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/m^3
	2008/50/EC	Annual protection of human health	40 μg/m^3
	2008/50/EC	Annual limit for protection of vegetation	30 μg/m^3
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/m^3
	2008/50/EC	Annual limit for protection of human health	40 μg/m^3
Stage 1 - Particulate Matter $PM_{2.5}$	2008/50/EC	Annual target value for the protection of human health	25 μg/m^3

[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.

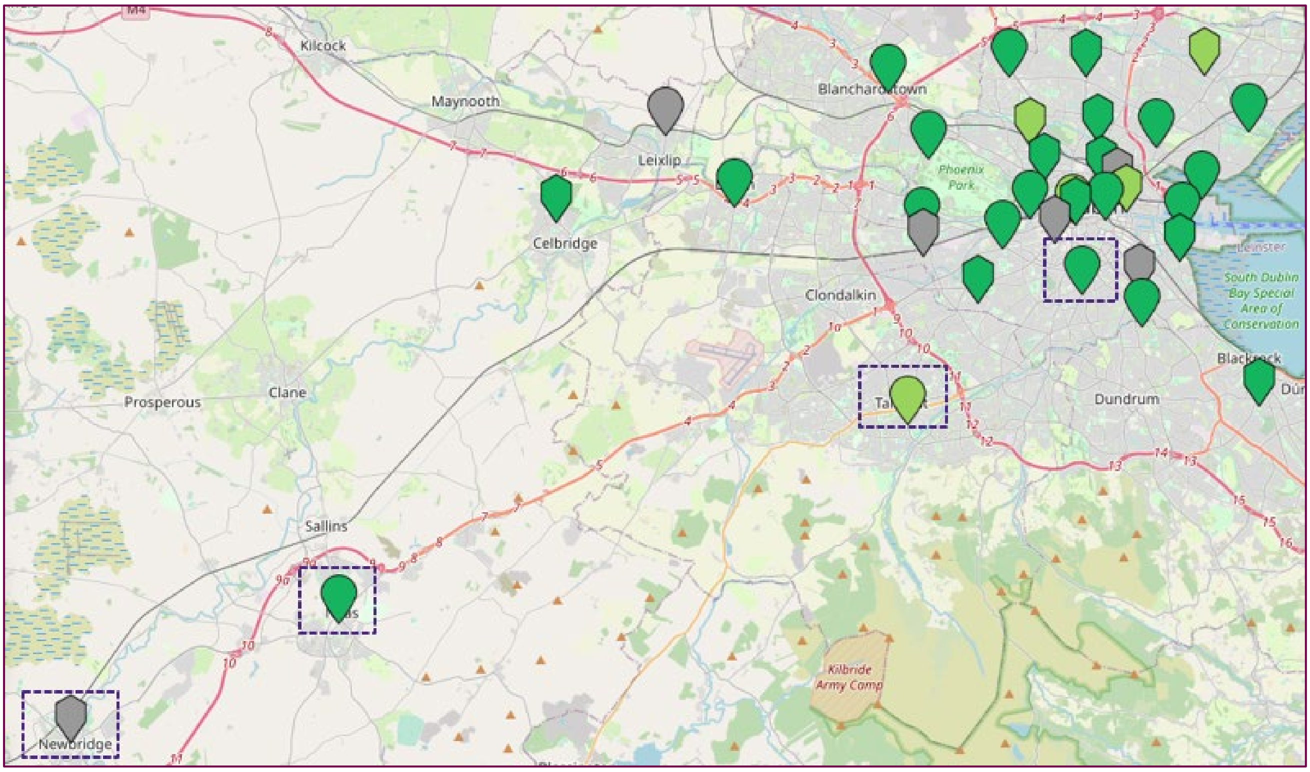

Figure 8.1: EPA Monitoring Sites (EPA, 2023)

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.

