - Access and geographical vulnerability (people for whom close proximity increases sensitivity).

The scientific literature identifies the following general points relevant to potential effects and health outcomes. The way risks are understood has important influences on health behaviour (Ferrer and Klein, 2015). Awareness of risk can affect mental, physical and emotional wellbeing, and can be worse when it is accompanied by uncertainty (Luria et al., 2009).

The ultimate goal of dialogue between regulators and communities is to produce an informed public (Sinisi, 2004). Trust, credibility, competence, fairness and empathy are of great importance (Sinisi, 2004) and the routine monitoring and clear communication of results can greatly increase trust, empower people and reduce fear (WHO, 2013).

The views that people hold can be associated with low-grade illnesses (e.g., headaches or hypertension) and can be exacerbated when there is uncertainty (Luria et al., 2009).

Sensitivity of receptor

The sensitivity of the general population is **low**. Most people in the study area live, work or travel at a separation distance from the Project's infrastructure and activities, including electrical infrastructure where they would not be concerned about the potential for risks. This group also includes that proportion of the population who are *ambivalent or not concerned* about EMF.

The sensitivity of the vulnerable sub-population is **high**. This reflects that the sub-population includes people who may be *uncertain or concerned* about EMF and this may exacerbate *existing* mental health conditions or be a source of stress and anxiety in itself. This may particularly be the case for people with near views and/or who live in close proximity to the Project's electrical infrastructure. Low incomes or existing deprivation may contribute to a limited sense of control and *reduced capacity* to obtain further information.

Magnitude of Impact

The magnitude of change due to the Project is **low**. The level of actual risk exposure is negligible as stated above, however the scale of change that may contribute to community concern is *medium, continuous* and *long-term*. The severity of the health outcome relates predominantly to a *minor* change in mental health related morbidity for a *very few* people within the population. Such individual level effects are unlikely to have implications for health service capacity. For many people there is likely to be a *rapid* reversal of effects should their concerns be responded to and resolved to their satisfaction.

Significance of effect

The significance of the population health effect is **minor adverse** (not significant). The professional judgment is that there could be a *very limited* adverse change in the health baseline for the surrounding population. This conclusion reflects scientific understanding of the impact of uncertainty or concern about environmental risks on mental health. It also reflects that the actual risks would be *well within* regulatory standards and that most members of the public would expect this to be the case. At most the Project change may have a *marginal* influence on population health inequalities.

15.6 Mitigation, monitoring and residual effects

The following further EIA Human Health mitigation and monitoring measures are proposed. The residual population health effect taking these measures into account is also presented.

15.6.1 Physical Activity

Further mitigation. During the operation and maintenance phase new routes to include access that supports people of all ages, including those with mobility and/or sensory needs. This includes: suitable width and surface to new routes for children's buggies, mobility aids and wheelchairs; appropriate route access points (including to parking); signs in formats that respond to visual impairments; connecting to existing routes and trail networks, including appropriate road crossings. This measure would be secured by a Mobility Management Plan.

Further monitoring. None.

Residual effect. Unchanged.

15.6.2 Transport modes, access and connections

Further mitigation. During construction and decommissioning advertise lane closures in advance so road users are forewarned and can manage commute to work effectively. Ensure that early and ongoing sharing with emergency and healthcare services with regard to any temporary road closures, diversions or lane closures. This measure would be secured by a Construction Travel Management Plan.

Ensure suitable pedestrian access is maintained for diversions of any temporary route closures and provide appropriate wayfinding information for temporary diversions during construction and decommissioning, such as being advertised online and signposting, including approximate journey times on the routes. Wayfinding for circular walks or to destinations should be clearly signposted. This measure would be included in the CTMP.

Further monitoring. None.

Residual effect. Unchanged.

15.6.3 Community identity, culture, resilience and influence

Further mitigation. None.

Further monitoring. None.

Residual effect. Unchanged.

15.6.4 Education and training

Further mitigation. As far as reasonably practicable (e.g. subject to standards and security checks) provide a targeted scheme of access to operation and maintenance training schemes and apprenticeships for young people in the local and regional area for people who are Not in Education, Employment, or Training (NEET). This would be secured through a workforce management plan.

Further monitoring. Monitoring of the proportion of NEETs taking up, and completing, training opportunities with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups.

Residual effect. Based on the efficacy of such strategies there is the potential for a **moderate beneficial** (significant) population health residual effect for education and training. This reflects the potential to achieve long-term benefits from a targeted training intervention at a critical stage in the life course of this group.

15.6.5 Employment and income

Further mitigation. As far as reasonably practicable (e.g. subject to standards and security checks) provide a targeted scheme of access to operation and maintenance employment opportunities in the local and regional area for people who are Not in Education, Employment, or Training (NEET). This would be secured through a workforce management plan.

Further monitoring. Monitoring of the proportion of local people with long-term unemployment, high job instability or low income who enter good quality stable employment with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups. This would be secured through a workforce management plan.

Residual effect. If a high proportion of good quality operation and maintenance employment opportunities were targeted to vulnerable groups, notably people who are unemployed, on low incomes, or who have high job instability, including young adults early in their careers, then there is the potential locally for a **moderate beneficial** (significant) population health residual effect. This reflects the potential to achieve long-term benefits though avoiding adverse physical and mental health effects (including to dependants) associated with long-term unemployment, high job instability or low income.

15.6.6 Climate change and adaptation

Further mitigation. None.

Further monitoring. None.

Residual effect. Unchanged.

15.6.7 Air quality

Further mitigation. None.

Further monitoring. None.

Residual effect. Unchanged.

15.6.8 Water quality or availability

Further mitigation. None.

Further monitoring. None.

Residual effect. Unchanged.

15.6.9 Noise and vibration

Further mitigation. None.

Further monitoring. None.

Residual effect. Unchanged.

15.6.10 Public understanding of electro-magnetic field risk

Further mitigation. Continued community consultation and sharing of non-technical information relating to the project (e.g. explaining compliance with public exposure guidelines, actual risks associated with the project), to allow people to express concerns and gain awareness of actual health effects. This will partially be met through the application process, including the EIAR NTS. Non-technical information and a point of contact for community liaison to be provided on the project website.

Further monitoring. None.

Residual effect. Based on the efficacy of such strategies there is the potential for a **negligible** (not significant) population health residual effect associated with public understanding of electro-magnetic field risk.

15.7 Cumulative effects and interactions

15.7.1 Cumulative effects

Cumulative health assessment extends the analysis of potential population health effects. This means a professional judgement is made as to the combined level of effect with other relevant projects and its implications for public health. Following IEMA 2022 guidance for human health, sensitivity of the relevant populations is unchanged from the main assessment in section 15.5. Magnitude is however appraised in light of the combined effect of multiple projects.

As set out in IEMA 2022 guidance, a combined public health effect is most likely where a population is affected by multiple determinants of health and a large proportion of the same individuals within that population experience the combination of effects.

A high degree of spatial proximity is required for there to be the potential for cumulative effects for localised changes in determinants of health, e.g., dust from a construction site. In contrast, where there are more far-reaching effects in a determinant of health, e.g., job creation or noise along shared transport corridors, there is greater opportunity for cumulative interactions between projects.

The assessment is qualitative, following the approach set out in section 15.5, and considers the potential for combined magnitudes of effect to the same populations.

This chapter is informed by cumulative assessment conclusions set out in other chapters. The health assessment does not duplicate detail set out in those chapters. Of the chapters listed in section 15.1 and which inform the human health assessment, Chapter 7: Water and Hydrology; Chapter 12: Traffic and Transportation, Chapter 14: Population and Chapter 16: Climate Change provide an assessment of cumulative effects.

The conclusions from listed chapters on cumulative effects relevant to the health assessment are summarised in the section below.

15.7.1.1 Transport Modes, access and connections

This section has been informed by Chapter 12: Traffic and Transportation which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Chapter 12 assesses the cumulative impact of the Gas Networks Ireland (GNI) gas connection to the project. Regard has been given to this for the health assessment.

As stated in Chapter 12: Traffic and Transportation, a considerable portion of the construction period will be working within existing agricultural lands, which will not result in any significant impact upon existing traffic progression.

It is noted that the combined effect is driven by the cumulative effect on transport modes, access and connections. The collective effect is not considered to change the minor adverse effect on population health of the Project in isolation.

The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are therefore not new or materially different to those listed for the project assessment in section 15.5.2. This conclusion applies to all project phases.

15.7.1.2 Education and training

This section has been informed by Chapter 14: Population which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Chapter 14 assesses the cumulative impact of the Project gas connection to GNI. Regard has been given to this for the health assessment.

As stated in Chapter 14: Population, it is not anticipated that there will be any impacts on the social or demographic characteristics of the Population.

The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the project assessment in section 15.5.4. This conclusion applies to all project phases.

15.7.1.3 Employment and income

This section has been informed by Chapter 14: Population which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Chapter 14 assesses the cumulative impact of the Project gas connection to GNI. Regard has been given to this for the health assessment.

As stated in Chapter 14: Population, it is not anticipated that there will be any impacts on the social or demographic characteristics of the Population.

The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the project assessment in section 15.5.5. This conclusion applies to all project phases.

15.7.1.4 Climate change and adaptation

This section has been informed by Chapter 16 – Climate Change which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Section 16.8 within Chapter 16: Climate Change assesses the cumulative impacts of the Project together with the ancillary infrastructure connected with the Project, namely a substation to transfer excess electricity from the Project to the grid, and provision of infrastructure to ensure readiness for connection to a district heat network (should this be proposed in the future). Regard has been given to these for the health assessment.

Chapter 16 – Climate Change concludes that although a quantitative assessment was not possible, the ability of the Project to export to the national grid would likely entail a beneficial effect in that the provision of low / zero carbon heating (from waste heat produced by the Project) to residential or other buildings would reduce the need for fossil fuel-generated heating.

During operation, the Project together with the abovementioned ancillary / export infrastructure may help contribute to national energy security and, through the provision of low/zero carbon heating, contribute to reducing the Project's impacts on global climate change. However, the collective effect is not considered to change the minor adverse effect on population health of the Project in isolation. This reflects that the relative scale within the context of global climate altering emissions is of a similar order of magnitude whether the projects are considered in isolation or combined.

The cumulative magnitude is therefore predicted to be similar to the individual level magnitude described in section 15.5.6. The magnitude of impact is considered to be low. Sensitivity of the general and vulnerable population groups is unchanged in the cumulative assessment. As described in section 15.5.6, the sensitivity is low for the general population, and high for the vulnerable group population.

The overall cumulative significance of effect remains unchanged at **minor adverse**, which is not significant in EIA terms.

15.7.1.5 Water quality or availability

This section has been informed by Chapter 7: Water and Hydrology which sets out relevant cumulative assessment findings and mitigation measures that have been taken into account. Chapter 7 assesses the cumulative impact of the GNI connection to the project.

As stated in Chapter 7, on the basis of the likely route of the pipeline and the minor nature of the water courses traversed, including the selection of the most appropriate crossing technique in consultation with the relevant statutory authorities and the application on best practice, the cumulative effects of the main Project with the GNI gas transmission line connection will not be significant and will not compromise the environmental objectives of the water bodies affected.

The population groups, sensitivity, magnitude and significance conclusions relevant to the cumulative health assessment are not new or materially different to those listed for the project assessment in section 15.5.8. This conclusion applies to all project phases.

15.8 Interactions

Table 15.8: Interactions by geographic population

Determinant of health	Site-specific	Local	Regional	National	International
Physical Activity	✓ Minor (O)				
Transport modes, access and connections	✓ Minor (COD)	✓ Minor (COD)			
Community identity, culture, resilience and influence	✓ Minor (O)				
Education and training		✓ Moderate (O)	✓ Moderate (O)		
Employment and income		✓ Moderate (O)	✓ Moderate (O)		
Climate change and adaptation				✓ Minor (O)	✓ Minor (O)
Air quality	✓ Minor (COD)				
Water quality or availability	✓ Minor (O)				
Noise and Vibration	✓ Minor (COD)				
Public understanding of electro-magnetic field risk	✓ Negligible (O)	✓ Negligible (O)			

Notes: Ticks indicate effects. Green shading indicates positive effects and orange shading indicates negative effects. C = construction, O = operation and maintenance, D = decommissioning.

The geographic population of the site-specific study area of Naas Rural and Carragh Electoral Divisions would experience effects during construction from changes to: transport modes, access and connections; air quality; and noise. During operation the same population would experience effects from changes to: physical activity; transport modes, access and connections; community identity, culture, resilience and influence; air quality; water quality or availability; and public understanding of electro-magnetic field risk.

The population would include a range of vulnerable sub-populations, including related to age, income, health status, social disadvantage and proximity. The extent to which the various health effects would affect the same individuals within the population would vary. However, there is anticipated to be some overlap, as well as common health outcomes affected, e.g. cardiovascular and mental wellbeing outcomes influenced by different pathways.

Whilst there is some increased adverse influence on health outcomes, the degree of increase is not considered to constitute a significant population health effect. The effect therefore remains minor adverse. The beneficial effect relating to physical activity for the site-specific population is also noted. However, as beneficial and adverse effects do not necessarily cancel out, this effect does not change the cumulative effect conclusion. Similarly, beneficial effects from the training and employment opportunities at the local level of County Kildare may also benefit some people in the site-specific population, but this is not expected to cumulative be a significant population health effect.

Vulnerable groups potentially experiencing combined effects of the Project include children and young people, particularly those from low-income households or who experience social disadvantage. This group may, as dependants, benefit from the Project’s contribution to local employment and training/education opportunities. This group may also experience some of the temporary disruptions during construction. Many of the adverse effects are temporary and those that are more long-term are not considered to cumulatively interact to have a significant effect on population health.

The overall position is that the site-specific geographic population of Naas Rural and Carragh Electoral Divisions is expected to experience minor beneficial (not significant) and minor adverse (not significant) population health effects.

At the local level of County Kildare and regional province of Leinster, training and employment benefits may interact, e.g. moving from a training opportunity to a job opportunity. However, the combined residual effect is not considered greater and remains as moderate beneficial (significant).

Overall, no new significant population health effects are expected due to the interaction of individual effects in any study area.

15.9 References

Cave, B., Claßen, T., Fischer-Bonde, B., Humboldt-Dachroeden, S., Martin-Olmedo, P., Mekel, O., Pyper, R., Silva, F., Viliani, F., Xiao, Y., 2020. Human health: Ensuring a high level of protection A reference paper on addressing Human Health in Environmental Impact Assessment As per EU Directive 2011/92/EU amended by 2014/52/EU.

Cave, B., Pyper, R., Fischer-Bonde, B., Humboldt-Dachroeden, S., Martin-Olmedo, P., 2021. Lessons from an International Initiative to Set and Share Good Practice on Human Health in Environmental Impact Assessment. Int J Env. Res Public Health 18. https://doi.org/10.3390/ijerph18041392

Central Statistics Office, 2023. Health Statistics.

Central Statistics Office, 2021. Mortality [WWW Document]. URL https://data.cso.ie/

Central Statistics Office, 2020a. Irish Life Tables.

Central Statistics Office, 2020b. Meantal health status in previous two weeks - all persons aged 15 years and over.

Central Statistics Office, 2019. Irish Health Survey 2019 - Main Results [WWW Document]. URL https://www.cso.ie/en/releasesandpublications/ep/p-ihsmr/irishhealthsurvey2019-mainresults/healthdeterminants/

Central Statistics Office, 2016. Central Statistics Office - Census 2016 Small Area Population Statistics [WWW Document]. URL http://census.cso.ie/sapmap/

Department of Health, 2019. Healthy Ireland Framework 2019-2025.

Environmental Protection Agency, 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency, County Wexford.

European Environment Agency, 2022. Health impacts of air pollution in Europe, 2022.

Ferrer, R., Klein, W.M., 2015. Risk perceptions and health behavior. Curr Opin Psychol 5, 85–89. https://doi.org/10.1016/j.copsyc.2015.03.012

Government of Ireland, 2023. Roadmap for Social Inclusion 2020-2025 - Ambition, Goals and Commitments.

Government of Ireland, 2018a. S.I. No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

Government of Ireland, 2018b. National Planning Framework.

ICNIRP, 1998. ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic And Electromagnetic Fields (Up To 300 Ghz). International Commission.

Kildare Children and Young People's Services Committee, 2019. Children and Young People's Plan 2019-2021.

Kildare County Council, undated. Healthy Kildare Plan 2022-2026.

Kindig, D., Stoddart, G., 2003. What Is Population Health? Am J Public Health 93, 380–383.

Luria, P., Perkins, C., Lyons, M., 2009. Health risk perceptions and environmental problems: findings from ten case studies in the North West of England. Liverpool John Moore's University, Liverpool John Moore's University.

Pobal, 2023. Irish Deprivation Indices [WWW Document].

Pyper, R., Cave, B., Purdy, J., McAvoy, H., 2021. Institute of Public Health (IPH) guidance: Standalone Health Impact Assessment and health in environmental assessment.

Pyper, R., Lamming, M., Beard, C., Buroni, A., Douglas, M., Turton, P., Hardy, K., Netherton, A., McClenaghan, R., Barratt, T., Bhatt, A., Cave, B., Gibson, G., 2022a. IEMA Guide: Effective Scoping of Human Health in Environmental Impact Assessment. England: Institute of Environmental Management and Assessment.

Pyper, R., Waples, H., Barratt, T., Hardy, K., Turton, P., Netherton, A., McDonald, J., Buroni, A., Bhatt, A., 2022b. IEMA Guide: Determining Significance for Human Health in Environmental Impact Assessment. Institute of Environmental Management and Assessment.

Sinisi, L., 2004. Public concerns and risk communication.

Transport for Ireland, 2018. Local Link Rural Transport Programme Strategic Plan 2018 to 2022.

Whitehead, B., Andrews, D., Shah, A., Maidment, G., 2014. Assessing the environmental impact of data centres part 1: Background, energy use and metrics. Build. Environ. 82, 151–159. https://doi.org/10.1016/j.buildenv.2014.08.021

WHO, 2018. Environmental Noise Guidelines for the European Region. World Health Organization Regional Office for Europe, Copenhagen.

WHO, 2013. Health and environment: communicating the risks (No. b). World Health Organization. Regional Office for Europe, Copenhagen.

World Health Organization, 2022. Mental health: strengthening our response. Retrieved Sept. 2022.

World Health Organization, 2021. WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. World Health Organization, Geneva.

World Health Organization, 1948. The Preamble of the Constitution of the World Health Organization. Bulletin of the World Health Organization, New York.

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16 CLIMATE CHANGE

16.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the findings of the environmental impact assessment (EIA) concerning the potential environmental effects of the Data Centre Application and the Substation Application (which together constitute the 'Project') on and from climate change (as described in Chapter 4, section 4.1).

Climate change in the context of EIA can be considered broadly in two parts:

- The impact of greenhouse gas (GHG) emissions caused directly or indirectly by the Project, which contribute to climate change; and
- The potential impact of changes in climate on the Project, which could affect it directly or could modify its other environmental impacts.

This chapter is supported by the following appendices contained within Volume II:

- Appendix 16.1 – Climate Change Policy Review;
- Appendix 16.2 – Climate Change Risk Assessment; and
- Appendix 16.3 – GHG Calculations.

The assessment considers the effects of the 'do nothing' scenario, where the Project is assessed as not going forwards, and then assesses the likely significant environmental effects resultant from the Project (based on the site description detailed within Chapter 4 Description of the Project, which includes details of the key components and construction). Further mitigation is then identified where necessary, and residual effects identified. This approach is further detailed within Chapter 1 of this EIAR.

16.2 Methodology

16.2.1 Planning Policy Context

A summary of relevant policy is given in this section. Full references are provided in Appendix 16.1 Climate Change Policy Review, Volume II. The Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR, further details the Project against Ireland's current national and local energy, climate and planning policies.

The most recent approved Climate Action Plan 2024 (Government of Ireland, 2024a) sets a course for Ireland's targets to halve emissions by 2030 and reach net zero no later than 2050. Ireland's national climate objective and 2030 targets are aligned with Ireland's obligations under the Paris Agreement, to set the long term goal to limit warming to below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. The Plan details efforts to reduce emissions associated with large energy users (such as the Project) and address electricity demand and grid flexibility. The Plan highlights that estimated emissions reductions fall short of the level of abatement required to meet national and international targets. Corrective actions by sector are detailed, and include the acceleration of renewable electricity generation, and increased focus on the decarbonisation of cement and construction.

Ireland's Long-Term Strategy on Greenhouse Gas Reductions (Government of Ireland, 2024b) sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. The Strategy provides a pathway to a whole-of-society transformation and links shorter-term Climate Action Plans and Carbon Budgets, and the longer-term objective of the European Climate Law and Ireland's National Climate Objective. Core measures identified as necessary to deliver a net zero emissions electricity sector include significantly higher renewable power capacity (largely through onshore and offshore wind, and solar PV), and increased deployment of flexible technologies and practices that could enable the grid to function with high levels of intermittent power sources (i.e. battery storage, and storage of renewable power as gas). With regards to the built environment, the Strategy highlights the importance of promoting the use of lower carbon alternatives in construction.

Ireland's National Adaptation Framework sets out a national adaptation strategy which aims to reduce vulnerability of Ireland's economy and society to the impacts of Climate Change. It identifies that the most immediate Climate Change influenced risks to Ireland are the associated changes in extreme weather, such as floods, precipitation, and storms. The framework therefore highlights the need to develop effective emergency planning for the short-term immediate effects, whilst building long-term resilience.

The Government of Ireland developed 12 Sectoral Adaption Plans under the National Adaption Framework. The plans outline how the different sectors must prepare for and adapt to the risks associated with climate change. Plans that are currently available, and are of relevance to the Project include the Electricity & Gas Sector Climate Change Adaptation Plan, and the Communications Sector Climate Change Adaptation Plan, both of which are detailed in Appendix 16.1 Climate Change Policy Review, Volume II.

The Government's Statement on the Role of Data Centres in Ireland's Enterprise Strategy (Government of Ireland, 2022) sets out principles that should inform and guide decisions on future data centre development. Such principles include: making efficient use of the electricity grid, using available capacity and alleviating any constraints; demonstrating additionality in their use of renewables; co-location of renewable generation facilities or advanced storage alongside the data centre, supported by Corporate Power Purchase Agreements, private wire, or other arrangement; and prioritising decarbonisation pathway, to ultimately achieve net zero data services.

With regard to local policy, the Kildare County Development Plan 2023-2029 (Kildare County Council, 2023) requires data centres to include strong energy efficiency measures to reduce their carbon footprint in support of national targets towards a net zero carbon economy, through the use of sustainable sources of energy generation and the use of renewable sources of energy to power their operations. Data centre developments must also explore the potential for low carbon district heating networks. The Plan also requires development to consider the necessity of adaptation to climate change, in particular having regard to flood risks, and considering the development's location, layout and design.

The Kildare County Development Plan 2023-2029 states that all data centre developments should be signatories to The Climate Neutral Data Centre Pact (2023), a pledge in response to the European Green Deal that aims to ensure data centres are climate neutral by 2030. The pact prioritises energy efficiency, water consumption, heat recovery and the re-use and repair of servers.

The Pact aims to ensure data centres are an integral part of the sustainable future in Europe and requires the following actions to be committed to: data centres and server rooms shall meet a high standard for energy efficiency; data centres will match their electricity supply through the purchase of clean energy; data centres will meet high standards for water conservation; opportunities to connect with district heating systems should be explored.

Further local policy within the Naas Local Area Plan 2021-2028 (Kildare County Council, 2021) requires data centres to consider targeted reductions in GHG emissions, and to include measures to generate energy on site, as part of the overall development proposal.

16.2.2 Relevant Legislation and Guidance

A summary of relevant legislation and guidance is given in this section. Full references are provided in Appendix 16.1 Climate Change Policy Review, Volume II. The Energy Policy Compliance Report (HDR, 2024a), appendix 4.9 to this EIAR, further details the Project against Ireland's current national and local energy, climate and planning policies.

16.2.2.1 Legislation

The National Policy Position on Climate Action and Low Carbon Development (Government of Ireland, 2014) was published in April 2014. The policy sets a fundamental national objective to achieve a transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050. The policy states that GHG mitigation and adaptation to the impacts of climate change are to be addressed in parallel national strategies – respectively through a series of mitigation plans and climate change adaptation frameworks.

The Climate Action and Low Carbon Development Act 2015 ensures developments are lawfully compliant in pursuing the transition to a low carbon, climate resilient and environmentally sustainable economy. A key element of this act is that developments should perform in a consistent manner 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 Climate Action and Low Carbon Development (Amendment) Act 2021 builds on the aforementioned 2015 Act and provides for the establishment of carbon budgets in support of achieving Ireland's climate ambition. The carbon budget programme, comprising three five-year budgets, came into effect on 6 April 2022 for the following periods:

- Budget 1 from 2021-2025 has been set at 295 $MtCO_2e$ (Million tonnes of Carbon dioxide equivalent) representing an average of 4.8% reduction per annum for the first budget period.
- Budget 2 from 2026-2030 has been set at 200 $MtCO_2e$ representing an average of 8.3% reduction per annum for the second budget period.
- Budget 3 from 2031-2035 has been set at 151 $MtCO_2e$ representing an average of 3.5% reduction per annum for the third provisional budget.

