8 AIR QUALITY

Introduction

8.1 This chapter of the EIAR reports on the likely significant air quality effects to arise from the demolition and construction stage and the operation stage of the proposed development.

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

8.3 The potential exists for dust deposition and increased particulate matter concentrations to occur during the demolition and construction stage, as well as increased air emissions resulting from the operational phases of the proposed development. The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}), typically generated during demolition and construction activities, and nitrogen oxides (NO_x) represented as nitrogen dioxide (NO_2) typically generated by combustion engine emissions and road traffic.

8.4 The chapter is supported by the following technical appendices in EIAR Volume 3:

- Appendix 8.1: Air Quality Modelling Inputs.
- Appendix 8.2: Air Quality Detailed Results.

Methodology

8.5 The assessment has been informed by the below legislation, policies, and published guidance and those outlined in Chapter 2: EIA Process and Methodology. The relevant policies are discussed throughout this chapter in more detail in the appropriate sections.

- International Legislation:
  - European Air Quality Framework Directive 2004/107/EC[1] and daughter Directive 2008/50/EC[2] on ambient air quality and cleaner air for Europe (CAFE), which set out a series of limit values for the protection of human health and critical levels for the protection of vegetation;
  - Directive 2010/75/EU industrial emissions (integrated pollution prevention and control)[3] known as Industrial Emissions Directive (IED);
  - Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCPD)[4];
- National Legislation and Policy:
  - Air Pollution Act 1987[5];
  - Environmental Protection Agency Act, 1992[6];
  - Protection of The Environment Act 2003[7]
  - Air Quality Standards Regulations 2011[8] amended by the Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016[9], which transposed the European Directive 2008/50/EC into Irish legislation;
  - European Union (Medium Combustion Plants) Regulations 2017[10] which transposed the European Directive 2015/2193 into Irish legislation;
  - The National Climate Action Plan 2021[11]
- Guidance and industry standards:
  - Institute of Air Quality Management (IAQM) guidance on the Assessment of Dust from Demolition and Construction, 2014[12];
  - Environmental Protection UK/IAQM (EPUK/IAQM) guidance on Land Use and Development Control for Air Quality, 2017[13];
  - Environmental Protection Agency (EPA) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)[14];
  - U.S. Environmental Protection Agency (USEPA) Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard[15]; and
  - UK Environment Agency Specified generators: dispersion modelling assessment[16, 17].

8.6 Specific Irish and European guidance and industry standards have been used to inform this assessment where available. International guidance and protocols from the UK or USA were used to supplement methodologies gaps where specific national guidance was not available, with a particular focus on UK guidance and protocols due to geographical proximity and for methodology consistency.

Assessment Scope

8.7 Dispersion of air pollutants is impacted by several factors including the height and location of a release, the prevailing meteorology, and the arrangement of buildings in the immediate vicinity. This EIAR has been based on the architectural and engineering design and drawings that accompany this application.

Technical Scope

8.8 The assessment considers the effects of the proposed development using the methodology set out below within the context of the policy framework and baseline conditions. The assessment considers the following potential impacts and associated likely effects:

1 European Air Quality Directive 2004/107/EC. European Air Quality Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air.
2 European Commission. Directive 2008/50/EC. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
3 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).
4 Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants.
5 Air Pollution Act, 1987. Number 6 of 1987
6 Environmental Protection Agency Act, 1992. Number 7 of 1992.
7 Protection of the Environment Act 2003. Number 27 of 2003.
8 Statutory Instruments S.I. No. 180/2011 - Air Quality Standards Regulations 2011.
9 Statutory Instruments S.I. No. 659 of 2016 – Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016.
10 Statutory Instruments S.I. No. 595/2017 - European Union (Medium Combustion Plants) Regulations 2017.
11 Government of Ireland, 2021. Climate Action Plan. Department of the Environment, Climate and Communications
12 Holman et al, 2014. IAQM Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London.
13 Moorcroft and Barrowcliffe. et al., 2017, Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.
14 Environmental Protection Agency Office of Environment Enforcement (OEE), 2019. Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).
15 USEPA, 2011. Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard.
16 Guidance Specified generators: dispersion modelling assessment. Available at: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment [Accessed on 04/08/2021]
17 UK Environmental Agency. Guidance Specified generators: dispersion modelling assessment. Available at: https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/supporting_documents/Specified%20Generators%20Modelling%20GuidanceINTERIM%20FINAL.pdf [Accessed on 04/08/2021]