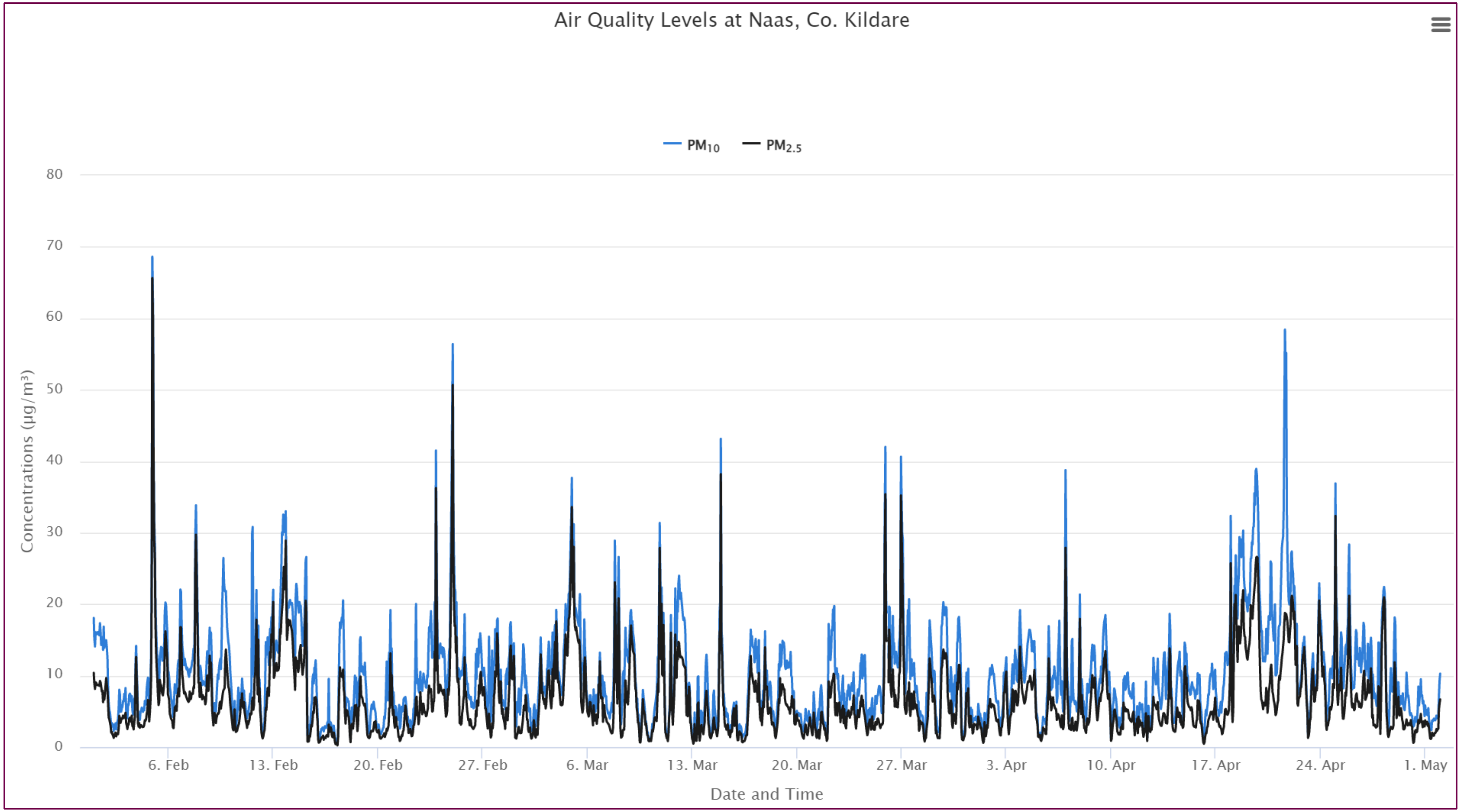

Figure 8.2: Air Quality Levels at Naas, Co. Kildare

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.