To deliver these targets, in July 2022 the government established Sectoral Emissions Ceilings which set maximum limits on GHG emissions for each sector of the Irish economy to the end of the decade. For the commercial built environment, the 2030 ceiling is 1 $MtCO_2e$ which represents a 45% reduction on 2018 levels (2 $MtCO_2e$). Further information is detailed in the Sectoral Emissions Ceilings Summary Report (Government of Ireland, 2022).

Ireland's 2030 target under the EU's Effort Sharing Regulation (ESR) is to deliver a 30% reduction of emissions compared to 2005 levels by 2030. This target concerns sectors such as transport, buildings, agriculture and waste, but does not include electricity providers, where resultant emissions fall under the EU's Emissions Trading System (ETS).

The EU ETS places a cap on GHG emissions that can be emitted by power plants, industry factories and the aviation sector. Within the cap, companies receive or buy emission allowances, which may be traded as needed. The cap decreases every year, ensuring that total emissions fall. Over the period 2021-2030 the emissions cap will continue to decrease annually by a factor of 2.2% (European Commission, n.d.).

Ireland's Nationally Determined Contribution (NDC) under the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC), submitted in December 2020, commits Ireland to 40% reduction in emissions by 2030, compared to 1990 levels.

16.2.2.2 Guidance and Recommendations

The main guidance used for the assessment of GHG emissions in EIA is the Institute of Environmental Management and Assessment (IEMA) guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022).

The main guidance document with regard to climate risk and resilience assessment within the context of EIA is the Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020).

Additional guidance used for the quantification of GHG emissions includes:

- the Greenhouse Gas Protocol suite of documents (World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), 2004);
- Sustainable Energy Authority of Ireland (SEAI) Emission Conversion Factors; and
- the European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

16.2.3 Study Area

GHG emissions have a global effect rather than directly affecting any specific local receptor. The impact of GHG emissions occurring due to the Project on the global atmospheric concentration of the relevant GHGs, expressed in CO_2-equivalents (CO_2e), is therefore considered within this assessment.

The climate change risk study area are the regional climate projections for county Kildare, which the Project site is located in.

16.2.4 Baseline Methodology

The baseline methodology is divided between the assessment of GHG emissions and climate resilience and adaptation.

The current and future baseline conditions relevant to the Project with regards to the impact of GHGs comprise the following:

- Existing and future emissions within the assessment boundary without the construction and operation of the Project, this includes any existing GHG sources or sinks from current land use; and
- The current and future baseline for grid-average intensity and natural gas has been established quantitatively through the use of published benchmarks, and qualitatively through national decarbonisation targets.

With regard to current climate, the baseline is the current local and regional climate and resulting weather patterns experienced in the area local to the site, which is accounted for within climate projection models. The future climate baseline has been informed by an ensemble of climate models collated within the Climate Impact Explorer (Climate Analytics, 2022).

16.2.5 Assessment Criteria and Assessment of Significance

16.2.5.1 Receptor Sensitivity / Value

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2e, has therefore been treated as a single receptor of **high sensitivity** (given the importance of the global climate as a receptor), in line with IEMA (2022) guidance.

With regards to climate resilience, given the variability in the nature of the potential effects of climate change on the Project, receptors have been identified on a risk-specific basis, whereby all receptors relate to the continued safe and effective operation of the Project. In line with IEMA (2020) guidance, the receptor vulnerability and susceptibility have been considered in determining the severity of risk. Each risk is given a severity score between one and three, where one signifies an unlikely or low impact and three is a severe impact (see Table **16.1**).

As such, sensitivity is detailed for each identified risk within Appendix 16.2 Climate Change Risk Assessment. Of the nine risks identified, five are assessed to have an unlikely or low impact, while three are assessed as having moderate impacts. The remaining risk (relating to flood risk) is not considered given Chapter 7: Water and Hydrology of the EIAR fully considers and mitigates assessed flood risk to the Project.

16.2.5.2 Magnitude of Impact

As GHG emissions can be quantified directly and expressed based on their global warming potential (GWP) as tonnes of CO_2e emitted, the magnitude of impact is reported numerically.

With regards to the impact of climatic changes on the Project, the magnitude is the degree of a change from the relevant baseline conditions which derives from the operation of the Project. The magnitude has been expressed in Appendix 16.2 as a combination of probability and severity, which has been informed by potential future climatic changes, and degree of influence for each identified risk. Each element of the risk assessment has been scored on a scale of one to three, the scores a summed to give a total risk score. These scorings are described in Table **16.1**.

Table 16.1: Overview of Climate Risk Scoring

Factor	Score definitions
Severity: the magnitude and likely consequences of the impact should it occur.	**1 =** unlikely or low impact: for example, low-cost and easily repaired property damage, small changes in occupier's behaviour.
	2 = moderate impacts with greater disruption and/or costs.
	3 = severe impact: for example, risk to individual life or public health, widespread property damage or disruption to business.
Probability: reflects both the range of possibility of climatic parameter changes and the probability that the possible changes would cause the impact considered	**1 =** unlikely or low probability of impact, impact would occur only at the extremes of possible change illustrated in projections.
	2 = moderate probability of impact, plausible in the central range of possible change illustrated in projections.
	3 = high probability of impact, high probability of impact, likely even with the smaller changes illustrated as possible in the projections.
Influence: the degree to which design of the Project can affect the severity or probability of impacts	**1 =** no or minimal potential to influence, outside control of developer, for example reliance on national measures or individuals' attitudes/actions; or hypothetical measures would be impracticable.
	2 = moderate potential to influence, for example a mixture of design and user behaviour or local and national factors; measures may have higher costs or practicability challenges.
	3 = strong potential to influence through measures that are within the control of the developer and straightforward to implement.

16.2.5.3 Significance of Effects

Assessment guidance for GHG emissions (IEMA, 2022) describes five levels of significance for emissions resulting from a development, each based on how the Project contributes towards achieving net zero by 2050. To aid in considering whether effects are significant, the guidance recommends that resultant GHG emissions should be contextualised against pre-determined carbon budgets, or emerging policy and performance standards where a budget is not available. It is a matter of professional judgement to integrate these sources of evidence and evaluate them in the context of significance.

In accordance with the guidance, the following factors have been considered in contextualising the Project's GHG emissions:

- the magnitude of gross and net GHG emissions as a percentage of national carbon budgets;
- the consideration of any increase / reduction in absolute GHG emissions of the Project compared with current baseline scenarios, including projections for future changes in those baselines; and
- whether the Project contributes to, and is in line with, Ireland's policy for GHG emissions reductions, where these are consistent with commitments to limit global climate change to an internationally-agreed level (as determined by Ireland's NDC to the Paris Agreement).

Effects from GHG emissions are described within this chapter as adverse, negligible or beneficial based on the following definitions, as stated within the IEMA guidance (IEMA, 2022).

- **Major Adverse**: the Project's GHG impacts would not be compatible with Ireland's net zero trajectory. Its GHG impacts would not be mitigated, or would be compliant only with do-minimum standards set through regulation. The Project may not provide further emissions reductions required by existing local and national policy for projects of this type.
- **Moderate Adverse**: the Project's GHG impacts would not be compatible with Ireland's net zero trajectory. Its GHG impacts would be partially mitigated and may partially meet the applicable existing and emerging policy requirements, however it would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type.
- **Minor Adverse**: the Project's GHG impacts would be compatible with Ireland's 1.5°C trajectory and would comply with up-to-date policy and 'good practice' emissions reduction measures. The Project would fully comply with, or exceed, measures necessary to achieve Ireland's net zero trajectory.

- **Negligible**: the Project would achieve emissions mitigation that goes substantially beyond existing and emerging policy compatible with the 1.5°C trajectory, and would have minimal emissions. The Project would be fully consistent with good practice design standards for projects of this type.
- **Beneficial**: the Project would result in emissions reductions from the atmosphere, whether directly or indirectly, compared to the without-project baseline. As such, its net GHG impacts would be below zero. The Project would substantially exceed net zero requirements.

Major and moderate adverse effects are both significant, and it is down to professional judgement to differentiate between the 'level' of significant adverse effects. Beneficial effects are also considered to be significant. Minor adverse and negligible effects are not considered to be significant.

In accordance with IEMA's 2020 guidance, for climate change risk and resilience or adaptation measures, a risk assessment has been undertaken, considering the hazard, potential severity of impact on the Project and its users (including their sensitivity and vulnerability), probability of that impact, and level of influence the project design can have on the risk. The approach to this risk assessment is detailed in Appendix 16.2: Climate Change Risk Assessment. A risk score of five or more (the minimum score where more than one element of the risk assessment score is above 'low') has been defined as a risk that could lead to a significant effect. By considering the measures adopted as part of the design, professional judgement is used in determining whether impacts are likely to result in significant adverse or beneficial effects.

16.2.6 Assumptions and Limitations of the Assessment

A 'Do Nothing Scenario' regarding climate risk and resilience is not considered to be necessary for either the construction or operational assessments. Within the time periods of the construction phase, variations in climatic parameters would be minimal compared to the present-day baseline. As such, the current land use (3 no. dwellings and agricultural sheds) and associated receptors (users/residents) are not considered to be sensitive to such negligible changes. No significant adverse effects are anticipated, and therefore the assessment has not been considered further. With regards to the operational phase, the future baseline provided at section 16.4.1 and detailed in Appendix 16.2: Climate Change Risk Assessment, would be applicable to the 'Do Nothing Scenario'. However, the current land use (3 no. dwellings and agricultural sheds) and associated receptors (users/residents) are not considered to be sensitive to such changes over the operational lifetime. No significant adverse effects are anticipated, and therefore the assessment has not been considered further.

As detailed within section 16.2.5.3, to aid in considering whether effects are significant, estimated GHG emissions arising from the Project have been contextualised against pre-determined national carbon budgets. These budgets are described within section 16.2.2.1 in addition to Sectoral Emissions Ceilings, which set maximum limits on GHG emissions for each sector of the Irish economy. While these Sectoral Emissions Ceilings and associated guidance (detailed within the Climate Action Plan 2024 (Government of Ireland, 2024a)) provide useful context with regards to the future baseline (i.e. providing confidence in the future decarbonisation of electricity, gas and building materials), their use to contextualise Project emissions should be treated with caution. The unique nature of the Project may mean that its emissions do not fall accurately within one sector, with associated guidance and context within Climate Action Plan 2024 (Government of Ireland, 2024a) unclear with regards to how data centres should be classified. For the purposes of this assessment, it is considered that the sector of most relevance to the Project is the commercial built environment. As such, emissions resultant from the Project have been contextualised where appropriate within this sector's Emissions Ceilings. As detailed above, this contextualisation should be treated with caution as it is unclear whether the Sectoral Emissions Ceiling for the commercial built environment appropriately encompasses all emissions resultant from the Project.

When assessing climate risks, uncertainty arises from both modelling uncertainty and natural variability in the potential magnitude of future changes in climate. Therefore, a high magnitude of change scenario and high end of probabilistic projections have been used, to provide a precautionary worst-case approach. This is further discussed in Appendix 16.2: Climate Change Risk Assessment.

At this stage in the design of the Project, material estimates have some uncertainty in terms of their quantities. As such, published benchmarks for the embodied carbon associated with data centre buildings, admin workshop and water treatment plant building, site security hut, and district heating building have been used to estimate possible emissions associated with such structures. Such benchmarks do not capture the measures specified by the Applicant to reduce construction stage emissions (detailed within section 16.3), which have been assessed qualitatively. As such, associated values of embodied carbon presented represent a conservative estimate.

Embodied carbon associated with servers is wide-ranging with carbon intensities differing between suppliers and server types. Therefore the ‘as built’ final embodied carbon from the servers will be highly dependent on tenant procurement practices. The calculation of embodied carbon associated with the server fit-out takes a conservative approach, informed by a worst-case embodied carbon intensity per server given it is currently unknown what products will be specified by the future tenant.

Calculations of embodied carbon use currently available material or product emissions conversion factors, and as such do not account for the likely decarbonisation of materials and products over time. Therefore, given the likely phased approach of the data centre building delivery, the calculations of embodied carbon provide a conservative estimate.

Calculations of operational emissions resultant from the Project use current emissions factors for natural gas. Given Ireland’s target for net zero by 2050 and Gas Networks Ireland’s (GNI) planned decarbonisation, it is anticipated that the gas network will decarbonise over the Project’s lifetime. As such, operational emissions calculated over the Project’s lifetime provide a conservative estimate. A detailed assessment of possible decarbonisation scenarios is presented within the Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR. Given such decarbonisation scenarios are predictions, and are reliant on external factors out of the control of the Applicant, the values presented within Appendix 4.9 are not used to inform a quantitative assessment within this chapter to ensure a conservative approach. They are instead used to inform a qualitative assessment of operational effects and likely future decarbonisation.

Additionally, the phased nature of the buildings’ construction may result in some having a lesser operational lifetime than others, given the overall development lifetime of 50 years. As the calculations assume all data centre buildings have an operational lifetime of 50 years, this may provide a conservative estimate of operational emissions.

The above uncertainties are integral to the assessment of climate change effects, but a precautionary approach has been taken as far as practicable to provide a reasonable worst case assessment. On the basis of the above, it is considered that limitations to the assessment have been minimised and that the results provide a robust estimate of the effects of the Project.

16.3 Characteristics of the Project

As described within Chapter 4 Description of the Project, the overall development comprises two main elements which together constitute the “Project”:

- The Data Centre Application – comprising 6 no. two storey data centre buildings, an administration/management building, car parking, landscaping, energy infrastructure and other associated works. These elements are the subject of the planning application submitted to Kildare County Council (KCC).
- The Substation Application – comprising a grid substation and 110 kV transmission connection. These elements are subject of the Strategic Infrastructure Development (SID) application to An Bord Pleanála.

The construction and operation of such proposals will result in emissions of GHGs to the atmosphere. These will derive from the manufacture of materials and products used in the construction of the Project alongside GHG emissions associated with the use of energy within the buildings during their operational phase. Such emissions will contribute to the global atmospheric mass of GHGs and result in consequent warming potential.

The Project and its users will be subject to risks from local climate when operational. Such risks may include flooding, damage to building from storms, and risks to users from heightened temperatures. It is anticipated that such risks will be exacerbated into the future as a result of the impacts of climate change.

The characteristics of the Project of relevance to the GHG calculations are detailed below, and have informed the assessment of likely significant environmental effects.

Buildings

The Project comprises the following buildings, also detailed within sections 4.2.2 and 4.2.3 of Chapter 4:

- 6 no. Data Centre Buildings, each with a total internal area and height as follows:

   - Total gross internal area (GIA) – 27,261 m^2
   - Height to parapet – 18 m
   - Height to flue – 19 m
- Admin workshop and Water Treatment Plant (WTP) GIA – 818.9 m^2;
- Site security hut GIA – 42.1 m^2;
- District Heating (DH) building GIA – 340.5 m^2;
- Total of 210 no. car parking spaces comprising of 63 electric car charging spaces and 14 no. disabled car parking spaces;
- Total number of 52 no. bicycle spaces (8 per Data Centre building and 4 for the administration workshop);
- Provision of new footpath and cyclist infrastructure to connect with existing cycle path and footpath;
- Provision of a new bus stop on the R409;
- Demolition of 5 no. agricultural buildings to the centre of the site; and
- Demolition of 3 no. dwellings along the northern boundary of the site, fronting onto R409 road.

Whilst subject to internal layout requirements of end users, each Data Centre building will consist of the main data hall block with an external plant gantry and an enclosed yard to the rear encompassing the building energy infrastructure. The front of each Data Centre building will comprise of end-user client administration/office areas, plus storage areas and the loading/receiving docks.

The buildings will be steel-framed with insulated metal faced cladding panels to the façade. The rear external yard will also be also enclosed with a metal louvre system to align with the main building form and the building entrance area will have large, glazed windows.

The following elements are embedded within the design of the Project, and are considered to mitigate GHG impacts:

- The design team will seek to source goods, services, or works with a reduced environmental impact throughout their lifecycle. In this regard, tender requests will set out the policies and targets as set in the Resource and Waste Management Plan (RWMP) (HDR, 2023) which must be achieved. Tenders will be assessed and include scoring for proposals demonstrating how compliance will be achieved with the policies and targets of the RWMP (e.g. proposals for use of recycled materials rather than virgin materials, identification of resource efficient options, collaboration with supply chains).
- Materials will aim to reflect local sustainable manufacturing sources and support low carbon green initiatives, such as:
   - Timber and wood-based products will be responsibly sourced (e.g. FSC or PEFC);
   - Insulation materials and building services will be specified with low embodied environmental impact;
   - Locally sourced construction materials will be preferentially used, with priority to the use of prefabricated elements where possible to reduce construction-phase transport emissions;
   - Specification of recycled and reused materials will be a main design consideration where feasible;
   - The buildings will be ‘designed for robustness’ to ensure that damage to the building due to wear and tear, for example in areas of heavy usage, are minimised and can be repaired with minimal environmental or cost impact;
   - Construction of components off-site and use of pre-fabricated elements where feasible;
   - Concrete for certain types of foundations and preparatory foundations works can be specified with recycled aggregates where feasible; and

  - Where available, reinforcement for concrete is to be specified with 95% recycled content. Similarly, steelwork will be specified with a 95% recycled content where available.
- Energy efficiency measures to reduce energy demand, in line with national data centre guidance and policy requirements:
  - The data halls will be primarily cooled using external air, utilising Ireland's cooler climate. Further cooling required i.e. during higher summer temperatures, will be provided through adiabatic cooling systems;
  - Heat pumps to be installed to serve the data centres' office areas;
  - Admin areas housing office spaces and reception areas to face north-west and north-east to minimise solar gains and reduce cooling demand within such areas;
  - Fabric performance of the buildings to be maximised to reduce the space heating loads in winter and cooling loads in the summer; and
  - Highly efficient LED lighting to be specified to all data halls and office areas. Lighting to all other areas of the buildings to be highly efficient and incorporate occupancy sensors where applicable.
- 30% of the total energy demand will be met by renewable sources, in line with local policy requirements. This will comprise:
  - Solar photovoltaic (PV) arrays located on the roof of each of the six Data Centre buildings comprising 120 kW per data centre building to supply the admin areas, and a further 500 kW per data centre building to supply electricity to the data halls); and
  - Corporate Power Purchase Agreements (CPPA) will be used to procure renewable energy from wind / solar farms. In addition to providing energy for the Project, CPPAs will fund the construction of wind and solar farms. The Applicant has had discussions with various solar and wind renewable energy suppliers with a view to supplying energy through CPPAs, identifying sufficient capacity available from suppliers to meet the 30% operational renewable energy target. CPPAs will be finalised following a grant of permission, along with a connection agreement with Eirgrid, and will be entered into prior to operational requirements. The process and technical aspects of CPPAs are considered fully in Volume II, Appendix 1.3.

The Applicant intends to sign up to the Climate Neutral Data Centre Pact once the data campus is built. It is considered that the above design measures, and connection to the gas network (as outlined below), aligns the Project with the requirements of the Pact.

Gas Turbines

As described within Chapter 4, section 4.2.4.1, mains (Gas Networks Ireland [GNI]) connected, on-site natural gas turbines are the proposed primary energy source for the Project. Generation of electricity is proposed using gas turbines, located within a dedicated, adjoined plant area, to the rear of each Data Centre building. Each Data Centre building will comprise of 8 no. turbines.

Irrespective of energy demand from regulated or unregulated sources, remaining energy demand (that is not met by solar PV or electricity supplied through the CPPA) is to be met by such generation. This strategy is in line with recent EU and Irish Government direction on the use of gas for generation as a transition fuel.

GNI vision document 'Vision 2050' highlights their strategy to achieving zero dependence on gas from fossil fuels by increasing the provision of biomethane, abated natural gas and the use of hydrogen. As such, emissions associated with the Project's operational energy demand are anticipated to decrease alongside the decarbonisation of its source gas network. This is further detailed within the Energy Policy Compliance Report (Appendix 4.9 of this EIAR), which presents decarbonisation scenarios as informed by national plan and strategy documents.

Further, to support Net Zero strategy, the Applicant will be a strong supporter of Biomethane production from offsite Anaerobic Digestion (AD) facilities. GNI forecasts in biomethane production show significant growth in AD facilities forecasted between now and 2030. These fuels will likely provide the renewable form of feedstock for operating onsite generation. Additional information with regards to the Project's energy supply strategy is provided within Volume II, Appendix 1.3.

Battery Energy Storage Systems

As detailed within Chapter 4, section 4.2.4.3, for the purpose of providing uninterrupted and conditioned power, each Data Centre building will have a dedicated battery energy storage system (BESS) located within the adjoined plant area, to the rear of each Data Centre building. The BESS will consist of rack mounted lithium iron phosphate battery modules.

The storage capacity provides a back-up energy source and in addition adds resilience to the wider network, having the capacity to provide immediate export of energy to the national grid, or the capacity to store excess electricity generated externally, if required.

Substation

As detailed within Chapter 4, section 4.2.4.6, a 110 kV GIS is proposed to be located to the north west corner of the subject site and will provide the grid connection on site. The provision of the substation and grid connection will enable the export of energy generated onsite to the wider network. The substation will also enable the energy storage facility to be connected to the national grid and add greater capacity and resilience to the national electric energy generation capacity and the national electric grid.

16.4 Baseline

With regard to current climate, the baseline is the local and regional climate and resulting weather patterns recorded within current climate data and accounted for within climate projection models. This is in the context, however, of wider trends in global climate changes affecting the Irish climate, which at their present rates may be considered part of the known baseline. The change in baseline over time with climate change is set out in Appendix 16.2.

With regard to GHG emissions, the current baseline is the current site use: agricultural land including 3 no. dwellings and 5 no. agricultural buildings. Emissions associated with such use are likely to be negligible within the context of the scale of energy consumption from the Project, and as such have not been assessed further.

16.4.1 Future Baseline Conditions

With regard to future climate, the future baseline can be considered using ensembles of future climate models, collated within Climate Analytics' Climate Impact Explorer (Climate Analytics, 2022), which encompass the potential climatic outcomes over continental, national and subnational levels from a range of potential global emissions and climate change scenarios. Data local to the Project was used to inform the future climate within this assessment.

With regard to GHG emissions, the future baseline trend is towards the decarbonisation of the built environment. This is based on Ireland's Sectoral Emissions Ceilings (Government of Ireland, 2022), prepared in support of Ireland's Carbon Budgets, which detail a 45% reduction on 2018 levels by 2030 in the commercial built environment. Further, the electricity and industry sectors are required to reduce emissions by 75% and 35%, respectively, on 2018 levels by 2030, providing confidence in the future decarbonisation of electricity, gas and building materials

The future baseline encompasses changes in the baseline carbon intensity of factors such as electricity, heating fuel, transport fuel or energy and the embodied carbon in construction materials. All of these are expected to decrease over time in line with national decarbonisation policy goals. For the purpose of this assessment, present-day carbon intensity values have been used (appropriately representative of the construction period and initial year of operation) to be conservative. The impact of grid decarbonisation on emissions resultant from the Project has been assessed qualitatively. It is noted that notwithstanding the specific mitigation for the Project, its operational emissions from energy consumption are likely to decrease during its lifetime due to the decarbonisation of the energy networks. A detailed assessment of possible decarbonisation scenarios is provided within the Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR.

The future baseline GHG emissions for existing land-use without the Project are expected to remain similar, i.e. emissions from the use of 3 no. dwellings and agricultural sheds. Emissions associated with the energy use from such buildings is likely to be negligible and immaterial within the context of the scale of energy consumption from the Project. Further, such emissions are likely to decarbonisation in line with national decarbonisation targets. As such, associated emissions have not been assessed further.

16.5 Impact Assessment – Construction Effects

16.5.1 Assessment of Effects as a Result of Climate Change

Due to the relatively short construction programme, variations in climatic parameters would be minimal compared to the present-day baseline. Construction work practices are adapted to existing climate conditions and weather in Ireland. Appendix 16.2 summarises potential changes in climatic parameters further into the future. These changes are likely to occur gradually, and it is considered that construction contractors will be able to adapt working methods over time to address such changes, if necessary. For example, warmer winter conditions may extend the time certain construction activities, such as concrete pouring, can be carried out. A greater chance of summer heatwave conditions may require adaptations, such as shading work areas or increased attention to construction dust control measures.

Negligible **not significant** construction-stage effects are predicted in the construction phase as a result of climate change.