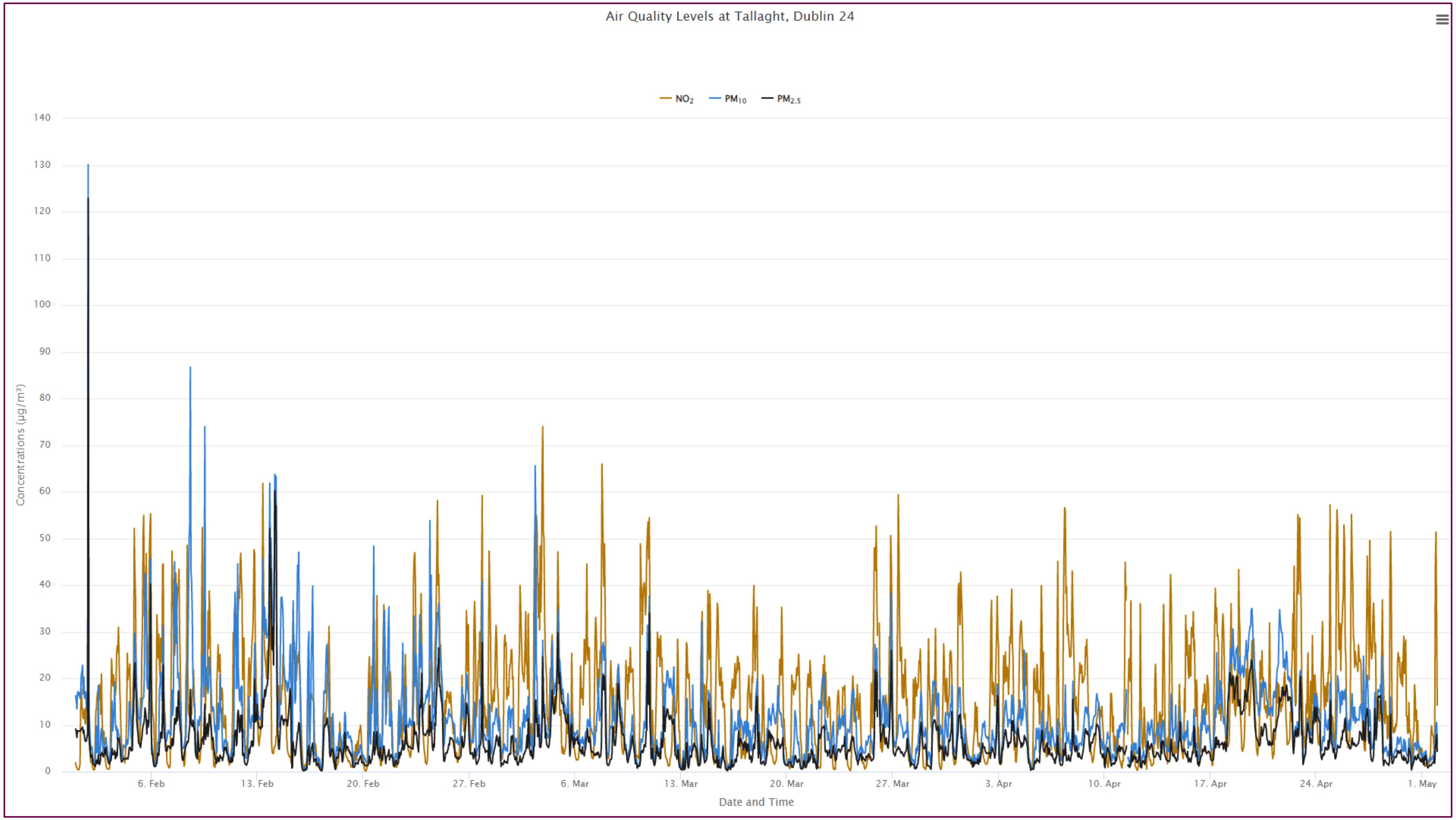

Figure 8.3: Air Quality Levels at Tallaght, Co. Dublin

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.

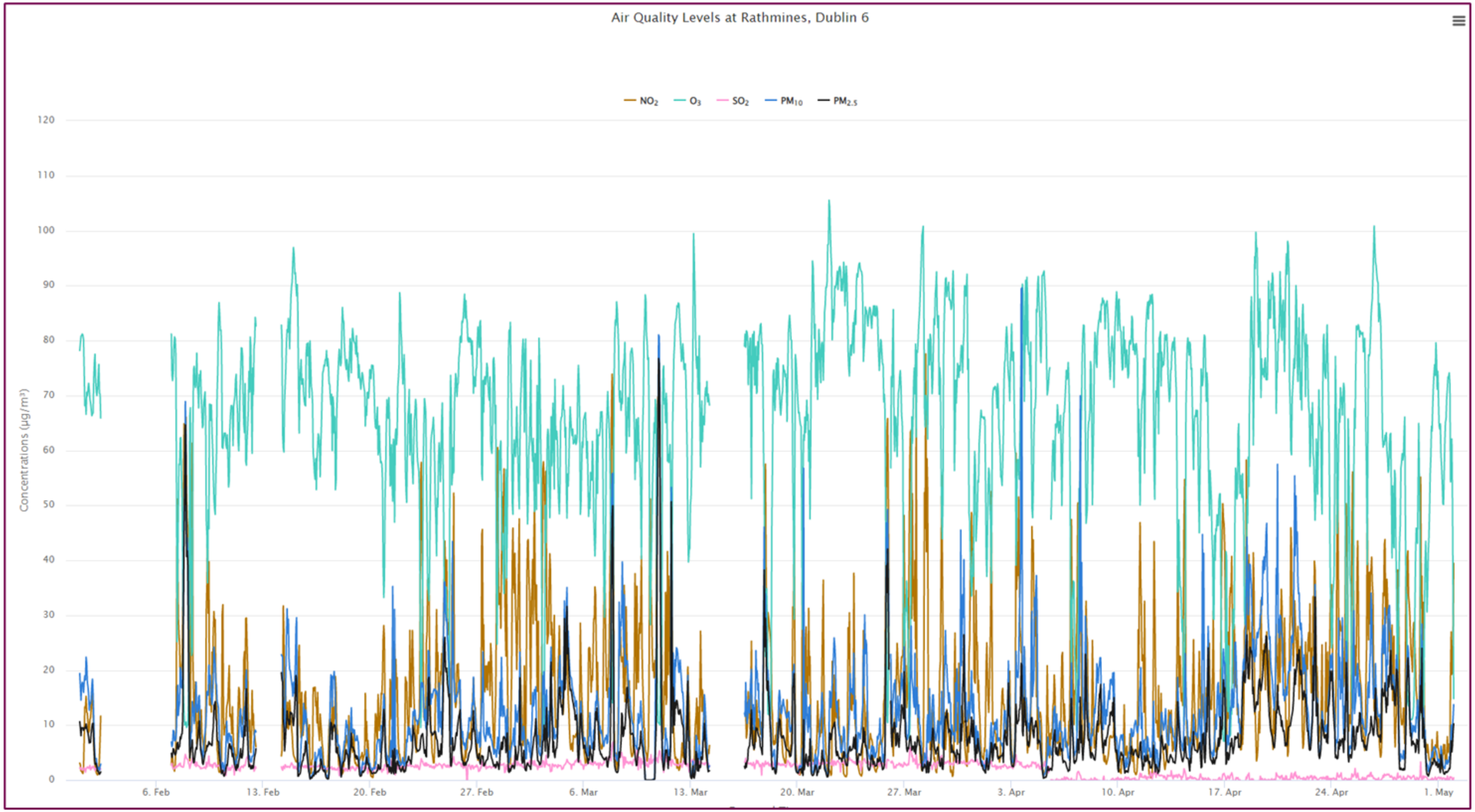

Figure 8.4: Air Quality Levels at Rathmines, Co. Dublin

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/m^3*	3	50	High
Phase 2	*12.5 μg/m^3*	0	50	High
Phase 3	*12.5 μg/m^3*	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 NOx 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

[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.