16.5.2 Assessment of Effects on Climate Change

16.5.2.1 Do Nothing Scenario

16.5.2.1.1 Magnitude of Impact

Under the 'do nothing scenario' it is assumed the Project does not go ahead. The Site would remain in its current use: agricultural land, including 3 no. dwellings and 5 no. agricultural buildings. There would be negligible emissions arising during the construction phase, associated with the operational emissions associated with the existing land use.

As stated in section 16.4, emissions associated with such use are likely to be negligible and will reduce over time in line with national decarbonisation (as detailed within the Climate Action Plan 2024).

16.5.2.1.2 Sensitivity of the Receptor

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents, has therefore been treated as a single receptor of **high sensitivity** (given the severe consequence of global climate change and the cumulative contributions of all GHG emissions sources).

16.5.2.1.3 Significance of Effect

The magnitude of impact associated with the 'do nothing scenario' is deemed to be immaterial, and is assessed as having a **negligible** effect on the highly sensitive receptor, which is **not significant** in EIA terms.

16.5.2.2 Likely Significant Environmental Effects

16.5.2.2.1 Magnitude

The manufacturing of associated materials and construction of the Project would result in both direct and indirect GHG emissions. The majority of the construction-stage impacts are 'Scope 3' (supply chain) emissions resulting from the extraction of raw materials and manufacturing of construction materials, alongside the emissions associated with their transportation to site.

Construction emissions from the Project can be split into two spheres of influence: those under the Applicant's control, and those under the future tenant control. This assessment will consider the magnitude of emissions associated with each individually and assign each a level of significance. The following items are considered within this assessment (detailed where relevant within section 16.3):

- Applicant control
    - Demolition of existing buildings on site

- Data Centre buildings (including data halls and admin blocks)
- Admin workshop and water treatment plant building
- Site security hut
- District heating building
- Solar PV
- Gas turbines
- Battery Energy Storage Systems
- Substation
- Construction transport movements

- Tenant control
  - Server fit out

Appendix 16.3: GHG Calculations, provides detailed information regarding the below methodologies and the quantification of emissions associated with the construction of the Project. The total construction-stage emissions concluded within Appendix 16.3 is reported within Table **16.2**, below.

Demolition

The demolition of buildings currently within the site boundary (3 no. dwellings and 5 no. agricultural buildings) is unlikely to result in significant construction-stage emissions. Construction and demolition waste in Ireland is most commonly backfilled, however this reflects the large proportion of stones and soils in such waste. With regards to metals, wood, concrete and brick (the materials most likely to constitute demolition waste at the Project) the dominant method of disposal is recycling, followed by energy recovery and backfilling (Environmental Protection Agency, 2022).

As detailed within the Resource and Waste Management Plan prepared in support of the application (HDR, 2023), the existing buildings have been assessed and their materials identified as unsuitable for re-use within the Project. However, such materials may be used during construction as a base for piling rigs before final disposal. The applicant has committed to the prevention or reduction of on-site construction waste generation through re-use, and recycling and recovery. As such, it is likely that demolition materials on site will be recycled where appropriate, preventing materials from being sent to landfill and reducing the need for the extraction of primary materials. Material which cannot be recycled may be directed to energy from waste facilities or to appropriate licenced waste facilities. As such, emissions associated with such demolition are considered to be immaterial. This impact is not quantitatively assessed further.

Buildings

At this stage in the design of the Project, material estimates and have some uncertainty in terms of their quantities and product specifications. As such, published benchmarks and product Life Cycle Assessments (LCAs) have been used to inform the calculation of embodied carbon.

Published benchmarks (Royal Institute of Chartered Surveyors (RICS), 2012) have therefore been used to calculate the embodied carbon associated with all proposed buildings. The benchmark data is expressed in kg CO_2e/m^2 of floorspace as an intensity, which was scaled by the total floor area for each building. Benchmark intensities appropriate for each building use were selected, this is further detailed in Appendix 16.3. Total embodied carbon emissions for all proposed data centre buildings equal 109,464 tCO_2e (including external plant compounds). Embodied carbon emissions associated with the admin workshop and water treatment plant, site security hut, and district heating building total 757 tCO_2e, 39 tCO_2e, and 186 tCO_2e, respectively.

Solar PV

Consideration of meta-analyses[1] of published solar PV LCAs has informed the estimate of emissions associated with the proposed inclusion of solar PV panels. The primary source of emissions factors used in assessing the embodied carbon effects of the Project was NREL's (2012) 'Life Cycle Greenhouse Gas Emissions of Crystalline Silicon Photovoltaic Electricity Generation', an in-depth meta-analysis of over 397 LCAs regarding C-SI PV systems. Using the lower to upper limit ranges from the primary source (NREL, 2012) (39 – 49 gCO_2e/kWh), the projected construction stage GHG impact of the panels and associated BoS components is between 6,174 tCO_2e and 7,757 tCO_2e (lower to upper limits) when scaled by the proposed total solar PV generating capacity (3.72 MW). To provide a conservative estimate, the greater of the values has been brought forward within the assessment of embodied carbon.

Gas Turbines

The impact of the gas turbines has been calculated using an intensity for the manufacturing GWP of 23.2 $kgCO_2e$ per kVA (ABB, n.d.). This was scaled by the total energy demand of the Project, totalling 240 MW, to give an embodied carbon value of 5,568 tCO_2e. It has been assumed that this intensity accounts for all gas turbine and electrical plant associated with the data centres.

The turbines are likely to be refurbished every two years. However, given this will not result in the installation of new turbines, just the repair and servicing of the existing turbines, resultant emissions are likely to be immaterial. Additionally, given national decarbonisation requirements, it is likely that any repair work is likely to decarbonise over the Project's lifetime.

Battery Energy Storage Systems

The impact of the battery energy storage systems (BESS) has been informed by a number of LCA studies detailing emissions associated with the component materials and cell manufacture (Pell and Lindsay, 2022; Yudhistira, 2021; Emilsson and Dahllöf, 2019) (further details included within Appendix 16.3). BESS manufacture is an energy-intensive process, owing to both the mining and refining of raw materials and the energy use during their manufacture. Current LCAs detailing emissions associated with such manufacture give varying emissions intensities, resulting from differences such as energy sourced from a renewables-rich mix or fossil fuel-rich mix (which will vary with manufacture location), battery densities and structure, and the complexity of the manufacturing process. As such, a range of reported carbon intensities have been used to inform the calculation of embodied carbon to account for such uncertainty. The storage capacity (79.2 MWh) of the BESS was scaled by 52.0 $kgCO_2e/kWh$ (Pell and Lindsay, 2022) to 169 $kgCO_2e/kWh$ (Yudhistira, 2021), in addition to an estimated replacement rate of BESS over the Project's lifetime. Total embodied carbon associated with the BESS was estimated to lie between 16,474 tCO_2e and 53,539 tCO_2e. To provide a conservative estimate, the greater of the values has been brought forward within the assessment of embodied carbon.

Substation

Embodied carbon associated with the proposed substation (including all associated transformers, busbars, and other equipment) has been informed by an Environmental Product Declaration (EPD) for a 16 kVA – 1000 MVA transformer (ABB, 2003). The LCA listed a manufacturing global warming potential (GWP) of 2,190 $kgCO_2e/MVA$, this was scaled by the proposed substation's rating of 600 MVA, to give an estimated embodied emission value of 1,314 tCO_2e.

Servers

The impact of embodied carbon associated with the servers has been estimated using product LCAs for servers appropriate for data centre use. Given the server type is not yet known at this stage in the design and will be subject to tenant specification, a range of server LCAs were considered. The greatest final value of embodied carbon has been reported within this assessment to provide the most conservative estimate.

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[1] A meta-analysis is a study whereby the results of multiple studies are assessed and combined, informed by statistical methods with the aim of reaching a best estimate from the combined results.

The total number of servers to be installed across the six proposed data centres was estimated by scaling the server power rating by the total proposed IT load associated with the data centres (180 MW). The lifetime of each server unit was taken into account within the calculations, and was assumed to be 4 years as specified by the product LCA (Sphera, 2021). As such, when considered within the context of the Project's 50 year lifetime, a replacement rate of 13 was established. The total number of servers was then scaled by an embodied carbon factor (1.375 tCO_2e per server) (Sphera, 2021) to give a total of 13,177,597 tCO_2e.

Vehicle Movements

Emissions associated with HGV and personnel vehicle movements during the construction of the Project have been estimated by scaling predicted number of vehicle movements per day, by an average journey distance and emissions factor (DESNZ, 2023). The resultant emissions total 33,312 tCO_2e.

Summary

Table **16.2**, below, summarises the embodied carbon associated with the materials and construction of the Project. As described above, this has been split into emissions controlled by the Applicant and by future tenants.

Table 16.2: Construction-Phase Embodied Carbon

Item	Embodied Carbon (tCO_2e)	Percentage of total embodied carbon (%)
Applicant Controlled Elements		
Data centre buildings	109,464	0.82%
Admin workshop and water treatment plant building	757	0.01%
Site security hut	39	0.00%
District heating building	186	0.00%
Solar PV	7,757	0.06%
Gas Turbines	5,568	0.04%
BESS	53,539	0.40%
Substation	1,314	0.01%
Construction transport movements	33,312	0.25%
Sub-total	211,936	1.58%
Tenant Controlled Elements		
Server fit out	13,177,597	98.42%
Total	**13,389,533**	

As detailed within section 16.3, the design team will seek to source goods, services, or works with a reduced environmental impact throughout their lifecycle. As such, the embodied carbon impact of the Project can be expected to be reduced compared to a business as usual approach.

The majority (98.42%) of the Project's embodied carbon emissions result from the server fit out within the data centre buildings. However, as detailed in section 16.2.6, embodied carbon associated with the servers is wide-ranging with carbon intensities differing between suppliers and server types. The final embodied carbon associated with the servers will be highly dependent on tenant procurement practices. The calculation of embodied carbon associated with the server fit out takes a conservative approach, informed by a worst-case embodied carbon intensity per server given it is currently unknown what products will be specified by the future tenant. As such, it can be anticipated that embodied carbon associated with the servers will likely be lower than that reported.

16.5.2.2.2 Sensitivity of the Receptor

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents, has therefore been treated as a single receptor of **high sensitivity** (given the severe consequence of global climate change and the cumulative contributions of all GHG emissions sources).

16.5.2.2.3 Significance of Effect

The nature and significance of effect has been characterised by contextualising the Project's construction stage GHG impacts within Ireland's carbon budget, and with its compliance with Ireland's net zero trajectory, local and national climate-related policy, legislation and guidance.

Carbon budgets that are relevant during the construction phase of the Project have been considered within Table 16.3. The phased delivery of the Project has been accounted for when attributing emissions to relevant carbon budgets.

Table 16.3: Construction Emissions and Carbon Budgets

Time period	2021-2025	2026-2030	2031-2035	Total*
Ireland carbon budget (tCO2e)	295,000,000	200,000,000	151,000,000	351,000,000
Applicant-controlled elements				
Project GHG impacts (tCO_2e)	2,296	139,760	69,880	211,936
Development emissions as percentage of Ireland Carbon Budget	0.001%	0.07%	0.05%	0.06%
Tenant-controlled elements				
Project GHG impacts (tCO_2e)	0	5,068,306	6,081,968	11,150,274
Development emissions as percentage of Ireland Carbon Budget	0.00%	2.53%	4.03%	3.18%

* This is the total during the budget periods, not the total for the Project's assumed lifetime.

Sectoral Emissions Ceilings that are relevant during the construction phase of the Project have been considered within Table **16.4**. The phased delivery of the project has been accounted for when attributing emissions to the relevant Sectoral Emissions Ceilings.

Table 16.4: Construction Emissions and Sectoral Emissions Ceilings

Time period	2021-2025	2026-2030	Total[1]
Sectoral Emission Ceiling – commercial built environment (tCO_2e)	7,000,000	5,000,000	12,000,000
Applicant-controlled elements			
Project GHG impacts (tCO_2e)	2,296	139,760	142,056
Project emissions as percentage of the Sectoral Emission Ceiling – commercial built environment	0.03%	2.80%	1.18%
Tenant-controlled elements			
Project GHG impacts (tCO_2e)	0	5,068,306	5,068,306
Project emissions as percentage of the Sectoral Emission Ceiling – commercial built environment	0.00%	101.37%	42.24%

[1] This is the total during the budget periods, not the total for the Project's assumed lifetime.

While the Climate Action Plan 2024 (Government of Ireland, 2024a) and Ireland's Long-term Strategy on Greenhouse Gas Emissions Reductions (Government of Ireland, 2024b) references targets to reduce embodied carbon in construction materials associated with the industry sector, it is uncertain to what extent the national carbon budgets and Sectoral Emissions Ceilings account for embodied carbon emissions, and as such contextualisation within such budgets and emissions ceilings must be approached with caution.

The total magnitude of impact is estimated to be 211,936 tCO_2e for Applicant-controlled elements of the Project, comprising 0.06% of the total Irish carbon budget over the relevant periods. Whilst it has not been possible at this stage to quantify the emissions reduction measures specified by the Applicant (as detailed within section 16.3, and 16.2.6), which are likely to reduce carbon resultant from the construction of the Project compared to a business as usual approach, such measures have been taken into account when considering the significance of the construction stage effects. The Applicant's approach to low carbon material and product procurement, and efficient construction methods are in keeping with good practice emissions reduction measures, and current and emerging national policy regarding the transition towards net zero. In particular this approach will contribute demand for low carbon materials and support the key target to decrease embodied carbon in construction materials, as detailed within the Climate Action Plan 2024 (Government of Ireland, 2024a) and Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction (Government of Ireland, 2024b).

The embodied carbon attributed to the inclusion of gas turbines and solar PV results from measures implemented to support the operational decarbonisation of the Project and are supported within national policy and decarbonisation targets (such as the Climate Action Plan 2024 (Government of Ireland, 2024a) which promotes the design of large energy users to enable low/zero carbon demand growth), and Government Strategy on the Role of Data Centres in Ireland (Government of Ireland, 2022). The connection to a gas network and on-site generation of electricity through the gas turbines is in line with recent EU direction (the Hydrogen and Decarbonised Gas Market Package) and consequently Irish Government direction on the use of gas for generation as a transition fuel, as detailed within the Energy Policy Compliance Report (HDR, 2024a). It also means that the Project will not add any additional demands to the grid, allows for any excess power generated on-site to be exported to the grid, and enables the Project to benefit from the decarbonising gas network thereby reducing its operational emissions.

As such, the Project aligns with Ireland's national legislation and policy, and net zero trajectory; the magnitude of impact on the high sensitivity receptor would result in **minor adverse** construction-stage effect which is **not significant** in EIA terms.

The total magnitude of impact is estimated to be 13,177,597 tCO_2e for tenant-controlled elements of the Project. Over the Irish carbon budget periods, the magnitude of impact is estimated to be 11,150,274 tCO_2e, comprising 3.18% of the total Irish carbon budgets. Mitigation measures to reduce such emissions are not within the Applicant's scope and as such emissions reductions cannot yet be committed to within this assessment. As such, it cannot be concluded that resultant emissions are in line with local and national net zero aspirations. However, there is uncertainty with regards to the servers likely to be installed by the tenant – embodied carbon associated with servers is wide ranging, with final 'as built' carbon values highly dependent on tenant procurement practices (as detailed within section 16.2.6). It would be the responsibility of the tenant to ensure server equipment will be assessed for reuse, repair or recycling, in line with the Climate Neutral Data Centre Pact (2023). Therefore, to account for such uncertainty, the magnitude of impact on the high sensitivity receptor would result in a **moderate** to **major adverse** construction-stage effect, which is **significant** in EIA terms.

16.5.2.3 Mitigation

While the Project already includes extensive embodied carbon mitigation within its design and material procurement commitments within the Applicant's control (as detailed within section 16.3), the following further mitigation measures should be considered:

- The Applicant should seek to obtain product EPDs for required MEP and building services during product procurement, with the aim to procure lower carbon products where available. Through close engagement with the supply chain and greater transparency into the GHG impacts of products being specified, it can be ensured that products used in the construction of the Proposed Development are manufactured in conditions with minimal GHG impacts (e.g. via the use of renewable energy and efficient resource consumption);
- Increase commitments with regards to the recycled content of the construction materials, where supply is available; and
- The Applicant should seek to understand and influence where possible the approach taken by future tenants with regards to server procurement processes, including whether product EPDs are obtained

and lower carbon servers are preferentially specified, and what practices the tenant has in place for re-using, repairing or recycling servers (as required of signatories of the Climate Neutral Data Centre Pact).

16.5.2.4 Residual Impacts

Accounting for the above further mitigation measures on Applicant-controlled elements of the Project, the magnitude of impact from construction phase emissions on the high sensitivity receptor would result in **minor adverse** construction-stage effect which is **not significant** in EIA terms.

With regards to the embodied carbon associated with tenant-fit out of the servers, it is considered that the proposed further mitigation has the potential to greatly reduce embodied carbon, enabling such emissions to align with decarbonisation targets. As such, the magnitude of impact on the high sensitivity receptor would be considered to result in in a **minor adverse** construction-stage effect, which is **not significant** in EIA terms.

16.6 Impact Assessment – Operational Effects

16.6.1 Assessment of Effects as a Result of Climate Change

16.6.1.1 Magnitude of Impact

As detailed within section 16.2.5.2, the magnitude is the degree of a change from the relevant baseline conditions which derives from the operation of the Project. The magnitude has been expressed in Appendix 16.2 as a combination of probability and severity, which has been informed by potential future climatic changes, and degree of influence for each identified risk. These scorings are summarised in Table **16.1** within section 16.2.5.2 and full descriptive definitions of the scoring are set out in Appendix 16.2.

Of the nine risks identified, two risks scored three, four risks scored four, one risk scored five, and one risk scored six. The remaining risk is associated with flood risk, and was not quantified as the effects of this risk are fully considered within Chapter 7: Water and Hydrology of the EIAR.

16.6.1.2 Sensitivity of the Receptor

As detailed within section 16.2.5.3 the severity of effect score for each identified risk considers the potential consequences of the hazard and the sensitivity of the receptor(s) affected. Given the variability in the nature of the potential effects of climate change on the Project, receptors have been identified on a risk-specific basis, whereby all receptors relate to the continued safe and effective operation of the Project. In line with IEMA (2020) guidance, the receptor vulnerability and susceptibility have been considered in determining the severity of risk. As such, sensitivity is detailed for each identified risk within Appendix 16.2 Climate Change Risk Assessment.

16.6.1.3 Significance of Effect

Appendix 16.2 summarises the potential climatic changes in the coming decades and considers the potential consequences for the operation of the Project in a risk assessment format. The potentially significant risks identified, that have potential to be mitigated through the development's design, are mainly those associated with flooding, high ambient and extreme temperatures, and extreme weather. The risk from flooding and appropriate mitigation measures has been assessed within Chapter 7: Water and Hydrology. Appropriate flood management and resilience measures have been provided, including an allowance for climate change effects.

The risk assessment in Appendix 16.2 considers in its scoring the level of influence the design, construction and operation of the Project can have upon the risks, in addition to its severity and probability. Appendix 16.2 details guidance included within the Government of Ireland Sectoral Adaptation Plans (Government of Ireland, 2020) and the Environmental Protection Agency's (EPA) Climate Change Assessment (EPA, 2023) regarding climate risk.

With the exception of flood risks, the greatest risks to the Project due to climate change have been identified as those arising from high temperatures affecting operation, public health and energy demand for cooling, and storms or extreme weather events causing building damage.

These risks were both identified as significant (risks scores of 6 and 5, respectively) prior to resilience or adaptation measures to mitigate the risks, which would result in a **significant adverse effect.**

The following embedded mitigation measures are incorporated into the Project's design, reducing the significant adverse effect to a **negligible** effect, which is not significant in EIA terms:

- Passive design measures will minimise excessive solar gain, such as admin areas housing office spaces and reception areas being north-west and north-east facing to minimise unwanted solar gains;
- Adiabatic cooling system will be designed to allow for further water storage adjacent to each building, to accommodate higher temperatures if needed, and
- The roof of each building will be provided with a reflective finish to improve solar reflectivity.

16.6.2 Assessment of Effects on Climate Change

16.6.2.1 Do Nothing Scenario

16.6.2.1.1 Magnitude of Impact

Under the 'do nothing scenario' it is assumed the Project does not go ahead. The Site would remain in its current use: agricultural land, including 3 no. dwellings and 5 no. agricultural buildings. As stated in section 16.4, emissions associated with such use are likely to be negligible and will reduce over time in line with national decarbonisation (as detailed within the Climate Action Plan 2024).

16.6.2.1.2 Sensitivity of the Receptor

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2-equivalents, has therefore been treated as a single receptor of **high sensitivity** (given the severe consequence of global climate change and the cumulative contributions of all GHG emissions sources).

16.6.2.1.3 Significance of Effect

The magnitude of impact associated with the 'do nothing scenario' is deemed to be negligible, and is assessed as having a **negligible effect** on the highly sensitive receptor, which is **not significant** in EIA terms.

16.6.2.2 Likely Significant Environmental Effects

16.6.2.2.1 Magnitude of Impact

Appendix 16.3: GHG Calculations, provides detailed information regarding the below methodologies and the quantification of emissions associated with the operation of the Project. The total operational-stage emissions concluded within Appendix 16.3 is reported within this section.

The use of the Project post-completion would result in indirect GHG emissions due to the use of electricity within the buildings. The operational energy demand has been split into regulated and unregulated energy, in addition to the GHG impacts associated with the operation of the BESS.

The energy demand associated with the Project is to be met by the onsite generation of electricity using gas turbines. This strategy is in line with recent EU and Irish Government direction on the use of gas for generation as a transition fuel, with gas being sourced from the Gas Networks Ireland (GNI) gas network. As such, all operational emissions associated with electricity consumption at the Project have been calculated by scaling relevant energy demands (broken down below), by the SEAI current natural gas emissions factor of 204 gCO_2e/kWh (summarised within Table **16.5**).

Regulated Energy

Regulated energy consumption results from the specification of controlled fixed building services and fittings, such as space heating and cooling, hot water, ventilation, and lighting. It is these regulated loads that are most able to be reduced through embedded design measures by the Applicant.

Emissions associated with the regulated energy consumption has been informed by consumption figures reported within the Energy Efficiency and Climate Change Adaptation Statement (HDR, 2024b) prepared in support of this application. The reported energy intensity associated with the office and reception areas totals 75.1 kWh/m^2. This offers a 22% reduction from 96.1 kWh/m^2 through the inclusion of the embedded energy efficiency measures detailed at section 16.3. This intensity (75.1 kWh/m^2) was scaled by the total GIA for the Project (including the admin workshop and water treatment building, site security hut, and district heating building) to give the total annual estimated energy consumption of 12,374,039 kWh per annum, offering a total annual reduction of 3,460,118 kWh per annum.

Unregulated Energy

Unregulated energy consumption is associated with systems or processes that are not controlled and do not have regulations imposed on them. Unregulated energy consumption within the Project is largely resultant from the data hall demand, where any server energy efficiency measures will be within the control of the tenant.

Emissions associated with the unregulated energy consumption has been informed by the project design – 6 no. data centre buildings, each comprising of 8 no. data halls with an electrical capacity to support up to 40 MW of IT equipment load, building services and regulated energy demand (as detailed above) in each building, totalling the maximum demand of 240 MW across the Project. To provide a conservative emissions estimate, it was assumed that the data centres would run 24 hours a day, 365.25 days a year, resulting in the total Project consumption of 2,103,840 MWh per year. Total unregulated energy consumption has been calculated by subtracting the unregulated demand (as detailed above) by the total Project energy demand, resulting in a total unregulated energy demand of 2,091,466 MWh per year.

Solar PV

3.72 MW total generation capacity of solar PV is proposed to be installed on the data centre roofs to supplement both the regulated and unregulated energy demand arising from the administration areas and offices, and data hall demand. This can be broken down into 120 kW per data centre building to supply the admin areas, and a further 500 kW per data centre building to supply electricity to the data halls. The total annual energy output of the proposed solar PV array has been calculated to total 679,285 kWh and 2,830,356 kWh per annum, associated with admin area supply (regulated) and data hall supply (unregulated) respectively. This totals an annual energy output of 3,510 MWh per annum, and 148,497 MWh over the Project's lifetime (accounting for an annual degradation factor of 0.7%).

Corporate Power Purchase Agreement

As detailed within the Herbata Data Centre Sources of Energy Report (Volume II, Appendix 1.3), 30% of the energy demand remaining following energy efficiency reduction measures will be met by renewable sources (in line with Kildare County Development Plan 2023-2029 policy requirements). Less than 1% of the Project's energy demand (both regulated and unregulated) has been calculated to be met by the onsite generation by solar PV in the first year of operation, the remainder will be met by purchased electricity via a CPPA totalling 3,032,926 kWh and 624,607,432 kWh per annum, associated with the regulated and unregulated demands respectively. This totals 627,642 MWh per annum, or 31,409,103 MWh over the Project's lifetime.