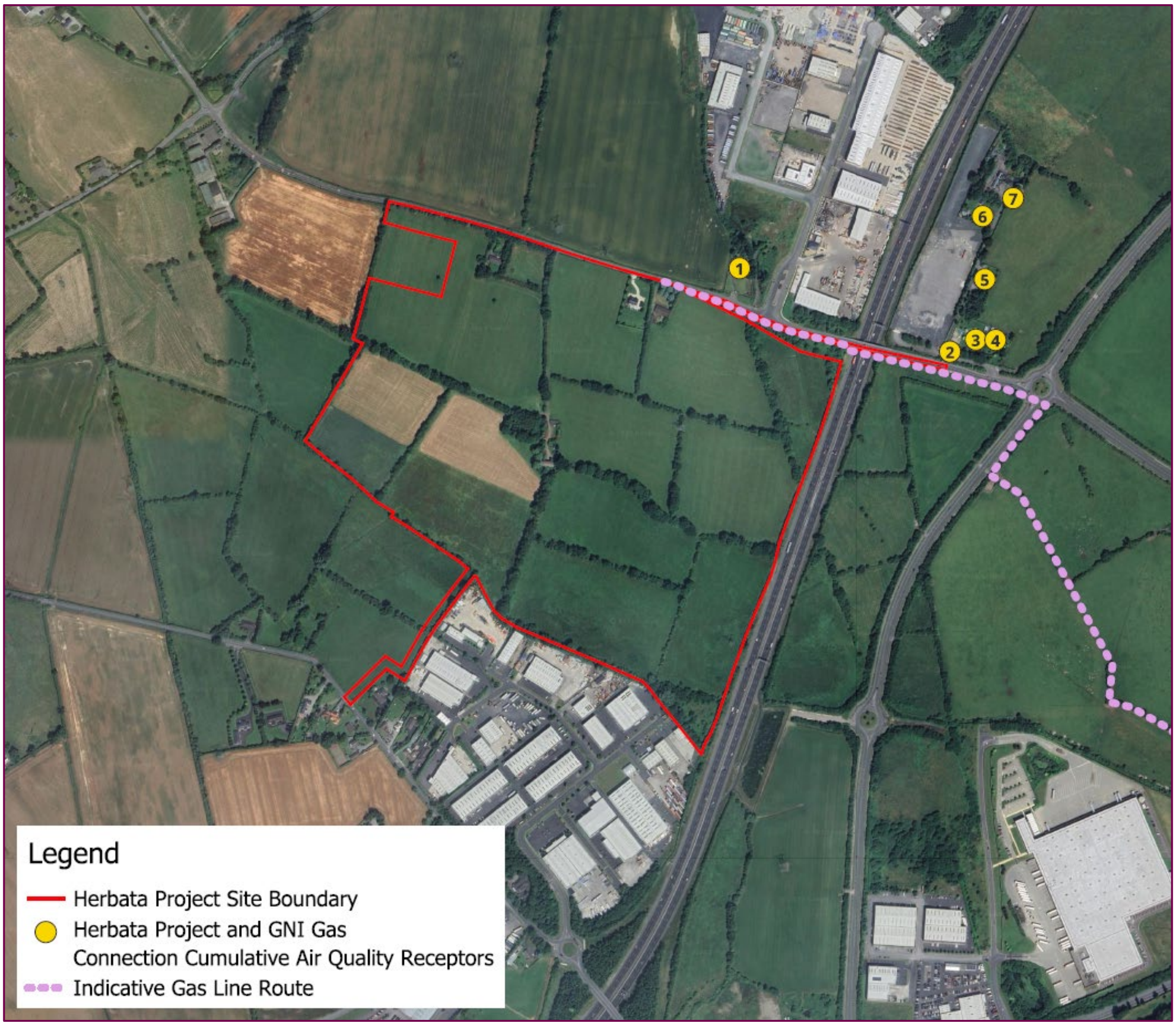

Figure 8.5: EPA Monitoring Sites (EPA, 2023)

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.

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Receptor	nsitivity of ceptor	scription of Effect	uration	agnitude	nificance	nificant / 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	