The commitment to a CPPA results in savings of 1,007 tCO_2e and 207,370 tCO_2e per annum, associated with the regulated and unregulated energy demand, respectively. This totals 52,081 tCO_2e and 10,375,742 tCO_2e when scaled over the Project's lifetime. This has been calculated by scaling the energy demand attributed to CPPAs by SEAI emissions factors for electricity (332 gCO_2e/kWh). This doesn't account for likely grid decarbonisation.

Battery Energy Storage Systems

For the purpose of providing uninterrupted and conditioned power, each data centre building will have a dedicated BESS system. The storage capacity provides a back-up energy source to the data centres, in addition the BESS adds resilience to the wider electricity network as it will have the capacity to provide immediate export of energy to the grid, or the capacity to store excess electricity generated externally, if required.

The primary role of the BESS is to provide a back-up energy source to the data centres. Emissions associated with this activity has been accounted for within the calculation of operational emissions arising from the regulated and unregulated energy consumption. Therefore, the assessment of operational effects of the BESS focuses on their role in exporting electricity to the grid, thereby enhancing the flexibility and resilience of the wider electricity network and avoiding the use of gas-fired peaking plants.

It is likely that the BESS would be charged both from surplus electricity generated by on-site gas turbines, in addition to electricity from the grid. It is assumed that as the penetration of non-dispatchable renewable energy resources in the Irish grid increases, energy market price mechanisms will be in place to ensure that, insofar as is possible, stationary grid-scale batteries would only charge using surplus renewable energy when charging from the grid. Given wind energy constitutes the majority of renewable energy generators and is most likely to be curtailed during periods of low demand, it has been assumed that this would be the source of electricity charging the BESS from the grid. However, as it is not certain that this would be the case in all market conditions, grid electricity has been assumed to charge the BESS in the absence of renewable supply. It is likely that GHG impacts will fall within the range of emissions generated by all three scenarios.

When charged by the on-site gas turbines, the BESS would not be avoiding electricity generation by gas-fired peaking plants, and as such would result in additional emissions from such generation activities. Emissions associated with electricity provision to the grid by the BESS has been calculated by scaling the annual energy input required to charge the BESS, with Ireland's natural gas emissions factor (204 gCO_2e/MWh) (SEAI, 2023), resulting in additional emissions of 235,889 tCO_2e.

When charged from grid electricity, the BESS will enable otherwise curtailed renewable energy, resulting in total emissions avoided by the Project's proposed BESS to lie between -530,002 tCO_2e and -147,249 tCO_2e over the Project's lifetime. Negative values represent avoided GHG emissions.

The above ranges provided are anticipated to present a conservative estimate that overstates annual emissions resultant and avoided from the Project as decarbonisation of the gas grid, and electricity grid has not been accounted for. This is planned to arise through the increasing provision of biomethane, abated natural gas and hydrogen, and provision of renewable energy.

Export of energy via the substation

The proposed substation would enable surplus electricity generated by the gas turbines located on site to be exported and provide capacity to Eirgrid. Emissions intensities associated with natural gas are currently lower than Ireland's grid electricity, and as such the export of gas-generated lower carbon intensity electricity would aid in the shift away from coal and oil and reduce the overall emissions intensity of grid electricity. Emissions associated with the combustion of gas on site are likely to further decrease as gas supplier GNI aims to gradually replace natural gas with biomethane and hydrogen, resulting in further opportunities to offer low carbon electricity to the grid. Given it is not currently known to what extent the substation will export electricity, it is not possible to make a quantitative estimate of emissions that could be avoided, however it is possible to conclude that the proposed generators will result in avoided emissions by enabling the reduction of higher carbon intensity generation sources.

Transport

Operational transport emissions have not been quantitatively assessed, given they are likely to be immaterial within the context of the emissions associated with the regulated and unregulated energy demands arising from the Project. However, it must be noted that the measures listed within section 16.3 embedded within the Project design (inclusion of bicycle parking, EV charge points, provision of cycling and pedestrian infrastructure, and provision of a new bus stop) will enable emissions reductions associated with the travel of staff to the site.

Summary

Table **16.5** summarises the regulated and unregulated energy demands arising from the Project, alongside their associated emissions. Reductions resultant from the above-described energy efficiency, and renewable energy procurement are also included.

Table 16.5: Summary of operational emissions

	Regulated Energy		Unregulated Energy	
	Annual Energy Demand (kWh)	Annual Emissions (tCO_2e)	Annual Energy Demand (kWh)	Annual Emissions (tCO_2e)
No mitigation				
Total	**15,834,157**	**5,257**[2]	**2,091,466**	**694,367**[2]
Embedded emissions reduction measures				
Energy Efficiency measures	-3,460,118		n/a	
Solar PV[1]	-679,285		-2,830,356	
CPPA[1]	-3,032,926		-624,609,432	
Total	**8,661,827**	**1,767**[3]	**1,464,026,173**	**298,661**[3]
Total percentage reduction		**-66%**		**-57%**

[1]Accounting for the first year of operation only. Over the lifetime of the solar PV array panel degradation will result in reduced output. Given 30% of energy demand must be met by renewable sources, this will result in an uplift throughout the Project's lifetime in the energy demand to be met within the CPPA.
[2]Emissions have been scaled by SEAI emissions factors for electricity (332 gCO_2e/kWh)
[3]Emissions accounting for embedded emissions reduction measures have been scaled by SEAI emissions factors for natural gas (204 gCO_2e/kWh) to account for the use of gas generators in the onsite provision of electricity.

Total annual emissions resultant from the regulated energy demand of the Project were estimated to be 1,767 tCO_2 per annum, or 88,351 tCO_2 over the Project's 50 year lifetime. Total annual emissions resultant from the unregulated energy demand of the Project were estimated to be 298,661 tCO_2 per annum, or 14,933,067 tCO_2 over the Project's 50 year lifetime.

Emissions associated with the BESS are anticipated to lie between 235,889 tCO_2e and -530,002 tCO_2e over the lifetime of the Project. The true emissions resultant from the BESS will be dependent on the energy sources used to charge the system, but will likely lie within this range.

It should be noted that estimates of emissions associated with both regulated and unregulated energy consumption are likely to provide a conservative worst-case estimate. Firstly, it is unlikely that the data centres will achieve 100% power utilisation, as they generally reach a maximum of between 70% to 80% utilisation. Further, a static current natural gas emission intensity factor has been used to calculate emissions, which does not take into account gas network decarbonisation by GNI, in line with policy and legislation as Ireland moves towards its net zero 2050 target (detailed within Appendix 4.9 to this EIAR). Finally, the calculation assumes all data centres are completed and operational for the entire 50 year lifetime of the Project. As such, it can be anticipated that actual emissions resultant from the Project will be less than that estimated.

16.6.2.2.2 Sensitivity of the Receptor

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2e, has therefore been treated as a single receptor of **high sensitivity** (given the consequences of global climate change and the cumulative contributions of all GHG emissions sources).

16.6.2.2.3 Significance of Effect

The Project's operational-stage emissions have been contextualised in the context of Ireland's Carbon Budgets from 2026 to 2035. The GHG impacts given within Table 16.616-4 represent carbon budget expenditures that will occur as a result of the Project's operation. The phased delivery of the Project has been accounted for when attributing emissions to relevant carbon budgets.

As described within section 16.2.6, the operational GHG figure per annum for the Project is a conservative estimate, not accounting for grid decarbonisation. As a result, the emissions reported within Table 16.616-4 below for each carbon budget period give a conservative assumption of carbon budget expenditures.

It should be noted that the operational GHG figure per annum is based on current natural gas conversion factors, providing a fixed current year estimate, which does not account for planned decarbonisation of the gas network in line with policy and legislation as Ireland moves towards its net zero 2050 target. As a result, the emissions reported within Table **16.6** below for each carbon budget period give a conservative assumption, in reality this is likely to be lower. A detailed assessment of possible decarbonisation scenarios is provided within the Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR. The decarbonisation trajectories are informed by relevant national plan and strategy documents, and assuming the decarbonisation of the gas network is in line with such documents, it can be expected that the Project will decarbonise completely by 2039. Further, the connection to a gas network and on-site generation of electricity through the gas turbines is in line with recent EU direction (the Hydrogen and Decarbonised Gas Market Package) and consequently Irish Government direction on the use of gas for generation as a transition fuel, as detailed within the Energy Policy Compliance Report (HDR, 2024a). As such, it is consistent with the requirements of the Climate Action Plan 2024 (Government of Ireland, 2024a) which promotes the design of large energy users to enable low/zero carbon demand growth.

Table 16.6: GHG Impacts in the Context of Ireland's Carbon Budgets

Time period	2026-2030	2031-2035	Total[1]
Ireland carbon budget (tCO_2e)	200,000,000	151,000,000	351,000,000
Regulated Emissions			
Project operational GHG impacts (tCO_2e)	4,123	8,246	12,369
Project emissions as percentage of Ireland Carbon Budget	0.002%	0.01%	0.004%
Unregulated Emissions			
Project operational GHG impacts (tCO_2e)	696,876	1,393,753	2,090,629
Project emissions as percentage of Ireland Carbon Budget	0.35%	0.92%	0. 60%
BESS Emissions			
Project operational GHG impacts (tCO_2e)	-24,733 to 11,008	-49,467 to 22,016	-74,200 to 33,025
Project emissions as percentage of Ireland Carbon Budget	-0.01% to 0.01%	-0.03% to 0.01%	-0.02% to 0.01%
Total Emissions[2]			
Project operational GHG impacts (tCO_2e)	712,008	1,424,015	2,136,023
Project emissions as percentage of Ireland Carbon Budget	0.36%	0.94%	0.61%

[1]This is the total during the budget periods, not the total for the Project's assumed lifetime.

[2]This assumes the worst case BESS scenario, with the fewest avoided emissions.

When contextualising the operational-stage emissions into the 2026 to 2030 Sectoral Emissions Ceilings for the commercial built environment (5 $MtCO_2e$), the Project's operational emissions comprise 14.24%. Considering regulated and unregulated emissions separately, these comprise 0.08% and 13.94% of the Sectoral Emissions Ceiling for the commercial built environment, respectively.

While the emissions associated with the BESS range from -74,200 to 33,025 tCO_2e over the carbon budget periods (where negative values represent avoided emissions), it is important to note that national and local policy calls for increased flexibility in the grid (including Climate Action Plan 2024 (Government of Ireland, 2024a), Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction (Government of Ireland, 2024b) and the Kildare County Development Plan 2023-2029) to increase the resilience of the electricity network. As such their inclusion is in line with national and local policy.

As detailed within section 16.6.2.1.1 above, and considering contextualisation within national carbon budgets, the emissions resulting from the operational phase of the Project are substantial. However, accounting for the extent of embedded design measures that act to reduce operational emissions (66% reduction in emissions associated with the regulated energy demand), in addition to considering the decarbonisation of the gas network leading to further operational emissions reductions and future net zero emissions in operation, the impact of GHG emissions associated with the regulated energy consumption on the high sensitivity receptor is consistent with Ireland's national legislation and policy, and net zero targets and would result in **not significant minor adverse** effects.

Similarly, the impact of GHG emissions associated with unregulated energy consumption, accounting for the extent of embedded design measures that act to reduce operational emissions (57% reduction in emissions associated with the unregulated energy demand due to the use of gas turbines in place of grid electricity, and renewable energy demand through CPPAs and on-site solar PV), in addition to considering the decarbonisation of the gas network leading to further operational emissions reductions and future net zero emissions in operation, on the high sensitivity receptor is consistent with Ireland's national legislation and policy, and net zero targets and would result in **not significant minor adverse** effects.

16.6.2.3 Mitigation

While the Project already includes extensive embodied carbon mitigation within its design and material procurement commitments (as detailed within section 16.3), the following further mitigation measures should be considered to further reduce energy consumption and resultant emissions:

- While design measures to reduce unregulated energy consumption from the data halls lie within the scope of the tenant during the fit out of the building, the below measures are included for tenant consideration as methods by which such unregulated energy may be reduced:
  - Reduce energy losses from power distribution units by using more efficient units, and look to install those which can also monitor power usage where relevant.
  - Implement efficient air flow management measures to improve cooling efficiency. Examples may include using a hot aisle / cold aisle layout, reducing the number of aisles requiring cooling; and using curtains or panels to avoid cold air from mixing with hot exhaust air.
  - Optimise airflow management within server units to ensure air leakage and recirculation are minimised, and cool air is guided exclusively through the IT equipment.

Waste heat produced by the data centres has the potential to be used as part of a local district heating network providing low carbon heat, avoiding the use of fuels with higher carbon intensities. The development of district heating networks is supported within both national and local policy, which expect data centre developments to aid in such development of heating infrastructure. Given no heat network yet exists in the locality of the site, the Project will ensure it is ready to export heat should demand for such infrastructure grow in the future. A number of the proposed gas turbines will be linked to waste heat boilers, with waste heat pumped via heat exchangers to the perimeter of the site, enabling future nearby developments to connect on and receive heat for a range of uses. The effects of this have not been quantitatively assessed, although it could be concluded that the provision of low / zero carbon heating where delivered, would likely have a beneficial impact by using residual waste heat to heat housing and other local buildings.

16.6.2.4 Residual Impacts

Accounting for the above further mitigation measures, the magnitude of impact from operational phase emissions on the high sensitivity receptor would result in **minor adverse** construction-stage effect which is **not significant** in EIA terms.

16.7 Whole Life Effects

16.7.1 Likely Significant Environmental Effects

16.7.1.1 Magnitude of Impact

The assessment of whole life effects considers emissions resultant from both the construction and operational phases of the Project, these are summarised within Table **16.7**.

Embodied carbon from the construction phase is based on current material emissions intensities, and operational emissions are based on the current natural gas emissions intensity, and as such both do not account for decarbonisation of the construction industry and the gas grid over the Project's lifetime. Therefore, the below-reported whole life GHG impact is likely to present a conservative emissions estimate.

Table 16.7: Project Net GHG Impact

	Emissions (tCO_2e)
Construction phase emissions[1]	13,389,533
Operational phase emissions - regulated	88,351
Operational phase emissions – unregulated	14,933,067
Operational phase emissions – BESS[2]	235,889
Net emissions (lifetime)	28,646,840

[1]As the reduction in embodied carbon as a result of the implementation of the proposed mitigation measures has not been quantitatively assessed at this stage, this value does not account for the likely reductions that will be achieved.
[2]This assumes the worst case BESS scenario, with the fewest avoided emissions.

Net lifetime emissions resulting from the Project are anticipated to decrease by at least 41% when accounting for embedded design measures that reduce Project emissions. Given the planned reduction in embodied carbon as a result of lower carbon material procurement and construction methods has not been quantitatively assessed at this stage, it is likely that the reported 41% decrease in lifetime emissions is conservative and would be greater when accounting for embodied carbon reduction measures.

The reported emissions from the BESS is due to the option to charge the BESS from the on-site gas turbines, which presents a conservative estimate. Under this scenario, the BESS would not be avoiding any emissions by offsetting the use of gas-fired peaking plants (given the source of electricity would be from gas-fired turbines). However, it should be noted that the use of BESS and resultant increased flexibility of the electricity network is promoted within national policy in order ensure the resilience of the grid (Climate Action Plan 2024, National Development Plan 2021-2030, and Electricity and Gas Sector Climate Change Adaptation Plan). Additionally, such emissions are likely to over-estimate emissions arising from electricity generation, given the planned decarbonisation of the gas network has not been accounted for. As such, all lifetime emissions associated with the operational phase of the Project are likely to be reduced in reality, in comparison to those reported.

16.7.1.2 Sensitivity of the Receptor

GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in CO_2e, has therefore been treated as a single receptor of **high sensitivity** (given the consequences of global climate change and the cumulative contributions of all GHG emissions sources).

16.7.1.3 Significance of Effect

The nature and significance of effect has been characterised by contextualising the Project's whole life carbon GHG impacts within Ireland's carbon budget, and with its compliance with Ireland's net zero trajectory, local and national climate-related policy, legislation and guidance.

Carbon budgets that are relevant during both the construction and operational phases of the Project have been considered within Table **16.8**. The phased delivery of the Project has been accounted for when attributing emissions to relevant carbon budgets.

Table 16.8: Net Emissions and Carbon Budgets

Time period	2021-2025	2026-2030	2031-2035	Total*
Ireland carbon budget (tCO2e)	295,000,000	200,000,000	151,000,000	351,000,000
Project GHG impacts (tCO_2e)	2,296	5,920,074	7,575,862	13,498,233
Development emissions as percentage of Ireland Carbon Budget	0.001%	2.96%	5.02%	3.85%

* This is the total during the budget periods, not the total for the Project's assumed lifetime.

Sectoral Emissions Ceilings that are relevant during both the construction and operational phases of the Project have been considered within Table 16.9. The phased delivery of the project has been accounted for when attributing emissions to the relevant Sectoral Emissions Ceilings.

Table 16.9: Net Emissions and Sectoral Emissions Ceilings

Time period	2021-2025	2026-2030	Total[1]
Sectoral Emission Ceiling – commercial built environment (tCO_2e)	7,000,000	5,000,000	12,000,000
Project GHG impacts (tCO_2e)	2,296	5,920,074	5,922,370
Project emissions as percentage of the Sectoral Emission Ceiling – commercial built environment	0.033%	118.4%	49.35%

[1] This is the total during the budget periods, not the total for the Project's assumed lifetime.

Project emissions form a considerable proportion of the national carbon budgets and Sectoral Emissions Ceilings for the commercial built environment. It must be noted that the majority of whole life emissions associated with the Project arise from embodied carbon from the servers. As previously stated within sections 16.2.6 and 16.5.2.2.3, the assessment of server embodied carbon takes a conservative worst-case approach, with final 'as built' emissions dependent on product specification and the reuse, repair or recycling of servers over the lifetime of the Project. Further, while the Climate Action Plan 2024 (Government of Ireland, 2024a) and Ireland's Long-term Strategy on Greenhouse Gas Emissions reductions (Government of Ireland, 2024b) reference targets to reduce embodied carbon in construction materials associated with the industry sector, it is uncertain to what extent the national carbon budgets and Sectoral Emissions Ceilings account for embodied carbon emissions, and as such contextualisation within such budgets and emissions ceilings must be approached with caution.

While the magnitude of whole life emissions associated with the Project are considerable, even including the embedded mitigation, they should be considered within the context of the EU ETS (described within 16.2.2.1), under which a permit will be in place prior to the Project becoming operational. The EU ETS places a cap on GHG emissions that can be emitted by power plants, industry factories and other large energy users. Within the cap, companies receive or buy emission allowances, which may be traded as needed. The cap decreases every year, ensuring that total emissions fall. Over the period 2021-2030 the emissions cap will continue to decrease annually by a factor of 2.2% (European Commission, n.d.).

As a result of this, operational emissions resultant from the Project generated by on site gas generators will be required to reduce in line with ETS reductions. This will likely be enabled by the planned decarbonisation of the GNI gas network, which has a target of achieving a net zero carbon network by 2050; natural gas will be gradually replaced with biomethane and hydrogen (GNI, 2019). Such decarbonisation has not been accounted for within the assessment of emissions within this Climate Change Chapter. In reality, lifetime emissions resultant from the operational phase of the Project are likely to be lower than that reported. A detailed assessment of possible decarbonisation scenarios is provided within the Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR.

Given the ability to register new generation facilities under the EU ETS, there is a presumption that new facilities are anticipated to be constructed, each of which would result in associated embodied carbon emissions. Therefore, emissions associated with the Project's embodied carbon, particularly those associated with the generation infrastructure, may fall under this presumption.

Further, the reported whole life effects are likely to be conservative, given the planned decarbonisation of the gas network, and reduction in embodied carbon associated with materials used in the construction phase are not accounted for quantitatively. It is anticipated that, over the Project's lifetime, the gas used on site will be increasingly comprised of hydrogen (GNI plan to deliver a mix of hydrogen within the gas network up to 20%) and bio-methane in lieu of fossil fuel-based gas, as detailed within the Energy Policy Compliance Report (HDR, 2024a), Appendix 4.9 to this EIAR.

It is also important to note that the majority of construction-stage emissions arise from the servers to be installed within the data centre buildings (approx. 98% of total construction-stage emissions), and have been taken into account in the assessments presented in this chapter. While this is out of the Applicant's control and will be the responsibility of the tenant to reduce where possible, operation in line with the Climate Neutral Data Centre Pact (2023) will require the tenant to prioritise circular economy principles and ensure server equipment will be assessed for reuse, repair or recycling. This would greatly reduce emissions resultant from the construction phase (which includes all server embodied carbon throughout the Project's lifetime), thereby reducing whole life emissions and contribution to carbon budgets.

Taking account both of the previously-detailed mitigation measures in place to reduce both construction- and operational-phase emissions, and the context of the EU ETS and presumption for the construction of new generation facilities, whole life effects of GHG emissions resultant from the Project on the high sensitivity receptor is aligned with Ireland's national legislation and policy, and net zero targets and have been assessed as minor adverse, which is not significant in EIA terms.

16.8 Assessment of Cumulative Effects

As stated within the relevant guidance on assessing GHG emissions (IEMA, 2022), the consideration of cumulative effects for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area would be included. This is because the atmospheric concentration of GHGs and their resulting effect on climate change is affected by all sources and sinks globally, not simply those in close proximity to the Project. All developments that emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Therefore, the effects of GHG emissions from specific cumulative projects should not be individually assessed, as there is no basis for selecting any particular cumulative project that has GHG emissions for assessment over any other.

Consequently, cumulative effects due to other specific local development projects are not individually predicted but are taken into account when considering the impact of the Project by defining the atmospheric mass of GHGs as a **high sensitivity** receptor, in line with relevant guidance.

However, in order for the Project to receive the gas required to power its generators, a high-pressure gas pipeline will be constructed. This has been considered below.

16.8.1 High-pressure Gas Pipeline

In order for the Project to receive a gas supply, to power the on-site gas turbines, a physical connection to the GNI gas network is required. GNI will be responsible for providing the required infrastructure works to construct a new high-pressure gas distribution pipeline to the Project site boundary (on the R409), from the existing GNI Above Ground Installation (AGI) at Glebe West, Co. Kildare. The final, detailed design, consenting and construction of the required infrastructure works will be the responsibility of GNI, the Applicant cannot and will not seek consent for the gas connection. Given the functional interdependence that exists between the Project and the GNI gas connection, the effects of the gas connection on climate change should be considered. The new gas connection will likely comprise a new circa 300 mm diameter high pressure gas pipeline, largely crossing agricultural/open land over a distance of 6.5 km. Emissions associated with the installation of the pipeline will likely largely result from supply chain emissions from the extraction of raw materials and manufacturing of construction materials, alongside the emissions associated with the fuels used by vehicles and plant. No quantitative information (i.e. detailed material quantities) regarding such construction-stage emissions is yet available, which could be used to inform an assessment of construction-stage GHG emissions. As such, a qualitative assessment of the effects of the new gas pipeline on climate change has been undertaken.

Emissions arising from the construction of the gas pipeline are likely to be minimal, given the relatively limited extent of the infrastructure proposed (i.e. carbon associated with the pipeline materials). By way of comparison to the emissions arising from the Project, which are extensive due to the scale of the proposed buildings, plant, and likely server capacity, emissions arising from the gas pipeline are likely to be negligible.

The provision of such a pipeline ensures the supply of gas to the Project, enabling operational emissions reductions through avoiding the use of grid electricity only to power the Project. The gas connection would also enable the Project to benefit from GNI's decarbonisation targets (through the increasing provision of biomethane, abated natural gas, and hydrogen), in turn resulting in the reduction of operational emissions resulting from the Project over its lifetime. Emissions avoided over the Project's lifetime as a result of this (when compared to a scenario where the Project would be powered by grid electricity) will likely outweigh those emissions resulting from the construction of the pipeline, resulting in a payback.

As such, it is likely that the installation of a new gas pipeline by GNI will result in a minor adverse effect during the construction phase, which is not significant.

16.9 Interactions

IEMA guidance (2020) defines an in-combination climate impact as *'when a projected future climate impact (e.g., increase in temperatures) interacts with an effect identified by another topic and exacerbates its impact'*.

The in-combination climate impact assessment has been informed by the potential climatic conditions detailed within future climate models, collated within Climate Analytics' Climate Impact Explorer (Climate Analytics, 2022). Data local to the Project was used to inform the future climate within this assessment (fully detailed within Appendix 16.2).

An initial screening exercise for each environmental topic has been undertaken which identifies impacts reported within the technical chapters making up the EIAR and considers whether projected climate conditions will alter the sensitivity of receptors or magnitude of impact resulting in a change in significance. The significance of any effect has been re-assessed using the standard methodologies for each relevant environment topic.

Consideration has also been given to whether any new effects will arise as a result of the Project under future projected climate conditions.

The assessment of in-combination climate impacts has considered the embedded design in determining whether projected climate change affects effects on sensitive receptors. Should an effect remain significant following the above-described assessment of in-combination climate impacts, further mitigation has been presented where relevant.

The assessment of in-combination effects with climate change is provided below. The initial screening exercise identified the following main areas where there is potential for interactions:

- Chapter 11: Landscape and visual
- Chapter 5: Biodiversity
- Chapter 10: Cultural heritage
- Chapter 7: Water and hydrology
- Chapter 15: Human health

Table **16.10**16-8 identifies the impact that may be affected, the justification, effect and explanation of effect.

Table 16.10: In-combination climate impacts.

Topic	Impact	Justification	Effect	Explanation
Chapter 11: Landscape and Visual	Impact of the Project on the surrounding landscape.	Projected future climate change may impact the success of the proposed landscaping.	Not Significant	Proposed planting has been identified as resilient to projected climate change.
Chapter 5: Biodiversity	Impact of temporary and permanent habitat loss and disturbance during construction of the Project.	Projected future climate change may impact the success of the proposed planting to limit habitat loss.	Not Significant	Proposed planting has been identified as resilient to projected climate change.
Chapter 10: Cultural heritage	Recorded monument (KD019-028----)	Buried archaeological deposits, particularly those that may contain waterlogged deposits (preserved in situ) can be vulnerable to the effects of climate change, including increased cycles of wetting and drying causing changeable ground conditions. Extreme temperatures (both high and low) can have an effect on the soil structure and levels of preservation of organic remains (wood, pollen, charred remains etc.).	Not Significant	Proposed mitigation will provide for a stable ground environment via engineered project design (drainage provisions). Monitoring of ground conditions during operational phase advised.
	Archaeology found during geophysical survey	The removal (preservation by record) of these features during the construction phase will mean that they are no longer vulnerable to climate change.	Not Significant	n/a
Chapter 7: Water and Hydrology	Impact of increased flood risk arising from additional surface water runoff during operation of the Project.	The projected future increase in precipitation may result in increased flood risk.	Not Significant	The drainage design accounts for future climate change by ensuring it is able to accommodate future surface water pressures associated with climate change.
Chapter 15: Human Health	Impact of climate change on the health of Project users during its operation.	Increasing temperatures may impact those using the site during its operation.	Not Significant	The human health assessment scopes in climate change within its operational phase assessment, as a determinant of health.

16.10 Summary of Effects

The potential impact of GHG emissions due to the Project, resulting in an effect on the global atmospheric GHG concentration that contributes to climate change, has been assessed and reported in this chapter.

The construction-stage emissions total 13,389,533 tCO_2e. This can be divided into those associated with the applicant-controlled elements (211,936 tCO_2e) and the tenant server fit-out (13,177,597 tCO_2e). The Applicant has committed to embodied carbon emissions reductions through the use of recycled and re-used materials: the design team will seek to source goods, services, or works with a reduced environmental impact throughout their lifecycle. In this regard, tender requests will set out the policies and targets as set in the Resource and Waste Management Plan (RWMP) (HDR, 2023) which must be achieved. Such mitigation is consistent with national targets to promote the use of lower carbon alternatives in construction as detailed within the Climate Action Plan 2024 (Government of Ireland, 2024a) and Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction (Government of Ireland, 2024b).

Within the context of Ireland's carbon budgets, emissions associated with the applicant-controlled elements of the Project would lead to a total impact of 211,936 tCO_2e by 2035, the end of the final published carbon budget period, and account for 0.06% of carbon budget emissions. Within the context of the Sectoral Emissions Ceilings for the commercial built environment, emissions associated with the applicant-controlled elements of the Project would lead to a total impact of 142,056 tCO_2e by 2030, the end of the published Sectoral Emissions Ceilings period, and account for 1.18% of the Sectoral Emissions Ceiling. Given the inclusion of the above-described emissions reduction measures, it is considered the Project is consistent with Ireland's national legislation and policy, and net zero targets and as such has been assessed to have a **minor adverse** effect which is **not significant** in EIA terms.

Within the context of Ireland's carbon budgets, emissions associated with the tenant-controlled elements of the Project would lead to a total impact of 11,150,274 tCO_2e by 2035, the end of the final published carbon budget period, and account for 3.18% of carbon budget emissions. Within the context of the Sectoral Emissions Ceilings for the commercial built environment, emissions associated with the tenant-controlled elements of the Project would lead to a total impact of 5,068,306 tCO_2e by 2030, the end of the published Sectoral Emissions Ceilings period, and account for 42.24% of the Sectoral Emissions Ceiling. In the absence of embedded mitigation, tenant-controlled elements of the Proposed Development have been judged to result in a **significant moderat**e to **major adverse effect**.

The operational phase of the Project would result in emissions associated with the regulated and unregulated energy demand of 1,767 tCO_2e and 298,661 tCO_2e per annum, respectively. The embedded mitigation included within the Project's design (i.e. use of gas turbines, 30% energy demand to be met from renewable sources, and energy efficiency measures reducing regulated energy demand) enables the Project's operational emissions arising from regulated and unregulated demand to be reduced by 66% and 57%, respectively.

Operational emissions associated with the BESS are anticipated to lie between 235,889 tCO_2e and -530,002 tCO_2e over the lifetime of the Project. The true emissions resultant from the BESS will be dependent on the energy sources used to charge the system, but will likely lie within this range.

In accordance with the Climate Action Plan 2024 guidance on electricity demand management, the Project makes provision for on-site renewable energy production and on-site energy storage. CPPAs will also enable sustainable sources of energy generation to serve the development. The remaining energy requirement shall be met by gas, a transitionary fuel, from the national gas grid. In addition, the proposed data centre will have the flexibility to export energy to the national grid if and when required.

Within the context of Ireland's carbon budgets, emissions associated with the regulated energy demand would lead to a total impact of 12,369 tCO_2e by 2035, the end of the final published carbon budget period, and account for 0.004% of carbon budget emissions. Within the context of the Sectoral Emissions Ceilings for the commercial built environment, emissions associated with the regulated energy demand would lead to a total impact of 4,123 tCO_2e by 2030, the end of the published Sectoral Emissions Ceilings period, and account for 0.08% of the Sectoral Emissions Ceiling. Given the inclusion of the above-described emissions reduction measures, it is considered the Project is consistent with Ireland's national legislation and policy, and net zero targets and as such would result in a **not significant minor adverse** effect.

Within the context of Ireland's carbon budgets, emissions associated with the unregulated energy demand would lead to a total impact of 2,090,629 tCO_2e by 2035, the end of the final published carbon budget period, and account for 0.60% of carbon budget emissions. Within the context of the Sectoral Emissions Ceilings for the commercial built environment, emissions associated with the unregulated energy demand would lead to a total impact of 696,876 tCO_2e by 2030, the end of the published Sectoral Emissions Ceilings period, and account for 13.94% of the Sectoral Emissions Ceiling. Given the inclusion of the above-described emissions reduction measures, it is considered the Project is consistent with Ireland's national legislation and policy, and net zero targets and as such would result in a **not significant minor adverse** effect.

Over the assumed lifetime of the Project, it will result in a total of 28,646,840 tCO_2e emissions. Within the context of the Ireland carbon budgets the net emissions expended as a result of the Project total 13,498,233 tCO2e, accounting for 3.85% of carbon budget emissions. Within the context of the Sectoral Emissions Ceilings for the commercial built environment, emissions associated with the regulated energy demand would lead to a total impact of 5,922,370 tCO_2e by 2030, the end of the published Sectoral Emissions Ceilings period, and account for 49.35% of the Sectoral Emissions Ceiling. Given the inclusion of the above-described emissions reduction measures, it is considered the Project is consistent with Ireland's national legislation and policy, and net zero targets and as such the impact of whole-life GHG emissions from the Proposed Development on the high sensitivity receptor is considered to meet the definition of a **minor adverse effect** that is **not significant**.

Of the nine potential risks to the Project as a result of climate change, two (high temperatures and extreme weather events) were considered to have a potentially significant effect. Owing to the good practice design measures that will be incorporated into the Project, these effects were determined to be negligible and not significant.

REFERENCES

ABB (n.d.) Environmental Product Declaration: AC generator type AMG 0900. [Online] https://library.e.abb.com/public/e87da12604e15ba4c125784f00380043/EPD_AMG0900_EN_RevB.pdf [Accessed May 2023]

ABB (2003) Environmental Product Declaration: Power transformer TrafoStar 500 MVA. [Online] https://library.e.abb.com/public/566748ad75116903c1256d630042f1af/ProductdeclarationStarTrafo500.pdf. [accessed 31/10/2022]

Climate Analytics, 2022. Climate Impact Explorer. [Online] https://climate-impact-explorer.climateanalytics.org/.

Climate Neutral Data Centre Pact (2023) Climate Neutral Data Centre Pact - Self Regulatory Initiative. Available at: https://www.climateneutraldatacentre.net/wp-content/uploads/2023/02/221213_Self-Regulatory-Initiative.pdf

DESNZ and Defra (2023) UK Government GHG Conversion Factors for Company Reporting. [Online] https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting [Accessed October 2023].

Environmental Protection Agency (2022). National Waste Statistics: Summary Report for 2020. [Online] https://www.epa.ie/publications/monitoring--assessment/waste/national-waste-statistics/EPA_National_Waste_Stats_Summary_Report_2020.pdf

Environmental Protection Agency (2023) Ireland's Climate Change Assessment, Volume 3: Being Prepared for Ireland's Future Climate. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/ICCA_Volume-3.pdf

E.Emilsson and L.Dahllöf (2019) Lithium-Ion Vehicle Battery Production: Status 2019 on Energy Use, CO2 Emissions, Use of Metals, Products Environmental Footprint, and Recycling. IVL Swedish Environmental Research Institute Ltd. Report number C 444

European Commission (n.d.). EU Emissions Trading System (EU ETS): Emissions cap and allowances. [Online] https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/emissions-cap-and-allowances_en

European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment.

Gas Networks Ireland (2019). Network Development Plan 2019. [Online] https://www.gasnetworks.ie/docs/corporate/gas-regulation/gni-ndp-2019.pdf

Government of Ireland (2014). National Policy Position on Climate Action and Low Carbon Development. Available at: https://www.gov.ie/en/publication/6f393-national-climate-policy-position/

Government of Ireland (2018) National Adaptation Framework: Planning for a Climate Resilient Ireland Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/76430/d35c3843-29c7-419a-b48b-ad5db2bfb118.pdf#page=null

Government of Ireland (2020) Sectoral Adaptation Planning. Available at https://www.gov.ie/en/collection/51df3-sectoral-adaptation-planning/

Government of Ireland (2021). National Development Plan 2021-2030. [Online] https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/

Government of Ireland (2022). Sectoral Emissions Ceilings. [Online] https://www.gov.ie/en/publication/76864-sectoral-emissions-ceilings/

Government of Ireland (2022). Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy, July 2022. [Online] https://enterprise.gov.ie/en/publications/publication-files/government-statement-on-the-role-of-data-centres-in-irelands-enterprise-strategy.pdf

Government of Ireland (2023). Climate Action Plan 2023: Changing Ireland for the Better. [Online] https://www.gov.ie/pdf/?file=https://assets.gov.ie/270956/94a5673c-163c-476a-921f-7399cdf3c8f5.pdf#page=null

Government of Ireland (2024a). Climate Action Plan 2024. [Online] https://www.gov.ie/pdf/?file=https://assets.gov.ie/296414/7a06bae1-4c1c-4cdc-ac36-978e3119362e.pdf#page=null

Government of Ireland (2024b) Ireland's Long-term Strategy on Greenhouse Gas Emissions Reductions. [Online] https://www.gov.ie/pdf/?file=https://assets.gov.ie/255743/35b2ae1b-effe-48af-aaf3-156dc5b01ee6.pdf#page=null

HDR (2023) Resource and Waste Management Plan

HDR (2024a) Energy Policy Compliance Report

HDR (2024b)) Energy Efficiency and Climate Change Adaptation Statement

IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation [Online] available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020

IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition. [Online] Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions :accessed: 6/4/2022

Irish Statute Book (ISB) (2021). Climate Action and Low Carbon Development (Amendment) Act 2021. [Online] https://www.irishstatutebook.ie/eli/2021/act/32/enacted/en/html

Kildare County Council (2021). Naas Local Area Plan 2021-2027. [Online] https://kildarecoco.ie/AllServices/Planning/LocalAreaPlans/CurrentLocalAreaPlans/NaasLocalAreaPlan2021-2027/Naas%20Local%20Area%20Plan%2020212027.pdf

Kildare County Council (2023). Kildare County Development Plan 2023-2029. [Online] https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/

NREL (2012). Hsu, D.D., O'Donoughue, P., Fthenakis, V., Heath, G.A., Kim, H.C., Sawyer, P., Choi, J.K. and Turney, D.E., 2012. Life cycle greenhouse gas emissions of crystalline silicon photovoltaic electricity generation: systematic review and harmonization. *Journal of Industrial Ecology*, *16*, pp.S122-S135.

Pell and Lindsay (2022) Comparative Life Cycle Assessment Study of Solid State and Lithium-Ion Batteries for Electric Vehicle Application in Europe. [Online] https://www.transportenvironment.org/wp-content/uploads/2022/07/2022_07_LCA_research_by_Minviro.pdf [Accessed May 2023]

RICS (2012) RICS Professional Information, UK Methodology to calculate embodied carbon of materials [Online] https://www.igbc.ie/wp-content/uploads/2015/02/RICS-Methodology_embodied_carbon_materials_final-1st-edition.pdf [Accessed July 2023]

SEAI (2023) Conversion Factors [Online] https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/ [Accessed November 2023]

Sphera (2021) LCA of Dell Servers R6505, R7505, R6525, R7525. [Online] https://www.delltechnologies.com/asset/en-us/products/servers/technical-support/full-lca-of-dell-severs-r6515-r7515-r6525-r7525.pdf [Accessed May 2023]

WRI and WBCSD (2004) The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard. Revised edition, Washington and Geneva: WRI and WBCSD.

Yudhistira (2021) Comparative life cycle assessment of different lithium-ion battery chemistries and lead-acid batteries for grid storage application. [Online] https://www.diva-portal.org/smash/get/diva2:1587593/FULLTEXT01.pdf [Accessed May 2023]

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17 CUMULATIVE EFFECTS AND INTERACTIONS

17.1 Introduction

The EIA Directive and its transposing Regulations requires that in addition to assessing impacts on human beings, fauna, flora, soil, water, air, climate, landscape, material assets and cultural heritage, the interrelationship between these factors in-combination must be taken into account as part of the environmental impact assessment process.

EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) provides a checklist for the assessment of cumulative effects, it should be considered whether the EIAR has:

- *'described cumulative effects?*
- *considered cumulative effects due to cumulation of effects with those of other projects that are existing or are approved but not yet built or operational?'*

The assessment presented in this EIAR Chapter draws on the assessment of impacts provided in Chapters of this EIAR, and information in the public domain relating to other known developments within the Study Area.

This EIAR is provided in accordance with the EU EIA Directive 2011/92/EU1 and EIA Directive 2014/52/EU and the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, in order to inform the consideration of the Application and provide the planning authority with the environmental information that must be taken into account when determining the Application.

The requirement for cumulative and combined impact assessments is stated in the relevant European Directive and domestic legislation, as detailed below:

- European Directive 2014/52/EU on the assessments of effects of certain public and private projects on the environment requires an assessment of: "the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project".
- S.I. No. 296/2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 – "the cumulation of effects with other existing or approved developments, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources", and (ii) the description of the likely significant effects on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and longterm, permanent and temporary, positive and negative effects of the proposed development, taking into account the environmental protection objectives established at European Union level or by a Member State of the European Union which are relevant to the proposed development.

17.2 Interaction and In-combination Effects

Table 17.2 (at end of this chapter) is a matrix table indicating the significant inter-relationships that are likely to occur between the various environmental disciplines with regard to the proposed development. Where a cross exists in a box in the table, this indicates that a relationship exists between the two environmental areas. The purpose of the table is to allow interaction between various disciplines to be recognised, although the level of interaction and in-combination effect will vary in each case. It is assumed in presenting this table that an environmental discipline has a potential inter-relationship both during the construction and operational phases of the development. An assessment of expected interaction and in-combination effect is given in Table 17.1.

Table 17.1: Summary of Interaction and In-combination Effects

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effects
Biodiversity	Landscape and Visual	Existing external boundary trees and hedgerows will be retained, protected, and augmented with additional native tree and hedge planting where necessary. Around the eastern boundary of the site to the M7, there will be a 30m wide landscape buffer provided. On other boundaries a minimum 10m buffer will be provided, which will allow for earth mounding and native, screen woodland planting to be provided to help integrate the development into the landscape, mitigate visual effects and increase site biodiversity. Only those trees which require removal to facilitate the development will be replaced. All other trees which can be maintained within the Project shall be retained and protected from damage in accordance with BS 5837:2012 (Trees in relation to design, demolition, and construction). It is important that a landscape management plan is prepared to ensure the healthy establishment of all trees within the Project and the replacement of any dead or dying plants in subsequent year
	Land andSoils	Earthworks by heavy plant in proximity to surface waters carries an inherent risk of pollution of watercourses. There is a risk involved with any construction activity in proximity to surface waters that a pollution incident might arise and result in spills or leaks of polluting substances.
	Water and Hydrology	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. If allowed to enter surface watercourses this run off can give rise to high suspended solids and detrimental impacts.
	Noise and Vibration	Disturbance from noise can impact on wildlife depending on the host environment. The noise consultant has liaised with the ecology team during the EIA process to ensure they were aware of the noise impact assessment process including sources of noise during construction and operation and predicted impacts.
Lands andSoils	Water and Hydrology	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. In addition to their contribution to sediment release soil erosion, removal of vegetation cover, soil compaction (caused by the bearing weight of heavy machinery) and increased hard standing can alter preferential drainage paths and ultimately change the hydrological regime of a watercourse by changing the timing and magnitude of flows entering it thus exacerbating sediment movement. In the absence of mitigation these processes have the potential to have permanent effects on associated watercourses downstream of the application site having a knock-on effect on water quality.
	Biodiversity	Earthworks by heavy plant in proximity to surface waters carries an inherent risk of pollution of watercourses. There is a risk involved with any construction activity in proximity to surface waters that a pollution incident might arise and result in spills or leaks of polluting substances.
	Material Assets – Built Services	Excavation of soils and reduction of levels on site can lead to direct impact on utilities above and below ground. Subject to mitigation measures including close liaison with utility companies in advance of construction no significant effects are predicted.
	Air Quality	Earthworks and disturbance of soils has potential to impact upon air quality. As the risk of dust impact on receptors from soiling has been

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effects
		identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures.
	Noise and Vibration	Machinery used in earthworks and construction could increase noise levels. No significant noise effects are predicted with implementation of mitigation measures. Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.
Water and Hydrology	Land and Soils	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. In addition to their contribution to sediment release soil erosion, removal of vegetation cover, soil compaction (caused by the bearing weight of heavy machinery) and increased hard standing can alter preferential drainage paths and ultimately change the hydrological regime of a watercourse by changing the timing and magnitude of flows entering it thus exacerbating sediment movement. In the absence of mitigation these processes have the potential to have permanent effects on associated watercourses downstream of the application site having a knock-on effect on water quality.
	Biodiversity	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality.
Air Quality	Land and Soils	Earthworks and disturbance of soils has potential to impact upon air quality. As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures.
	Population, Human Health	Construction of the proposed development has the potential to influence human health from nuisance dust and from changes to local air quality associated with construction traffic. However, the human health effects from changes to air quality are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health..
	Water and Hydrology	As outlined in the Site Specific Flood Risk Assessment the Project is located wholly within Flood Zone C where the probability of flooding from the Bluebell stream is less than 0.1% (1 in 1000 years). This means that there will be no risk of the site being subjected to flooding during the construction of the development and the risk of impacts of suspended solids and other pollutants from site run-off will be from overland flow generated from rainfall falling on the site and not from flood waters from the Bluebell Stream (Liffey_100 river water body).
Noise and Vibration	Landscape and Visual	Noise has the potential to interact with LVIA due to the creation of noise attenuation measures. Temporary construction noise barriers will be used to achieve attenuation of noise levels between ground based construction plant and the nearest noise-sensitive properties.There is a potential relationship with LVIA, as the visual impact of acoustic barriers bears consideration.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effects
	Population, Human Health	Potential human health effects from changes in noise exposure would be limited to increased annoyance from a reduction in local amenity during the daytime. This would be a direct and local impact resulting from on-site construction activities and associated transport movements. Due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly, but is not of a magnitude, exposure, duration or timing to quantify any change in baseline health.
	Biodiversity	Disturbance from noise can impact on wildlife depending on the host environment. The noise consultant has liaised with the ecology team during the EIA process to ensure they were aware of the noise impact assessment process including sources of noise during construction and operation and predicted impacts. Overall predictions are that there will be no significant noise impact generated during construction or operation when ecological features are assessed.
	Land and Soils	Machinery used in earthworks and construction could increase noise levels. No significant noise effects are predicted with implementation of mitigation measures. Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.
	Traffic and Transportation	Construction traffic noise will be controlled through management of parking, loading and traffic arrangements. These will be managed by the contractor to reduce traffic volumes and in and around the site prevent congestion.
Cultural Heritage	Landscape and Visual	Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The proposed development will introduce a new type of development within the local area.
	Climate	Buried archaeological deposits, particularly those that may contain waterlogged deposits (preserved in situ) can be vulnerable to the effects of climate change, including increased cycles of wetting and drying causing changeable ground conditions. Extreme temperatures (both high and low) can have an effect on the soil structure and levels of preservation of organic remains (wood, pollen, charred remains etc.). Proposed mitigation will provide for a stable ground environment via engineered project design (drainage provisions). Monitoring of ground conditions during operational phase advised.
Landscape and Visual	Land and Soils	The quality of the excavated material will dictate if it can be reused on site in landscaped areas. The material of lower quality that cannot be adopted into the proposed development and used on site as landscape fill material will need to be reused or disposed off-site. There are a number of viable options that will be considered, all with the aim of ensuring no impact on the receiving environment. The proposed development will result in a surplus of excavated material, which may contain contaminants. Any contaminated material will be exported to an approved licensed waste facility.
	Biodiversity	Only those trees which require removal to facilitate the development will be replaced. All other trees which can be maintained within the Project shall be retained and protected from damage in accordance with BS 5837:2012 (Trees in relation to design, demolition, and construction).

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effects
		It is important that a landscape management plan is prepared to ensure the healthy establishment of all trees within the Project and the replacement of any dead or dying plants in subsequent year
	Noise and Vibration	Noise has the potential to interact with LVIA due to the creation of noise attenuation measures. Temporary construction noise barriers will be used to achieve attenuation of noise levels between ground based construction plant and the nearest noise-sensitive properties.
	Cultural Heritage	Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The proposed development will introduce a new type of development within the local area. The introduction of the proposed development will not however impact upon any inter-relationships between monuments located within the local landscape.
	Material Assets – Built Services	Excavation of soils and reduction of levels on site can lead to direct impact on utilities above and below ground. Subject to mitigation measures including close liaison with utility companies in advance of construction no significant effects are predicted.
	Climate	Impact of the Project on the surrounding landscape. Proposed planting has been identified as resilient to projected climate change.
Traffic and Transportation	Air Quality	Potential air quality effects during the construction phase can occur due to dust emissions and from construction traffic movements, with the pollutants of most concern being nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$).
	Human Health	Construction works and constructed-related vehicles and traffic have the potential to disrupt local vehicle traffic (private and public transport) as well as some sustainable travel (bus routes) and active travel (pedestrians and cyclists). This may include health-related journey times, community severance or road safety. There is also potential for increases in vehicle movements during the operational phase, relating to the movement of materials and people to and from the Project site, which may cause delays in local vehicle traffic and health-related journey times and disruptions in active travel.
Material Assets – Built Services	Landscape and Visual	The alteration to existing utilities on the site has potential for visual impact. As far as practicable utilities will be underground and not visible. No significant landscape or visual effects are predicted. New landscape planting will have a beneficial landscape effect.
	Land and Soils	Excavation of soils and reduction of levels on site can lead to direct impact on utilities above and below ground. Subject to mitigation measures including close liaison with utility companies in advance of construction no significant effects are predicted.
Population and Human Health	Noise and Vibration	Potential human health effects from changes in noise exposure would be limited to increased annoyance from a reduction in local amenity during the daytime. This would be a direct and local impact resulting from on-site construction activities and associated transport movements. Due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly, but is not of a

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effects
		magnitude, exposure, duration or timing to quantify any change in baseline health. The magnitude is therefore considered to be negligible.
	Traffic and Transportation	An increase in HGVs and vehicle movements has the potential to change the transport nature (composition and flow rate on local roads). Depending on the magnitude of change, there is the potential for an increased risk of accident and injury; feelings of isolation from increased severance; and loss of amenity from increased severance or transport disruption. Any change to transport nature and flow rate would be a direct and local impact where due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in transport nature and flow rate are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly but is not of an order of magnitude sufficient to quantify any change in baseline health outcome. The magnitude is therefore considered to be negligible.
	Air Quality	Construction of the proposed development has the potential to influence human health from nuisance dust and from changes to local air quality associated with construction traffic. However, the human health effects from changes to air quality are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.
Climate	Landscape and Visual	Impact of the Project on the surrounding landscape. Proposed planting has been identified as resilient to projected climate change.
	Biodiversity	Impact of temporary and permanent habitat loss and disturbance during construction of the Project. Proposed planting has been identified as resilient to projected climate change.
	Cultural heritage	Buried archaeological deposits, particularly those that may contain waterlogged deposits (preserved in situ) can be vulnerable to the effects of climate change, including increased cycles of wetting and drying causing changeable ground conditions. Extreme temperatures (both high and low) can have an effect on the soil structure and levels of preservation of organic remains (wood, pollen, charred remains etc.). Proposed mitigation will provide for a stable ground environment via engineered project design (drainage provisions). Monitoring of ground conditions during operational phase advised.
	Human Health	Impact of climate change on the health of Project users during its operation. Increasing temperatures may impact those using the site during its operation. The human health assessment scopes in climate change within its operational phase assessment, as a determinant of health.

17.3 Cumulative Effects

17.3.1 Introduction

Cumulative effects are those that accrue over time and space from a number of development activities – the impact of the Project is considered in conjunction with the potential impacts from other projects or activities which are both reasonably foreseeable in terms of delivery (i.e. have planning consent or relevant applications which have been submitted and are in the planning system) and are located within a realistic geographical scope where environmental impacts could act together with the Project to create a more significant overall effect.

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. A number of planning applications (permitted, submitted but undetermined and under construction) have been identified within the locale of the Project site. While a range of applications have been submitted or approved within proximity to the Project, namely within the Osberstown Business Park and M7 Business Park. It is not considered that such proposals, which will take place within areas of existing development would have potential to act cumulatively with the Project.

17.3.1.1 GNI Infrastructure Upgrade

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

17.3.1.2 Biodiversity

As identified in Chapter 1 of the EIAR (Section 1.4.4), the Project will require a physical connection to the gas network to supply the on-site gas turbines. The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2.

The construction works for the for the gas pipeline will likely comprise of a 14m working corridor within areas of agricultural land, in addition to works within the verge of public roads and watercourse crossings at three watercourses and a large number of minor drainage ditches and field drains. The method of constructing this crossing (and other watercourses along the likely route) will typically consist of either open excavation (from smaller watercourses and ditches) or directional drilling / pipe jacking as appropriate.

On this basis it is considered that the proposed gas pipeline connection to the project will have no potential to give rise to any cumulative effects upon ecological receptors when considered alongside the Project.

Given the nature of the impacts upon biodiversity which are predicted to arise in association with the Project, in addition to the mitigation measures which are set out in Section 5.5 below, it is not envisaged that the Project would have potential to give rise to any further potential significant effects when considered cumulatively with the nearby assessed projects.

17.3.1.3 Lands and Soils

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

A desktop review of the proposed high pressure gas pipeline route was undertaken to assess potential impacts on lands and soils along the most likely route.

The works associated with the proposed new pipeline involve the excavation of a trench to install the new pipe, circa 1.2m deep for approximately 10.5km through agricultural lands, road crossings and along footpaths and verges. The excavated materials will be removed from site and disposed of at appropriately licenced waste facilities. Additionally, works through agricultural lands will also require excavation of topsoils and construction of temporary haul roads and hardcore working platforms in a corridor circa 14m in width along the route of the pipe. The topsoils will be stockpiled and reinstated along the route as the works progress, following removal of the temporary haul roads and working areas. The impact of these works on Lands and Soils will be Slightly Negative, localised to the works short term and Temporary in nature and are reversible with reinstatement works.

In conclusion, much of the likely pipeline route will follow existing gas pipelines and other services. There are no predicted negative significant cumulative effects on Lands and Soils as a result of these associated projects.

17.3.1.4 Water and Hydrology

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. Table 7.12 in EIAR Chapter 7 provides an assessment of the potential cumulative effects of these developments (set out in Section 1.4 of Chapter 1)with the Project by establishing their location, hydrologically connective to the Project site and the assessments undertaken for each individual application. Based on the assessment in Table 7.12 it can be concluded that there is no potential for cumulative effects with the Project and these developments.

The likely route of the new pipeline will require crossing a number of watercourses within the Liffey_050, Liffey_100 and Liffey_110 river water bodies, including the Grand Canal, Naas River, Bluebell Stream and numerous land drainage ditches. The method of constructing this crossing (and other watercourses along the likely route) will typically consist of either open excavation (from smaller watercourses and ditches) or directional drilling / pipe jacking as appropriate. GNI will determine the best crossing method for all watercourses as part of their environmental assessment. The final design will be subject to consultations with Waterways Ireland / Inland Fisheries Ireland and Kildare Co. Council Water Services and Environment departments.

GNI will use the standard construction corridor for pipelines on agricultural lands which will usually require a working width that will be fenced off and stripped of topsoil to allow the installation of the pipeline in a trench. The excavated subsoil will be stored separately from the topsoil in the working width to ensure there is no cross contamination.

An GNI Infrastructure Upgrade Outline Report has been used to assess the potential for cumulative effects with the Project.

In terms of water and hydrology, there is the potential for elevated suspended solids in the surface water run-off from the working areas, however pre-construction drainage and a dedicated haul route will ensure that the run off generated will be reduced to a minimum by ensuring on rainfall incident on the working area will have the potential to generate run-off. In addition the best practice measures for pipeline construction as outlined in the CIRIA guidance document C648, Control of water pollution from linear construction projects will be followed by the GNI contractors who will be contractually required to ensure pollution form the working area and the water course crossings do not impact on the water bodies and water courses traversed by the pipeline.

On the basis of the likely route of the pipeline and the minor nature of the water courses traversed, including the selection of the most appropriate crossing technique in consultation with the relevant statutory authorities and the application on best practice it is reasonable to assume that the cumulative effects of the main Project with the GNI gas transmission line connection will not be significant and will not compromise the environmental objectives of the water bodies affected.

17.3.1.5 Air Quality

During construction, dust emissions to air from other committed developments and cumulative emissions sources in the area around the site are not close enough or significant enough to generate cumulative impacts should they occur at the same time, aside from the GNI gas connections project.

In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments, together with those generated by the planned development. Therefore, the potential impacts of the Project cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned future development.

After an assessment of potential adverse effects produced by the development, it was concluded that there would be no significant adverse air quality effects for both human and ecological receptors which cumulatively would not hinder the developments proceeding (the Project and the GNI gas connection).

Overall, the effects of the GNI gas connection on air quality are considered to be not significant after the implementation of mitigation measures. For example, as detailed in the IAQM guidance, there may be a provision to hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

17.3.1.6 Noise and Vibration

An GNI Infrastructure Upgrade Outline Report has been used to assess the potential for cumulative effects with the Project.

The construction works associated with the proposed gas pipeline will take place during Phase 1 of the construction programme for the Project, as the gas connection will be required in order to bring Data Centres online.

The cumulative construction noise impact of the Project construction programme and the GNI Gas Connection has been reviewed, considering the concurrent Phase 1 construction and Gas Connection construction at the relevant noise-sensitive receptors.

As noted in the GNI Infrastructure Upgrade Outline Report, a large portion of the construction works for the GNI Gas Connection will likely take place across agricultural lands. Works will likely involve a construction corridor of 14m width, centred on the pipeline.

Access to the works on agricultural lands will typically be provided at public road crossing locations. It is not expected that construction traffic for the Gas Connection will be significant in the context of existing traffic flows (see Section 9.5.1.4).

The predicted sound pressure levels, assuming operation of single items of plant and equipment, are at least 60 dBA in all phases/stages of construction. The combination of multiple construction noise sources and concurrent construction activities, stages and phases is likely to give rise to an increase of 5 dB at receptors, therefore exceeding the criterion level of 65 dBA at time during construction.

Significant cumulative construction effects could arise from combinations of noise sources throughout the construction programmes, if works take place concurrently, however these are expected to impact receptors in the short-term only. Combined construction noise effects should be taken into consideration when developing the construction noise management plan for both the Project and the GNI Gas Connection, with mitigation employed as necessary, as discussed in Section 9.5.5 Mitigation.

17.3.1.7 Cultural Heritage

A desktop review of the likely high pressure gas pipeline route was undertaken to assess potential impacts on recorded archaeology and built heritage. Much of the proposed pipeline route will follow existing gas and other service. All existing services will have a zone of disturbance associated with previous construction works in the areas immediately adjacent to the services. However, any undisturbed areas across the proposed pipeline working area that will be impacted by the proposed pipeline construction have the potential to contain previously unrecorded archaeology sub-surface and as such will require archaeological mitigation. The proposed pipeline route as currently understood will run close to a small number of recorded archaeological and built heritage sites, including Hilltop enclosure (KD024-271----) at Tipperkevin. Jigginstown House and associated features (KD019-033001- (Protected Structure NS19-058), KD019-033002-, KD019-033003-, KD019-033004-, KD019-033005-) and Jigginstown Bridge (Protected Structure NS19-060, NIAH11901906). Careful design and micro-routing of the proposed pipeline will ensure that these sites are not directly impacted.

There is no predicted negative significant cumulative effects on cultural heritage as a result of these two associated projects.

17.3.1.8 Landscape and Visual

The methodology for assessment of cumulative impacts has been derived from Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

The significance of any identified cumulative landscape and visual effect has been assessed as per the main LVIA methodology. These categories have been based on the same combination of receptor sensitivity and predicted magnitude of impact in order to identify the residual significance of effects.

As identified in Chapter 1 of the EIAR (Section 1.4), there are a number of other projects which have been identified for consideration in terms of their potential for cumulative effects. These projects with which the Project may possibly have cumulative effects have been considered in order to identify the likely cumulative landscape and visual effects, if any.

These projects, that include Solar Farms, Battery Storage projects and a Data Centre, has established that the nearest project to the Project site is a solar farm located approx. 5km. At these large distances and with substantial buildings and strong vegetation located between the Project sites there is no potential for any cumulative landscape and visual effects. The potential cumulative projects are all to remote from the Project to have any potential for cumulative landscape and visual effects.

Overall, when potential construction and operational stage cumulative landscape and visual effects are considered for the Project in combination with permitted and planned projects they will not result in any significant cumulative landscape and visual effects due to a combination of separation distance, intervening development and the nature and setting of the proposals. Construction stage activities involve an increase in construction traffic for all cumulative projects. HGV traffic is frequent feature of this landscape, and the existing wider Dublin road network consists of very busy roads with low potential for significant cumulative visual impacts as a result. The operational stage activities as part of the Project are sufficiently separated from any permitted or planned projects in the area surrounding the Project to avoid potential cumulative effects while permitted or planned developments within the surrounding area or so similar in character that they are difficult to discern from the existing busy context.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report indicates that the most likely route for the new high-pressure gas distribution pipeline will be from the location of the existing GNI above ground installations (AGIs) at Glebe West and Naas Town to the Project site following a combination of the existing road network and the route of existing utilities. A large portion of the gas pipeline will likely cross agricultural / open lands will likely require a construction corridor for the works that consists of a 14m wide strip that is normally reinstated to the existing land use. Once constructed and with reinstatement complete a pipeline of this nature will have no cumulative landscape and visual effects as it is below ground. The construction stage will result in activities that will be noticeable but temporary. Construction traffic while visible will blend with existing traffic on the busy road network found in the local landscape with no significant effect. Pipeline work along roads is a common feature in this landscape and temporary and transient in nature and no significant cumulative landscape and visual effects are predicted. Pipeline works on agricultural lands will result in temporary disturbance but will all be reinstated. Overall, when the potential for cumulative landscape and visual impacts are considered there will be no significant cumulative effects for the Project and the GNI Gas Connection.

17.3.1.9 Traffic and Transportation

Overall, when potential construction and operational stage cumulative landscape and visual effects are considered for the Project in combination with permitted and planned projects they will not result in any significant cumulative landscape and visual effects due to a combination of separation distance, intervening development and the nature and setting of the proposals. Construction stage activities involve an increase in construction traffic for all cumulative projects. HGV traffic is frequent feature of this landscape, and the existing wider Dublin road network consists of very busy roads with low potential for significant cumulative visual impacts as a result. The operational stage activities as part of the Project are sufficiently separated from any permitted or planned projects in the area surrounding the Project to avoid potential cumulative effects while permitted or planned developments within the surrounding area or so similar in character that they are difficult to discern from the existing busy context

Many of these projects are associated with the commercial and industrial complexes located to the north and south of the Project site. It is not likely that the Project will result in any negative significant cumulative effects on cultural heritage in combination with these external plans/projects.

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2.

The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

In terms of the construction impacts of the proposed gas pipeline.

a. Works within the agricultural land will not result in any significant impacts upon traffic progression on the sounding road network. Access to the works on the agricultural lands will be taken from the public road network in the general location of where the pipeline will cross the public road. During the construction phase a Traffic Management Plan will be agreed with the Council's Roads Department.
b. Works within / along public roads are likely to result in a short term low impact upon existing traffic progression, prior to commencement of the construction phase Traffic Management Plans will be agreed with the Council's Roads Department to identify traffic management proposals including safety and signage requirements.
c. Construction period is likely to be 7-12 months, however, a considerable portion of the construction period will be working within existing agricultural lands, which will not result in any significant impact upon existing traffic progression.

17.3.1.10 Material Assets – Built Services

The GNI Infrastructure Upgrade Outline Report notes that the proposed works will likely include the construction of a new circa 300mm dia. high pressure gas pipeline which is likely to follow the existing pipeline route from the Glebe West AGI to the Naas Town AGI. From there it will most likely closely follow the existing low-pressure distribution network around the Southern Link Road to the junction with the R445 Newbridge Road, cross the Grand canal and follow the existing public foul sewer network wayleave across agricultural lands in a north-westerly direction towards the Project site.

A desktop review of the likely pipeline route was undertaken to assess potential impacts on existing built services along the route. This included a review of known public drainage and utility services via service provider online mapping systems. There are extensive drainage and utility services located along the most likely route of the pipeline. Normal best practice techniques for avoiding danger from underground and overhead services and extensive planning and survey works will be required to ensure the proposed pipe avoids clashing with local infrastructure and that adequate separation distances from adjacent and proximate services are maintained. The following key items of services infrastructure have been identified along the most likely route of the new pipeline:

- Running alongside existing 150mm dia. high-pressure gas pipeline from Glebe West AGI to Naas Town AGI.
- Crossing 1270mm dia. watermain in agricultural lands west of Glebe West
- Crossing beneath High Voltage Electrical services in agricultural lands west of glebe west
- Crossing 1600mm dia. watermain in agricultural lands west of Glebe West and south of Punchestown racecourse
- Crossing 450mm dia. watermain along L2023 West of Punchestown Racecourse
- Crossing 1200mm surface water sewer at Ballymore Eustace Road Roundabout
- Running adjacent to existing low pressure gas pipeline in verge of Naas Southern Ring Road from Ballymore Eustace Road Roundabout to Newbridge Road.
- Running adjacent to 600mm dia. foul sewer in verge of Naas Southern Ring Road from Ballymore Eustace Road Roundabout to Newbridge Road.
- Running adjacent to 900mm dia. foul sewer in through agricultural lands from Grand Canal to Caragh Road Roundabout

In conclusion, much of the likely pipeline route will follow existing gas pipelines and other services. It is considered that the new pipeline can be delivered along this route without the need to divert or relocate significant existing infrastructure.

There are no predicted negative significant cumulative effects on Material Assets - Built Services as a result of these associated projects.

17.3.1.11 Population

The GNI Infrastructure Upgrade Outline Report, identifying the specification and most likely route for the connection and a description of the works required to provide same, is included in Volume II, Appendix 1.2. The report provides sufficient detail and information to allow a robust cumulative impact assessment to be conducted.

The GNI Infrastructure Upgrade Outline Report indicates that the most likely route for the new high-pressure gas distribution pipeline will be from the location of the existing GNI above ground installations (AGIs) at Glebe West and Naas Town to the Project site following a combination of the existing road network and the route of existing utilities. The nature and extent of the required works indicate a likely construction programme of 7-12 months, during which there will be an increase in employment opportunities.

Once operational, there will no requirement for additional employment associated with the gas connection, therefore there will be no impacts associated with the gas connection. Due to the nature of the development, it is not anticipated that there will be any impacts on the social or demographic characteristics of the Population as a result.

17.3.1.12 Human Health

Cumulative health assessment extends the analysis of potential population health effects. This means a professional judgement is made as to the combined level of effect with other relevant projects and its implications for public health. Following IEMA 2022 guidance for human health, sensitivity of the relevant populations is unchanged from the main assessment in section 15.5, EIAR Chapter 15. Magnitude is however appraised in light of the combined effect of multiple projects.

As set out in IEMA 2022 guidance, a combined public health effect is most likely where a population is affected by multiple determinants of health and a large proportion of the same individuals within that population experience the combination of effects. Chapter 15 Human Health is informed by cumulative assessment conclusions set out in other chapters. The health assessment does not duplicate detail set out in those chapters. Of the chapters listed in section 15.1 and which inform the human health assessment, Chapter 7: Water and Hydrology; Chapter 12: Traffic and Transportation, Chapter 14: Population and Chapter 16: Climate Change provide an assessment of cumulative effects.

The conclusion are not repeated here rather in the subsection detailed with section 17.3 of this chapter.

17.3.1.13 Climate

As stated within the relevant guidance on assessing GHG emissions (IEMA, 2022), the consideration of cumulative effects for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area would be included. This is because the atmospheric concentration of GHGs and their resulting effect on climate change is affected by all sources and sinks globally, not simply those in close proximity to the Project. All developments that emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Therefore, the effects of GHG emissions from specific cumulative projects should not be individually assessed, as there is no basis for selecting any particular cumulative project that has GHG emissions for assessment over any other.

Consequently, cumulative effects due to other specific local development projects are not individually predicted but are taken into account when considering the impact of the Project by defining the atmospheric mass of GHGs as a high sensitivity receptor, in line with relevant guidance.

However, in order for the Project to receive the gas required to power its generators, a high-pressure gas pipeline will be constructed. Emissions arising from the construction of the gas pipeline are likely to be minimal, given the relatively limited extent of the infrastructure proposed (i.e. carbon associated with the pipeline materials). By way of comparison to the emissions arising from the Project, which are extensive due to the scale of the proposed buildings, plant, and likely server capacity, emissions arising from the gas pipeline are likely to be negligible.

The provision of such a pipeline ensures the supply of gas to the Project, enabling operational emissions reductions through avoiding the use of grid electricity only to power the Project. The gas connection would also enable the Project to benefit from GNI's decarbonisation targets (through the increasing provision of biomethane, abated natural gas, and hydrogen), in turn resulting in the reduction of operational emissions resulting from the Project over its lifetime. Emissions avoided over the Project's lifetime as a result of this (when compared to a scenario where the Project would be powered by grid electricity) will likely outweigh those emissions resulting from the construction of the pipeline, resulting in a payback.

As such, it is likely that the installation of a new gas pipeline by GNI will result in a minor adverse effect during the construction phase, which is not significant.

Table 17.2: Inter-relationship Matrix – Potential Interaction between Environmental Disciplines

	Biodiversity	Land and Soils	Water and Hydrology	Air Quality	Noise and Vibration	Cultural Heritage	Landscape and Visual	Traffic and Transportation	Material Assets – Built Services	Population	Human Health	Climate Change
Biodiversity		X	X		X		X					
Land and Soils	X		X	X	X							
Water and Hydrology	X	X										
Air Quality		X						X		X	X	
Noise and Vibration	X	X					X	X		X	X	
Cultural Heritage							X					X
Landscape and Visual	X	X			X	X			X			X
Traffic and Transportation										X	X	
Material Assets – Built Services		X					X					
Population				X	X			X				X
Human Health				X	X			X				X
Climate Change	X										X	

HERBATA DATA CENTRE, NAAS

EIAR
VOLUME I MAIN TEXT – CHAPTER 18 SUMMARY OF MITIGATION

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June 2024

18 SUMMARY OF MITIGATION

18.1 Introduction

As described throughout the EIAR, the design of the Project has been progressed taking account of identified environmental constraints and considerations, enabling avoidance or reduction of potential environmental impacts where practicable. This chapter summarises the additional mitigation measures identified in the EIAR, which are considered necessary to avoid; reduce; or offset potential impacts.

The purpose of the following Summary of Mitigation is to collate mitigation measures, both for ease of reference and for use by the contractor. These mitigation measures are those identified within Chapters 5 to 16 of this EIAR.

The timing of mitigation varies and may be a design requirement, or implemented prior to construction, during construction and/or during operation of the proposed scheme. The stated mitigation measures have been identified through the EIA process, and whilst some of these are also necessary to achieve separate legislative compliance (e.g. protected species licences), they are included as they still encompass mitigation commitments of this EIAR.

18.2 Biodiversity

18.2.1 Designated Sites and Features of Natural Heritage Importance

The Project is considered to have negligible potential to give rise to significant effects upon designated sites of conservation significance. As such no specific mitigation measures are proposed in respect of designated sites.

Mitigation measures set out below in respect of freshwater aquatic habitats will also act to prevent any effects upon downstream European sites which are nonetheless deemed to be below a *de minimis* threshold.

18.2.2 Habitats

The Project will incorporate measures, as set out within the accompanying Landscape Statement and associated plans (see Volume III Technical Appendices) for the protection of retained habitats in addition to the delivery of proposed compensatory planting.

Proposed SuDS features, which will comprise a significant area of the Project site, will be subject to a range of wetland planting, including wet grasslands, marginals and aquatic species which are designed to provide a mosaic of habitats which are either temporarily or permanently wet and will provide significant floral diversity including a range of species of high value for pollinators.

Of the areas proposed for SuDS planting, including dry grassland swales and the margins of wetland ponds, a total of 2.6ha of species rich wet grasslands and wetland planting are proposed within the development. It is considered that this wet grassland planting will fully compensate for losses to areas of wet grassland and tall sedge swamps which will occur at construction phase of the Project as these existing habitats are relatively species poor. In addition, the proposals will also incorporate 1.38ha of biofiltration planting, comprised of a range of non-native species which nonetheless provide some opportunities for pollinators and other native invertebrates.

Proposed SuDS features themselves, which will support variable depths of open water, depending on weather conditions, will provide pond habitat which is not currently present on site and offer potential opportunities for a wide range of aquatic fauna including a wide range of invertebrates, in addition to associated benefits for foraging birds and bats. These features, which are likely to hold some water year-round will fully mitigate for any adverse effects associated with the loss of seasonally dry drainage ditches within the site and represent a significant ecological enhancement of the site post-development.

The Project, as set out above, will give rise to the loss of around 2.9km of hedgerows and treelines in addition to 0.22ha of orchard, comprised of a former kitchen garden, and 0.46ha of scrub largely dominated by bramble. In order to compensate for these losses, the Project is to incorporate large areas of woodland, scrub and hedgerow planting. In total 5.4ha of woodland planting is to be delivered within the scheme, described as native mixed structural screen planting and comprised of a range of native species including a proportion of standard trees. A further 0.9ha of native scrub/hedge mix is also proposed for areas where full height woodland is not appropriate, such as in proximity to overhead lines, and will be managed to a maximum of 3m in height. This planting is to be located around the margins of the site, to provide screening of the development from adjacent areas and also providing continuous habitat corridors linking SuDS features and other proposed landscape planting with semi-natural habitats off-site to the south-west.

In addition to woodland and scrub planting the proposals will incorporate 0.639km of native hedgerows planted throughout the site and managed to a maximum height of 3m.

It is considered that proposed woodland, scrub and hedgerow planting will fully mitigate for proposed losses to hedgerows, scrub and orchard habitats within the site over the long term. Some residual short term adverse effects (minor adverse) are nonetheless predicted associated with the loss of mature hedgerows and treelines and the associated delay in the establishment of compensatory habitats.

The Project will also incorporate significant areas of species-rich grassland planting including 3.1ha of short-cut floral lawns, comprising a range of native species tolerant to regular mowing to a relatively short height, and 3.4ha of long wildflower meadows which are to be managed through an annual hay cut regime. These habitats will be inclusive of a range of native flora species of value for invertebrates and will, it is considered, fully mitigate for losses of semi-improved neutral agricultural grasslands and dry meadows/grassy verges habitat which will arise as a result of the Proposed Development. Furthermore, it is considered that these areas of species-rich meadow will represent a significant enhancement of the site over the current situation.

In addition to proposed native planting a proportion of the proposed buildings will incorporate a total of 0.9ha of green roofs which are to be planted with a non-native sedum blanket and subsequently managed to ensure this habitat is maintained. These areas will provide some opportunities for a range of pollinator species.

Subject to the implementation of this compensatory planting it is envisaged that adverse ecological impacts associated with the loss of various habitats on site required to facilitate the Proposed Development, will be largely mitigated. Furthermore, the scheme is predicted to deliver biodiversity net gain over the current situation through the provision of a range of species-rich habitats of value for pollinators in addition to wetland habitats, woodland and scrub.

Indirect effects associated with construction phase of the Project were limited to those associated with water quality and habitat deterioration effects arising to lowland river habitat (the Bluebell Stream) through sedimentation and pollution effects associated with nearby earthworks and other construction activities.

In order to mitigate these potential effects upon the freshwater environment a range of mitigation measures are to be implemented within the Proposed Development, and are set out within Chapter 7: Water and Hydrology of the EIAR and within the accompanying Construction and Environmental Management Plan (CEMP). Subject to the implementation of these construction phase mitigation measures it is considered that any potential significant adverse effects upon freshwater habitats within the Bluebell Stream, and any downstream watercourses, would be fully mitigated.

In addition to the above construction phase mitigation measures, the proposals will also incorporate a range of design measures to ensure that surface water run-off of the site is maintained consistent with the greenfield run-off rates including a range of SuDS features which will include petrol interceptors. Furthermore, proposals will incorporate the discharging of foul water to the existing Irish Water foul sewer for treatment at Osberstown WwTW. These features will ensure that any potential operational phase effects upon lowland river habitats (the Bluebell Stream) are fully mitigated.

While proposed mitigation measures will fully mitigate for impacts which are predicted to arise to habitats, some residual **minor adverse** and **significant** effects remain in relation to the loss of mature hedgerows and treelines within the site. While proposed compensatory planting will fully mitigate for such losses in the long term, residual short-term adverse effects are associated with the time required for establishment of compensatory planting following loss of mature hedgerow and treeline habitats.

18.2.3 Bats

Demolition of any building with a known bat roost must take place between March - mid- May or September - October inclusive, of any given year, to avoid the bat maternity and hibernation seasons and minimise the impact on bats. A NPWS bat roost derogation/roost exclusion licence will be obtained prior to the commencement of demolition of Structure 1, see accompanying Bat Survey Report (Appendix 5.B, Volume II Technical Appendices).

Prior to the demolition of the confirmed bat roost, Structure 1 (S1), and the other structures on site which have roosting suitability (S2-S6), the licenced ecologist will thoroughly search for the presence of roosting bats using an endoscope and torch. If bats are found to be present during demolition, species rescue and translocation will be carried out using gloves, and the bat(s) carefully transported to a nearby artificial bat roost. If a bat(s) is found roosting where it cannot be safely removed by hand, or where there are features with potential to conceal a roosting bat which cannot be sufficiently searched to confidently confirm that roosting bats are absent from the cavity, a bespoke designed bat exclusion device will be fitted around the roost entrance. Details of such measures will be included in the NPWS bat roost derogation licence method statement, as required.

All trees which have been confirmed to have Moderate or High bat roosting suitability will either have a dawn re-entry survey carried out or be inspected using an endoscope by a licenced ecologist immediately prior to felling. If any bats are found and cannot be safely removed by hand, the same measures stated above for structures will be applied.

4no. bat roost box locations are proposed within the site. These will comprise pole-mounted bat boxes, with two individual bat boxes proposed per location. Poles will be set in concrete or alternatively driven to a depth of at least 1m. Boxes themselves will be manufactured by Greenwood Ecohabitats[1] or similar, and will be erected, two per pole and fastened to the pole with metal straps or banding at a height of 3.5m or higher. These boxes are intended to compensate for the loss of numerous trees with bat roost potential which were not recorded to support bat roosts and to provide additional roosting resources for the local bat population. Greenwood Eco-Habitat artificial bat roost boxes are constructed from Ecostyrocrete and have a high bat uptake rate. The following boxes will be utilised, two per pole:

- ‘Half and Half bat box’ consist of a two-crevice design, and the other half of the box has the Small Hollow design, providing roosting opportunities for a wide range of bat species, or similar (Four no. total)
- Two crevice bat boxes, or similar. (Four no. total)

In addition to proposed bat box locations the proposals will incorporate three bat house structures. It is proposed that one will be a blockwork structure with floor dimensions of three-by-three metres, with a pitched slate/slate tile roof with 1F felt underlay, bat-access slates and gaps in soffits and facia to facilitate access. The interior of this structure will include layers of spaced plywood or OSB between rafters to provide interior crevices (“squeeze boxes”) which will ensure that the structure is suitable for a variety of bat species. A door into this structure will be provided to facilitate access for monitoring and maintenance, as required.

The remaining two bat house structures will utilise a timber design with floor dimensions of approximately 2.5 x 2.5m and significantly raised off the ground. Such structures will utilise interior “squeeze box” features in addition to appropriate access points, including for monitoring. Further details on the design of these structures will be provided in respect of the NPWS derogation license application for the scheme and/or in respect of any relevant planning conditions.

Typical designs for bat houses and bat boxes are illustrated in drawing number 22217-RKD-ZZ-ZZ-DR-A-1402 (Volume III).

In addition to proposed bat box locations the proposals will incorporate three bat house structures. The exact design of these structures is yet to be finalised however it is proposed that one will be a blockwork structure with floor dimensions of three-by-three metres, with a pitched slate/slate tile roof with 1F felt underlay, bat-access slates and gaps in soffits and facia to facilitate access. The interior of this structure will include layers of spaced plywood or OSB between rafters to provide interior crevices (“squeeze boxes”) which will ensure that the structure is suitable for a variety of bat species. A door into this structure will be provided to facilitate access for monitoring and maintenance, as required.

The remaining two bat house structures will be constructed using a timber A-frame design utilising four square wooden corner posts set in concrete approximately 2.5m apart, raising the structure off the ground by approximately 1.8m or higher. The structures will have a pitched A-frame roof, constructed from sheet-metal,

[1] https://www.greenwoodsecohabitats.co.uk/shop

lined with OSB, gable walls constructed from wooden cladding, incorporating interior “squeeze box” features and no floor, allowing access from below.

An ECoW will provide advice on the exact design and location of artificial bat roosts however the initially proposed locations are shown on the project Landscape Masterplan (BSM-ZZ-ZZ-DR-L-0301) which accompanies the EIAR submissions. Proposed artificial bat roost boxes and bat houses are to be located along the southern site boundary to utilise the connectivity of the bluebell stream to the River Liffey, in addition to providing close access to proposed mitigation planting and SUDs features for foraging.

The Lighting Strategy for the Project has been designed in accordance with the Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (ILP 2011) and Bats and Artificial Lighting in the UK (ILP 2018).

Artificial lighting will only be installed where and when necessary, i.e. when it is needed for safety reasons or to comply with statutory guidelines. There will be no direct illumination of any artificial bat roosts. Lighting will be avoided in areas where existing trees are to be retained and in areas proposed for native woodland buffer planting. Lighting design will aim to use narrow spectrum lights with no UV content; directional downlights illuminating below the horizontal plane; bollard or low level downward directional luminaries; external security lighting should be set on motion-sensors and short (1 minute) timers; and use accessories such as baffles, shields, louvres or adjusting the angle of the lamp where necessary (ILP 2018).

Proposed bat box and house locations will be located within areas of the site which will not be subject to lighting levels greater than 0.1lux associated with the proposed development. Proposed mitigation planting will in the medium term, provide further attenuation of artificial lighting from off-site sources.

The Project will incorporate significant areas of compensatory planting including areas of woodland, scrub, species rich grassland, hedgerows and SUDs features which are likely to fully mitigate for the loss of foraging habitats currently supported on the site for bats. The site was not considered likely to act as a significant commuting route for local bat populations given its location between areas of existing development and the M7 road. Connectivity of the site and the wider area will be maintained through the proposed landscape planting regime.

It is considered that the provision of these measures will fully mitigate for the loss of roosts and potential roosts which will occur as a result of the proposed development. Furthermore these proposals will represent a significant enhancement of the site for roosting bats and will provide opportunities for maternity colonies and individual roosting bats which are not currently supported on the site.

18.2.4 Birds

The Project has potential to give rise to significant effects upon nesting bird’s species which are likely to utilise habitats including scrub, orchard, scattered trees, hedgerows, amenity planting and buildings within the Application Site.

In order to avoid any significant impacts upon birds all site clearance, in addition to demolition of buildings, will take place during the period 1st September to 28th February which is outside the breeding season for those bird species that are likely to breed on the site. This will avoid any direct impacts of the Project on breeding birds.

Proposed mitigation planting and SUDs features within the scheme design are likely to provide significant opportunities for breeding birds during the operational phase of the proposed development.

18.3 Lands and Soil

18.3.1 Incorporated Design Mitigation

The design of the pond structures and foundations will be such that the depths are of a minimum in relation to fluvial flood levels, thus maintaining the excavations required at a minimum also. This, in addition to a design that has tried to balance the cut and fill required for the development shall serve to reduce the volume of soils to be exported off-site and therefore reduce the quantity of imported materials. The Contractor shall seek to export waste arising from the Construction Phase to licensed facilities as close to the site as possible to minimise the carbon footprint associated with handling of the material.

18.3.2 Construction Phase Mitigation

The following sections describe the mitigation measures which shall be adopted as part of the construction works on site to reduce the potential impacts on the soils, geology and hydrogeological environment.

18.3.2.1 Control of Excavations and Export of Material Arising from the Site

The proposed works shall incorporate, as identified in the Construction Environmental Management Plan (Volume II, Appendix 4.5), the reduce, reuse and recycle approach in relation to the excavation of soil on site. All excavation arisings shall be, where possible, reused on site. Stockpiles have the potential to cause negative impacts on air and water quality, therefore, the effects of soil stripping and stockpiling shall be mitigated through the implementation of an appropriate earthworks handling protocol implemented by the Contractor during the Construction Phases. Stockpiles shall be formed within the boundary of the excavation zone and there shall be no direct link or pathway from this zone to any surface water body. Only local/low level of stockpiling shall occur as the bulk of the material to be excavated shall be paced directly into haulage vehicles for transport off site to an appropriately licensed facility or, where possible, will be reused in other areas of the site as fill. The Contractor shall implement dust suppression measures, vehicle wheel washes, road sweeping and general housekeeping to ensure that the surrounding environment is free of nuisance dirt and dust dirt on roads.

18.3.2.2 Export of Material Arising from Site

Where demolition and construction material, such as excavated material, cannot be reused on site it shall be transported for recovery/disposal at an appropriately licenced facility as outlined in the Construction Environmental Management Plan. Following the geo-environmental sampling and associated laboratory testing, the waste classification completed on the soils has found that all results indicate that the materials are free from asbestos and are classified as a non-hazardous soil waste suitable for disposal at an inert landfill facility. Additional Soil Classification shall be carried out as part of the Construction Phases and waste shall be delivered by the Contractor to licensed Waste facilities which are authorised under the Waste Management Act 1996, as amended, and which hold the appropriate certificate of registration, Waste facility permit or EPA licence.

18.3.2.3 Control of Water During the Construction Phases

The Contractor shall carry out the earthwork and excavation activities such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing silts. The Contractor shall exercise care to ensure that exposed soil surfaces are stable in order to minimise erosion and that all exposed soil surfaces shall be within the main excavation site thus limiting the potential for any offsite impacts. All surface water run-off shall be prevented from directly entering into any water courses whatsoever in accordance with the Construction Environmental Management Plan. During the excavation of the existing site for the pond structures and foundation excavations, surface water shall pond in the excavations. The Contractor shall implement pre-treatment and silt reduction measures on site and shall include a combination of silt fencing, settlement measures (silt traps, silt sacks and settlement tanks) and hydrocarbon interceptors (as outlined in the Construction Environmental Management Plan). Qualitative and quantitative monitoring shall be implemented, with the client's Environmental Consultant auditing the Contractor's regular sampling and analysis results.

18.3.2.4 Sources of Fill Material / Aggregates for the Site

The Contractor shall source all imported fill and aggregate for the Project from reputable suppliers and shall ensure the following

- Aggregate Declarations of Performance for the classes of material specified,
- Environmental Management status and the Regulatory and Legal Compliance status of the proposed suppliers.

The Contractor may consider recycled or recovered materials as aggregates for the Project where appropriate.

18.3.2.5 Fuel and other Hazardous Substance Handling, Transport and Storage

The Contractor shall implement the following mitigation measures on site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Dedicated bunded refuelling areas,
- Provision of spill kits for hazardous substances,

Diesel/ petrol powered equipment to be placed on suitable drip trays.

18.3.2.6 Construction Environmental Management Plan

A Construction Environmental Management Plan for the Project is provided in Volume II, Appendix 4.5. The Construction Environmental Management Plan sets out the minimum requirements which will be adhered to during the construction phase of the Project to help ensure that construction activities are planned and managed in accordance with the environmental requirements identified within and the relevant guidance and legislation.

The Construction Environmental Management Plan will form part of the Contract Documents for the construction stage to ensure that the Contractor undertakes the works required to implement mitigation measures.

18.3.3 Operational Phase Mitigation

As noted above there is limited impact on the geological environment of the area expected during the operational phase of the development. The site has been designed to mitigate any soil contamination which may occur during the operational phase of the Project. This includes bunding of all chemical and fuel containers, the discharge of waste process water to the foul drainage network, the containment of firefighting water run-off in detention ponds and the provision of oil and fuel interceptors on drainage networks.

18.4 Water and Hydrology

18.4.1 Mitigation Incorporated into the Drainage Design

18.4.1.1 Wastewater

Wastewater generated on-site particularly during the operational phase of the development will be piped and discharged to the existing Irish Water foul sewer which flows along the L2030 Newhall Road to the Newhall Wastewater Pumping Station located (west of the site), and is ultimately pumped to Osberstown WWTP (north of the site). Irish water has provided agreement in principle for the connection of the development associated with the development to their assets and have confirmed that the connection is feasible without the need to upgrade Irish Water infrastructure. The Project will include a private rising mains from the site to the existing 300mm wastewater gravity network along Newbridge Road. Provided the sewer network is installed using industry standard best practice, including the installation of the sewer under the Bluebell Stream by trenchless techniques, and routinely checked there is likely to be no impact from wastewater from the development and therefore no further mitigation required. Drainage pipelines will be inspected by CCTV at completion of the construction project and any damage will be repaired.

18.4.1.2 Surface Water

There is no existing surface water infrastructure on the site, drainage runoff is collected via overland flows to agricultural ditches connected to Bluebell Stream. Consultation has taken place with Inland Fisheries Ireland (IFI) and the IFI document “Planning for Watercourses in the Urban Environment” has been incorporated into the design. The development has incorporated a variety of Sustainable Drainage Systems (SuDS) techniques to counteract the potential increased runoff as a result of increased hardstanding. It is proposed to collect all surface water as far as practically possible at surface level with ponds and swales. Surface water will therefore be utilised at peak times, as well as hydrant and sprinkle back supply. The excess water will be discharged back into Bluebell Stream. While all storm water collected on site will be discharged into the current water course following treatment via SuDS measures which include permeable surfaces, grass lined swales, bioretention ponds and oil interceptors at critical locations within the drainage network, e.g. on the surface water drainage form the GIS substation. The SuDS processes decrease the impact of the development on the receiving environment by providing amenity and biodiversity in many cases.

Adequately specified oil interceptors will be incorporated into the proposed drainage network for the substation, parking areas and access roads.

18.4.2 Construction Phase Mitigation Measures

18.4.2.1 Construction Phase Best Practice Measures

Mitigation measures will be implemented by the contractors who will construct the development in accordance with the requirements listed within the Construction Environmental Management Plan which will be submitted as part of the planning applications for the development. Furthermore, once appointed, the contractors will submit a detailed Construction Management Plan based on the requirements of these submitted planning documents for approval by the Planning Authority. The mitigation measures implemented by the contractor will refer to the construction management procedures for best practice regarding the following recognised international guidelines:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
- Control of Water Pollution from construction sites, Guidance for consultants and contractors (C532);
- Environmental Good Practice on Site (3rd edition) (C692); and
- Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters (2016).

18.4.2.2 Suspended Sediment and Sedimentation

Preventing run-off is an effective method of preventing sediment pollution in the water environment. Therefore, adoption of appropriate erosion and sediment controls to manage run-off during construction is essential to prevent sediment pollution.

Mitigation measures to address the potential impact from suspended solids will be carried out in accordance with a site specific CEMP. The measures will be employed prior to the commencement and during construction and will include such measures as:

- Drainage and measures to control run-off will be employed to manage sediments prior to any works to be undertaken at the site, i.e., arrangements for the treatment of dirty groundwater ingress from any excavations will be in place in advance of the dewatering to ensure it can be adequately managed on site;
- If possible, earthworks operations should be limited to the summer months.
- The site shall be surveyed to identify all existing drainage features and waterbodies.
- It is proposed that this work on the culverts to facilitate the secondary access through the M7 Business Park will be undertaken in dry conditions and will utilising an open-cut methodology with temporary damming and fluming of the relevant lengths of watercourse.
- Works within the channel of a watercourse with sensitive fish present (i.e. salmon, lamprey, trout and eels) requires appropriate timing of the works. Therefore, IFI's document entitled 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016) will be consulted for additional information on timing of works. In salmonid rivers such as the Liffey_100, downstream of the Project, the guidelines require that all in-stream works should be carried out during the period July to September; any requirement for works to be conducted earlier will seek approval from IFI.
- In order to ensure that the biological elements of the ecological status are not impacted the risk of the potential loss or crushing of sensitive fish in the vicinity of the culvert crossings should be mitigated before in-channel works commence by their capture and translocation distantly away from the works area. Authorisation via Section 14 of the Fisheries Act will be required from IFI and should be conducted using a competent fisheries expert, with the application made at least 12 weeks prior to works commencement.

- A minimum Buffer of 10 metres is proposed from the proposed works to the Bluebell Stream to protect the aquatic environment.
- Silt fencing will be installed at strategic locations around the perimeter of the site. The indicative location of the silt fencing has been determined in the Construction Phase Surface Water Management Plan within the in the construction stage CEMP (EIAR Volume II, Appendices, Appendix 4.5) and will be subject to confirmation for phase to be developed. The purpose of the silt fencing is to prevent silt laden water leaving the site and entering neighbouring land with the potential to impact nearby watercourses.
- Filter drains be cut to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized propriety settlement tanks, with a proprietary silt bag to intercept bulk silt volumes, to remove suspended solids. Details are provided in the Surface Water Management Plan included in the construction phase CEMP (EIAR Volume II, Appendices, Appendix 4.5);
- The use of filter drains and temporary settlement ponds shall further treat any potential contaminated/ polluted runoff prior to discharge to a Silt Bag arrangement which will provide maximum treatment of surface water runoff entering the Bluebell stream.
- During the construction phase of the development, all silt/ pollution removal strategy structures shall be constructed/ installed outside the extent of the riparian buffer which has been determined as 10m from the Bluebell Stream bank
- Retention and utilisation of subsoil and topsoil for the creation of landscape mounding, up to 6.5m high, to the site boundary with the M7 and for reinstatement of disturbed landscape areas
- Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident;
- Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same;
- The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of the works, and a record of these inspections will be maintained;
- Any temporary storage of soil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains. There can be no direct pumping of silty water from the works directly to any watercourse. All water from excavations must be treated by infiltration over lands or via settlement areas, silt busters etc;
- 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 material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
  - Any hard surface site 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;
  - A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate;
  - Road sweepers will be employed to clean the site access route as required.

The incorporation of these mitigation measures during the construction phase means the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of the environmental effect to **imperceptible**, based on the very high sensitivity of the receiving environment.

18.4.2.3 Concrete and Cement Pollution

The impacts in relation to cement and concrete for the development are, for the most part (but not limited to) the installation of the concrete areas (to be poured in-situ) and construction works of buildings. The principal risks are:

The use of concrete in close proximity to water bodies requires a great deal of care. Fresh concrete and cement are very alkaline and corrosive and can cause serious pollution in water bodies. It is essential to ensure that the use of wet concrete and cement in or close to any water course is carefully controlled so as to minimise the risk of any material entering the water, particularly from shuttered structures or the washing of equipment. The following measures will be undertaken to mitigate against possible pollution:

- A concrete washdown area will be provided on site for trucks to use after delivery of concrete or on return to the batching plant. This area will be adequately bunded to mitigate the risk of contaminated runoff discharge to the Liffey_100 water body. Concrete trucks are to be washed down within the concrete truck washdown area after delivery of concrete, prior to exiting the site. Washdown runoff will be appropriately treated prior to discharge;
- Wash-out areas on site will be properly designed with an impermeable line to contain all cement laden water. No wash-out of ready-mix concrete vehicles shall be located within 10 metres of any temporary or permanent drainage features. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times;
- The installation of the box and pipe culverts, including the concrete required for the binding will be undertaken in dry conditions through the damming and fluming of the minor water course, to prevent wet concrete from entering the aquatic environment.

In circumstances where the mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect to **imperceptible**.

18.4.2.4 General Construction Works

The risk of water quality impacts associated with works machinery, infrastructure and on-land operations (for example leakages/spillages of fuels, oils, other chemicals and waste water) will be controlled through good site management and the adherence to codes and practices which limit the risk to within acceptable levels. The following measures will be implemented during construction:

- A works specific Construction Environmental Management Plan has been prepared as part of the planning submission and will be developed and implemented by the contractor and will include detail in respect of every aspect of the works in order to minimise potential impacts and maximise potential benefits associated with the works;
- Management and auditing procedures, including tool box talks to personnel, will be put in place to ensure that any works which have the potential to impact on the aquatic environment are being carried out in accordance with the contactors environmental controls, which will be consistent with an approved CEMP and any planning conditions;
- Existing and proposed surface water drainage and discharge points will be mapped on the Drainage layout. These will be noted on construction site plans and protected accordingly to ensure water bodies are not impacted from sediment and other pollutants using measures to intercept the pathway for such pollutants;
- Welfare facilities (canteens, toilets etc.) will be available within the construction compound and this will remain in place for the construction of the Project. The offices and site amenities will initially need to have their own foul water collection until connections are made to the mains networks.

The use of oils and chemicals on-site requires significant care and attention. The following procedures will be followed to reduce the potential risk from oils and chemicals:

- New metal gerry cans with proper pouring nozzles will be used to move fuel around the site for the purposes of refuelling items of small plant on site. Metal gerry cans and any other items of fuel containers will be stored in certified metal bunded cabinets.
- Drip trays will be used under items of small plant at all times. Any waste oils etc. contained in the drip trays or the bunded area will be emptied into a waste oil drum, which will be stored within the bund.

- Any gas bottles will be stored in a caged area at a secure location on the site. All will be properly secured at point of work.
- No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks may be kept in the material storage area in suitable containers and will be stored on appropriately bunded spill pallets as required. Any fuel and oil stored onsite shall be stored on bunded spill pallets approved under BS EN 1992-3:2006). All bunds will be impermeable and capable of retaining a volume of equal to or greater than 1.1 times (>10%) capacity of the containers stored on them. In the event of a filling spillage excess oil or fuel will be collected in the bund;
- Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will be undertaken offsite where possible. Where this is not possible, filling and maintenance will take place in a designated material storage compound, which is located at least 10 metres from any temporary or permanent drainage features. Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release. Training will be given to appropriate site workers in how to manage a spill event. A certified double skinned metal fuel tank will be situated in this secure bunded area on the construction site if applicable. This tank will be certified for lifting when full.
- Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event. A hazardous bin will also be available to contain any spent sand or soak pads.
- Contingency Planning: A project specific Pollution Incident Response Plan will be prepared by the contractor and will refer to PPG 21 Pollution Incident Response Planning. The contractor's Environmental Manager will be notified in a timely manner of all incidents where there has been a breach in agreed environmental management procedures. Suitable training will be provided by the contractor to relevant personnel detailed within the Pollution Incident Response Plan to ensure that appropriate and timely actions is taken.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels during machinery activities and prevent any resulting soil and/or groundwater quality impacts:

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit and operatives must have spill response training; and
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

Provided these mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to **negligible** thus reducing the significance of environmental effect will be reduced to **imperceptible**.

18.4.2.5 Demolition Works

The risk to water quality impacts associated with demolition works during the construction phase will be controlled through good site management conforming to health and safety, while adhering to codes and practices which limit the risk of demolition related contamination. PPG 6: Working at construction and demolition sites, shall be adhered to particularly in relation to safe and secure on site storage and minimising storage time, wheel washing, placing of concrete and dealing with silty water for the construction and demolition industry (Environmental Agency, 2012).

A Method Statement for the demolition of the building shall be prepared showing the sequence of demolition and the method of demolition to be employed. A health and safety plan showing all the measures for the protection of the public including hoardings shall also be prepared.

In circumstances where the above mitigation measures are employed during the construction phase operations, the potential magnitude of the impact on the receiving waters will be reduced to negligible thus reducing the significance of the environmental effect to imperceptible during demolition works.

18.4.3 Operational Phase Mitigation Measures

18.4.3.1 Foul Water

Foul wastewater generated on-site particularly during the operational phase of the development will be piped and discharged to the existing Irish Water foul sewer. Agreement in principal to discharge to the existing foul network and Osberstown WWTP will be secured with Irish Water and will ensure the wastewater discharge authorisation for the existing agglomeration will not be adversely affected (see EIAR Volume II, Appendices, Appendix 4.12, Planning Engineering Report, Appendix E).

Furthermore, each data centre building is serviced by its own local foul drainage network which conveys flows to one of two onsite pumping stations, located west and east of the site. Each pumping station will have sufficient capacity to accommodate wastewater generated by a sprinkler discharge event by a data centre (max 440m^3). This is sufficient to accommodate 24 hour storage for domestic and process wastewater generation.

Both the surface water and foul system are to be entirely separate developments.

Where the mitigation measures listed above are employed, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect will be reduced to Imperceptible.

18.4.3.2 Storm Water Run-off

The development has incorporated a variety of Sustainable Drainage Systems (SuDS) techniques to counteract the potential increased need for supply. SuDS, supplemented by bypass separators on the piped storm water network, will include green roofs, permeable paving, rain gardens, attenuation tanks, bioretention pods, as well as, grassed and open space landscape portions of the site.

To reduce the water demand on the Local Authority water supplies and to reduce the requirement of the facility to use mains connection, water conservation measures will be incorporated throughout the development. Surface waters will be collected as far as practically possible at surface level via ponds and swales, to be used for peak hours and hydrant and sprinkler back up supply. Rainwater will be collected for use in the cooling operations of the plant to decrease reliance on public supply.

During the operational phase, there is potential for storm water run-off to be impacted by pollutants arising within the car parking areas and roadways. This runoff has the potential to provide pathways for a wide range of contaminants arising from general operations to the aquatic environment. The main potential pollutants from surface water drainage or direct run-off are sediment, hydrocarbons, and trace contaminants including metals and organics.

The attenuation tanks and pervious pavements have proposed dual purpose and whilst they are flow attenuation features they also mitigate against potential water quality issues associated with storm water run-off.

All surface water run-off from roof areas and hardstanding areas are designed to be collected by a gravity pipe network. The collected stormwater will be diverted through a petrol interceptor prior to an underground attenuation storage tank.

Provided the best-practice techniques illustrated in CIRIA's guidance document (C768 – Guidance on the Construction of SuDS) are followed, no further mitigation is required. Where the measures listed above are employed, the potential impact to receiving water environment will be reduced to **negligible** thus reducing the significance of environmental effect will be reduced to **imperceptible**.

18.4.3.3 Hydromorphology

In terms of the culvert installation the condition of the Bluebell Stream the existing stream bed shall be excavated to the design formation levels as set by the engineer. If suitable, all existing bed material will be stockpiled on site for re-use along the culverted stream channel. Where the measures listed above are employed, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect will be reduced to imperceptible.

18.5 Air Quality

18.5.1 Pre-Construction & Construction Phase

Mitigation measures are divided into general measures applicable to the entire and measures applicable specifically to the defined construction activities (i.e. demolition, earthworks, construction and track-out). As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures (IAQM, 2023).

A Dust Management Plan (DMP) will be prepared by the appointed contractor for the Site and submitted to the Council for written agreement prior to commencement of construction. The DMP will at a minimum include the following mitigation measures listed below to minimise and manage potential dust emissions:

18.5.1.1 Communications

With respect to communications, the following will be implemented:

- Develop and implement a stakeholder communications plan that includes community engagement;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the Site Manager;
- Appropriate training will be provided to all staff to ensure that they are aware of and understand the dust control and other environmental control measures; and,
- Display the head or regional office contact information.

To be implemented before works commence on site and training given as appropriate by the appointed contractor.

18.5.1.2 Site Management

With respect to site management, the following will be implemented:

- Daily visual inspections of the site and site boundary for evidence of dust depositions will be made. A dust inspection of the site will be undertaken by a suitable person, trained and nominated by the site manager. Increase frequency of site inspections will be undertaken when activities with a high potential to produce dust are being carried out, such as earthworks activities, power tool use and during prolonged windy or dry condition;
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints record available to the relevant regulatory authorities when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in an environmental log book;
- Avoid site runoff of water or mud;
- Use covered skips;
- No bonfires and burning of waste materials on site;
- It is recommended that passive monitoring at three - site boundary locations shall be completed for the duration earthworks (Bergerhoff method);
- Keep surfaces such as Site fencing and barriers clean using wet methods.

To be implemented during works as required by the appointed contractor.

18.5.1.3 Earthworks

Earthworks are planned as part of the Project including foundations (and associated excavation of soils and materials), creation of stockpiling and cut and fill areas. With respect to earthworks, the following will be implemented:

- Disturbance of the ground will be kept to a minimum wherever possible;
- Soil handling should be restricted during adverse weather conditions such as high winds or exceptionally dry spells – depending on outcome of walk over survey identifying any potential issues ;
- Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate;
- Dampening methods will be used where necessary; and,
- Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.

To be implemented during earthworks by the appointed contractor.

18.5.2 Construction

With respect to construction, the following will be implemented:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed;
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; and,
- Cleaning of hard stand areas by personnel only or if required mechanical road sweepers (with water suppressant fitted) to clean any site hard stand area.

To be implemented during construction period by the appointed contractor.

18.5.2.1 Vehicle Movement and Vehicle Emissions

As with any construction site, there are associated vehicle movement, emissions and plant use. With respect to vehicle movement and vehicle emissions, the following will be implemented:

- Implement a wheel washing system until earthworks are completed. Wheel wash system should have an adequate amount of hard surface between it and the Site exit;
- Transportation of dusty/fine materials will be conducted in enclosed or sheeted vehicles;
- An onsite speed limit (to be displayed) will be implemented by the main contractor that will be appropriate to the types of construction plant utilised;
- Regular cleaning and maintenance of site roads as appropriate. Hard surface roads should be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Ensure all vehicles switch off engines when stationary and not in immediate use - no idling vehicles (emissions to air controlled);
- All plant utilised should be regularly inspected (emissions to air controlled);

- Visual monitoring of plant will include: Ensuring no black smoke is emitted other than during ignition (emissions to air controlled);
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturers limits (emissions to air controlled); and,
- Vehicle exhausts will be directed away from the ground and other surfaces and preferably upwards to avoid road dust being re-suspended to the air.
- Avoid the use of diesel or petrol powered generators where possible, using mains electricity or battery powered items where practicable;
- Impose and signpost a speed limit of 20 km/hr on sealed surfaces and 15 km/hr on unsealed surfaces.

To be implemented throughout by the appointed contractor.

18.5.3 Operational Phase

The proposed facility incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- Reuse/recycling of material on-site where possible reducing emissions related to production of virgin materials;
- Solar photovoltaic (PV) arrays are located on the roof top of each of the six DC buildings. The solar PV arrays will provide a minimum 500kW peak per building provided as part of 30% renewable energy target for operational energy target;
- LED lighting, which is proven to use 75% less energy when compared to traditional incandescent bulbs will contribute to further reduce already minimal indirect emissions due to electricity use; and,
- Planting of trees contribute to carbon sequestration and improved air quality.

18.6 Noise and Vibration

18.6.1 Construction Phase

Worst case construction noise predictions can be reduced through use of appropriate mitigations as detailed below in Section Construction Mitigation. The target for mitigation measures is a reduction in daytime construction noise to achieve the daytime Category A threshold limit (i.e. 65dBA).

BS 5228-1 states that:

> "*…if the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.*"

These factors have therefore been considered to determine the effect significance.

As a summary of proposed construction works:

1. Construction works will be temporary and limited in duration;
2. Construction plant and machinery have been assessed as operating for the full working period of the day, i.e. 100% duty cycle. Due to natural pauses in activity and rest breaks equipment will not be fully operational during the working day; and
3. Construction works are not proposed to occur during night-time or on Sundays, unless for emergency works. Therefore, there will be no associated construction noise impact during these times at construction noise receptors.
4. Temporary construction noise barriers will be used to achieve attenuation of noise levels between ground based construction plant and the nearest noise-sensitive properties.

18.6.1.1 Specific Construction Mitigation

Construction mitigation measures will be put in place to ensure construction noise levels are attenuated and reduced where necessary.

Best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.

BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the Proposed Scheme. Construction best practice measures which will be implemented included below:

1. Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order;
2. Careful selection of quiet plant and machinery to undertake the required work where available;
3. Machines in intermittent use will be shut down in the intervening periods between work;
4. Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, temporary construction barriers or enclosures will be utilised around noisy plant and equipment;
5. Handling of all materials will take place in a manner which minimises noise emissions; and
6. Audible warning systems will be switched to the minimum setting required by the Health & Safety Executive.

The use of the proposed construction noise mitigation measures will ensure that construction noise levels are controlled to the lowest levels practicable.

Construction traffic noise will be controlled through management of parking, loading and traffic arrangements. These will be managed by the contractor to reduce traffic volumes and in and around the site prevent congestion.

18.6.1.2 Piling Noise and Vibration Mitigation

Particular attention should be paid to piling noise when piling strategy is developed, in terms of location, scheduling and pile type. It is understood that rotary bored piling will be employed. Although this piling technique tends to generate lower levels of vibration than pile driving, transient vibrations can also occur when the auger strikes the base of the borehole. If it is necessary to insert an appreciable length of temporary casing to support the boring, a casing dolly can be used and, as with the impact bored piling method, this will give rise to intermittent vibrations. The use of special tools, such as chisels, will also result in intermittent vibrations.

Occupants of residential properties should be advised of likely piling and demolition schedules; awareness of when and where these works will be taking place can help residents and businesses to prepare for potential impacts.

18.6.1.3 Construction Environmental Management Plan

Further details of all environmental mitigation measures are included in the Construction Environmental Management Plan (CEMP), which accompanies the planning application(s) for the Project.

Once further details of construction methodology and schedule are finalised, a specific Noise Management Plan will be produced and implemented by the final appointed contractor of the project The CEMP and subsequent noise management plan will set out the mitigation measures that will be employed to reduce the noise and vibration impacts of the development during the construction phase.

18.6.2 Operational Phase

Mitigation measures have been considered and implemented in the design and engineering of the Project, including factors such as selection of plant and equipment, noise control at source, selection of construction materials, orientation of buildings and site layout. The benefit of these mitigation measures has been included in the noise predictions and subsequent operational noise impact assessment in Section 9.5.2.

Operational conditions have been carefully considered to ensure that operational requirements are fulfilled in terms of power generation and cooling, whilst minimising noise impact. This is particularly important for the night-time period. There will be controlled use of gas turbines/gas engines during the night, with the number of gas turbines or engines online minimised where possible. The number of gas turbines or engines online should not exceed the 'worst-case' scenarios for daytime and night-time which have been assessed in this chapter. Routine maintenance works, such as testing and servicing will be limited to daytime periods where there is potential for increased noise outputs.

18.7 Cultural Heritage

18.7.1 Mitigation by Avoidance / Design

The fulacht fia (KD019-028----) located within the Project area will be preserved *in situ* as an undeveloped greenspace. The project design has been altered to avoid a direct impact on this feature whose extent has been identified from the geophysical survey. A minimum 5m buffer from the outer edge of the archaeological site will be established prior to any construction works commencing within the site.

18.7.2 Mitigation by Prevention

The c.5m buffer around fulacht fia (KD019-028----) will be fenced-off prior to the commencement of construction in order to protect the site during the course of works. This fence shall remain in place until all development works have been completed. The fencing will be erected under archaeological supervision and no construction related activities, such as machine movements, dumping of spoil or storage of materials will occur within the fenced-off area.

18.7.3 Mitigation by Reduction

Archaeological investigations have identified the existence of several previously unrecorded features of potential archaeological origin within the development area. With the exception of the recorded monument (fulacht fia KD019-028----) preservation *in situ* of the identified features of archaeological potential is not a viable option within the Project site. Therefore, they will be preserved by record through a programme of archaeological excavation and recording under licence from the National Monuments Service (NMS) in the Department of Housing, Local Government and Heritage.

The archaeological excavations will involve the stripping of topsoil from appropriate areas around the identified archaeological features within the development site and this will be carried out under the constant supervision of a suitably qualified archaeologist. The stripped area will include at least 10m of clearance from the edge of the archaeological feature to the edge of the excavation. The supervised topsoil stripping will be undertaken using a mechanical excavator fitted with a toothless bucket which will remove the topsoil down to the uppermost archaeological layer or the surface of natural subsoil in areas where no archaeological material is present. A systematic programme of manual archaeological excavation of all revealed features of archaeological potential will then be carried out in accordance with the method statement submitted to the NMS as part of the licence application process. This will include the manual excavation of all identified archaeological features, the compilation of written, drawn and photographic records, the retrieval of archaeological objects and a programme of environmental sampling.

The archaeological excavations will be undertaken in advance of the main construction works in the relevant areas in order to allocate adequate time to appropriately excavate and record the archaeological deposits/features.

Following the completion of excavations, a post-excavation phase of works, involving analysis, reporting and dissemination to the relevant authorities will be undertaken off site. The level of the post-excavation analysis and reporting will be commensurate with the level of archaeology excavated on site.

There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological excavations and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement stating the proposed strategy for the pre-construction archaeological excavations will accompany the submitted licence application which will clearly detail the extent of the archaeological works and outline the processes to be enacted to excavate and record all identified archaeological materials. A preliminary report on the archaeological excavations will then be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all archaeological works in written, mapped and photographic formats. Following the completion of all required post-excavation analyses, including environmental, artefact studies and dating, a final report on the excavations will be submitted to the above bodies.

It is also proposed to carry out a photographic survey of the vernacular buildings located at the centre of the site prior to their demolition to allow for their preservation by record.

A photographic survey of the portions of townland boundary to be removed should be undertaken prior to their removal and other groundworks on site. Sections through the townland boundaries should be archaeologically recorded during the archaeological excavations outlined above.

18.8 Landscape and Visual

18.8.1 Mitigation of Construction Impacts

The clearance of the existing site and subsequent construction works will be restricted to land within the site boundary. A site compound, including site accommodation, together with hoarding, scaffolding, cranes, and other associated temporary works will be required during the construction phase. These features will be visible during the construction phase from areas immediately adjacent to the Project site. Cranes and scaffolding may be visible at a greater distance, though this will be dependent upon view direction and intervening built form. These temporary features will be viewed as a feature of construction in the urban setting. All construction impacts are limited to the construction period and therefore of temporary duration.

18.8.2 Mitigation of Operational Impacts

Please refer to EIAR Volume III Technical Drawings & Figures for details on the proposed hard and soft landscape plans for the Project, which are set on the planning application and described in Chapter 4 of the EIAR.

Only those trees which require removal to facilitate the development will be replaced. All other trees which can be maintained within the scheme shall be retained and protected from damage in accordance with BS 5837:2012 (Trees in relation to design, demolition, and construction).

It is important that a landscape management plan is prepared to ensure the healthy establishment of all trees within the Project and the replacement of any dead or dying plants in subsequent years.

18.9 Traffic and Transportation

There is no proposed mitigation upon the surrounding highway network as part of this proposal. The Project is served by existing motorways and regional roads which can accommodate the predicted levels of traffic during the construction and operational phases.

18.10 Material Assets

18.10.1 Construction Phase

18.10.1.1 Surface Water

Groundwater or run-off that collects in excavations or foundation trenches will be drained or pumped to a construction site water treatment arrangement. The water is to be directed into a proprietary settlement tank, with a proprietary 'silt bag' to intercept bulk silt volumes. This process entails sediment-laden water being pumped into a filter bag, which traps the solids inside and allows the filtered water to flow freely out through the Geotextile fabric to disperse into the collection point. The proposed collection point shall be a series of silt trap fences and filter drain arrangements, adjacent to constructed pond which will act as temporary settling ponds during the construction The water and silt within the pond are to be emptied into water vacuum tanker and is to be disposed of off-site toa licenced facility.

Due to the sloping nature of the existing topography, there is a risk of silt/ sediment accumulating/ discharging towards the Bluebell stream. To mitigate against unwanted silt discharge, Silt traps in the form of silt fences or hay bale structures will be adopted across lengths of the site to intercept runoff and provide a stage of treatment and runoff filtration.

Runoff filtered through the silt trap fence shall be then intercepted by a temporary filter drain which will run directly parallel to the downstream side of the silt trap fence. The collected, filtered runoff shall discharge to the constructed ponds which shall act as temporary settlement structures during the construction phase. The use of filter drains and temporary settlement ponds shall further treat any potential contaminated/ polluted runoff prior to discharge to a Silt Bag arrangement which will provide maximum treatment of surface water runoff entering the Bluebell stream.

During the construction phase of the development, all silt/ pollution removal strategy structures shall be constructed/ installed outside the extent of the riparian buffer which has been determined as 10m from the Bluebell Stream bank.

18.10.1.2 Foul Drainage

During construction, all new sewers shall be pressure tested and CCTV surveyed in accordance with the Uisce Éireann Standards to identify potential defects and such defects should they arise, shall be repaired prior to the connection

18.10.1.3 Water Supply

During construction, the watermains shall be tested in accordance with the requirements of Irish Water prior to connection.

18.10.1.4 Gas Networks Ireland

During construction, the gas mains shall be tested in accordance with the requirements of GNI prior to connection. The turbines will also be tested in accordance with the manufacturer's specifications.

18.10.1.5 ESB Utility Services

During construction as part of the final testing and commissioning, the overhead lines and underground cables will all be tested in accordance with the requirements of ESB and Eirgrid's standard procedures.

18.10.1.6 Fibre Utility Services

During construction, the ductwork for the fibre network will be CCTV surveyed to ensure no breakages has occurred during installation.

18.10.2 Operational Phase

18.10.2.1 Surface Water

Surface water runoff from the Project will be managed in accordance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS), with surface water attenuation and retention included as part of the main surface water drainage system. The surface water management proposals shall serve to significantly reduce the overall impact of the Project on the existing environment and shall reduce the risk of flooding in the receiving public surface water network. The proposed SuDs strategy shall also provide cleansing of all surface water prior to the discharge to the Bluebell Stream, increasing the sustainability of the design.

18.10.2.2 Foul Drainage

The proposed development's management company shall carry out operational inspection and maintenance regimes to carry out to ensure the system keeps operating within the design specifications.

18.10.2.3 Water Supply

The Project's management company shall carry out operational inspection and maintenance regimes to carry out to ensure the system keeps operating within the design specifications.

18.10.2.4 Gas Networks Ireland

GNI shall carry out operational inspection and maintenance regimes to carry out to ensure the system keeps operating within the design specifications.

18.10.2.5 ESB Utility Services

The substation will be managed, operated and maintained by ESB who will carry out operational inspection and maintenance regimes to ensure the system keeps operating within the design specifications .

18.10.2.6 Fibre Utility Services

The Project's management company shall carry out operational inspection and maintenance regimes to carry out to ensure the system keeps operating within the design specifications.

18.11 Population

The Project will generate more than 100 no. jobs. The provision of c. 225 no. jobs over a c.37ha site in proximity to other low density employment generators is not considered to be a "large scale employment centre". It is therefore considered that there is no requirement to provide a childcare facility at this location. The surrounding area is well served by childcare facilities, pre-schools and schools there are a large number of childcare facilities in the immediate surrounds. No further mitigation measures are proposed.

18.12 Human Health

18.12.1 Physical Activity

During the operation and maintenance phase new routes to include access that supports people of all ages, including those with mobility and/or sensory needs. This includes: suitable width and surface to new routes for children's buggies, mobility aids and wheelchairs; appropriate route access points (including to parking); signs in formats that respond to visual impairments; connecting to existing routes and trail networks, including appropriate road crossings. This measure would be secured by a Mobility Management Plan.

18.12.2 Transport modes, access and connections

During construction and decommissioning advertise lane closures in advance so road users are forewarned and can manage commute to work effectively. Ensure that early and ongoing sharing with emergency and healthcare services with regard to any temporary road closures, diversions or lane closures. This measure would be secured by a Construction Travel Management Plan.

Ensure suitable pedestrian access is maintained for diversions of any temporary route closures and provide appropriate wayfinding information for temporary diversions during construction and decommissioning, such as being advertised online and signposting, including approximate journey times on the routes. Wayfinding for circular walks or to destinations should be clearly signposted. This measure would be secured by a Construction Travel Management Plan.

18.12.3 Education and training

As far as reasonably practicable (e.g. subject to standards and security checks) provide a targeted scheme of access to operation and maintenance training schemes and apprenticeships for young people in the local and regional area for people who are Not in Education, Employment, or Training (NEET). This would be secured through a workforce management plan.

Monitoring of the proportion of NEETs taking up, and completing, training opportunities with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups.

Based on the efficacy of such strategies there is the potential for a moderate beneficial (significant) population health residual effect for education and training. This reflects the potential to achieve long-term benefits from a targeted training intervention at a critical stage in the life course of this group.

18.12.4 Employment and income

As far as reasonably practicable (e.g. subject to standards and security checks) provide a targeted scheme of access to operation and maintenance employment opportunities in the local and regional area for people who are Not in Education, Employment, or Training (NEET). This would be secured through a workforce management plan.

Monitoring of the proportion of local people with long-term unemployment, high job instability or low income who enter good quality stable employment with the Project in order to confirm the expected benefit and further tailor the targeting of local vulnerable groups. This would be secured through a workforce management plan.

If a high proportion of good quality operation and maintenance employment opportunities were targeted to vulnerable groups, notably people who are unemployed, on low incomes, or who have high job instability, including young adults early in their careers, then there is the potential locally for a moderate beneficial (significant) population health residual effect. This reflects the potential to achieve long-term benefits though avoiding adverse physical and mental health effects (including to dependants) associated with long-term unemployment, high job instability or low income.

18.12.5 Public understanding of electro-magnetic field risk

Continued community consultation and sharing of non-technical information relating to the project (e.g. explaining compliance with public exposure guidelines, actual risks associated with the project), to allow people to express concerns and gain awareness of actual health effects. This will partially be met through the application process, including the EIAR NTS. Non-technical information and a point of contact for community liaison to be provided on the project website.

18.13 Climate Change

18.13.1 Construction Phase

While the Project already includes extensive embodied carbon mitigation within its design and material procurement commitments within the Applicant’s control, the following further mitigation measures should be considered:

- The Applicant should seek to obtain product EPDs for required MEP and building services during product procurement, with the aim to procure lower carbon products where available. Through close engagement with the supply chain and greater transparency into the GHG impacts of products being specified, it can be ensured that products used in the construction of the Proposed Development are manufactured in conditions with minimal GHG impacts (e.g. via the use of renewable energy and efficient resource consumption);
- Increase commitments with regards to the recycled content of the construction materials, where supply is available; and
- The Applicant should seek to understand and influence where possible the approach taken by future tenants with regards to server procurement processes, including whether product EPDs are obtained and lower carbon servers are preferentially specified, and what practices the tenant has in place for re-using, repairing or recycling servers (as required of signatories of the Climate Neutral Data Centre Pact).

18.13.2 Operational Phase

18.13.2.1 Assessment of Effects as a Result of Climate Change

The following embedded mitigation measures are incorporated into the Project's design, reducing the significant adverse effect to a negligible effect, which is not significant in EIA terms:

- Passive design measures will minimise excessive solar gain, such as admin areas housing office spaces and reception areas being north-west and north-east facing to minimise unwanted solar gains;
- Adiabatic cooling system will be designed to allow for further water storage adjacent to each building, to accommodate higher temperatures if needed, and
- The roof of each building will be provided with a reflective finish to improve solar reflectivity.

18.13.2.2 Assessment of Effects on Climate Change

While the Project already includes extensive embodied carbon mitigation within its design and material procurement commitments, the following further mitigation measures should be considered to further reduce energy consumption and resultant emissions:

- While design measures to reduce unregulated energy consumption from the data halls lie within the scope of the tenant during the fit out of the building, the below measures are included for tenant consideration as methods by which such unregulated energy may be reduced:
    - Reduce energy losses from power distribution units by using more efficient units, and look to install those which can also monitor power usage where relevant.
    - Implement efficient air flow management measures to improve cooling efficiency. Examples may include using a hot aisle / cold aisle layout, reducing the number of aisles requiring cooling; and using curtains or panels to avoid cold air from mixing with hot exhaust air.
    - Optimise airflow management within server units to ensure air leakage and recirculation are minimised, and cool air is guided exclusively through the IT equipment.

Waste heat produced by the data centres has the potential to be used as part of a local district heating network providing low carbon heat, avoiding the use of fuels with higher carbon intensities. The development of district heating networks is supported within both national and local policy, which expect data centre developments to aid in such development of heating infrastructure. Given no heat network yet exists in the locality of the site, the Project will ensure it is ready to export heat should demand for such infrastructure grow in the future. A number of the proposed gas turbines will be linked to waste heat boilers, with waste heat pumped via heat exchangers to the perimeter of the site, enabling future nearby developments to connect on and receive heat for a range of uses.