- Development works, the resulting dust impacts from the demolition and construction and the associated effects on human health receptors and amenity, as per the IAQM Guidance on assessment of dust from demolition and construction[12];
- Development works demolition and construction stage and operation stage traffic emission effects on human health receptors, as per the IAQM Guidance on land use and development control for air quality[13].
- Operation of the proposed development data center associated emissions arising from combustion plant effects on human health receptors beyond the site boundary.

8.9 The UK EPUK/IAQM guidance is applicable to assessing the effect of changes in exposure of member of the public resulting from developments where a proposal could affect local air quality and for which no other appropriate guidance exists in Ireland, as such this guidance has been adopted. The guidance considers the proximity to an Air Quality Management Area (AQMA), which is an area likely to approach or exceed the values set by air quality objectives. The guidance provides an indicative criterion to determine the level of an air quality assessment due to road traffic flows emissions:

- A change of Light Duty Vehicles (LDVs) flows of more than 100 Average Annual Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA) or more than 500 AADT elsewhere.
- A change of Heavy-Duty Vehicles (HDVs) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

8.10 The proposed development site and study area are not expected to approach or exceed the air quality objectives (as shown in the Baseline Conditions of this Chapter) and therefore the criteria outside an AQMA would apply to determine the significance of effects arising on local air quality due to the proposed development traffic flows.

8.11 The estimated demolition and construction stage vehicle movements for 12 hours working day would result in a combined LGV and HGV two-way 440 daily trips, of which 126 two-way trips would be HGV. However, when the movements are averaged over a full year period (24-hour AADT), these would be expected to be lower than 12-hour daily movements. Demolition and construction works' traffic flows would therefore not be expected to exceed the threshold of 500 AADT LGV movements or the 100 AADT HGVs for a detailed modelling assessment to be necessary according to EPUK/IAQM guidance. In addition, HGV movements would be controlled through the implementation of a Construction Environmental Management Plan (CEMP) as described in Chapter 5: Construction Description, which would be secured by means of an appropriately worded planning condition. The effects of demolition and construction related traffic emissions would be short-term, negative, and imperceptible with relation to human health. Accordingly, demolition and construction traffic emissions have not been considered further within this chapter.

8.12 The operational stage would be expected to generate 164 daily vehicles, i.e., well below the EPUK/IAQM criteria. The effects of completed development stage related traffic emissions would be long-term, negative, and not significant with relation to human health. Accordingly, operational stage traffic emissions have not been considered further within this chapter.

8.13 There are no protected European sites, designated under the EC Habitats Directive (92/43/EEC)[18], or National Heritage Areas (NHAs), designated under the Wildlife Acts[19], within the proposed development boundary. The nearest European sites to the Proposed Development are the Rye Water Valley/ Carton Special Area of Conservation (SAC), approximately 5.9 km north-west of the site, and Glenasmole Valley SAC, approximately 8.0 km south-east of the site. The Grand Canal proposed NHA is located approximately 1.3 km north of the site. The nearest protected European sites and NHAs are considered to fall outside the zone of influence of the proposed development and therefore the demolition and construction stage and operation stage air quality effects would be expected to be long-term, negative, and imperceptible and have not been considered further within this chapter.

8.14 The assessment includes a quantitative assessment of emissions of the Multifuel Generation Plant (MFGP) and the data center emergency generators. None of the other plant associated with the data center (i.e., chillers, substation) would give rise to significant emissions of air pollutants.

8.15 The potential impact to air quality during the operational phase is a breach of the ambient air quality standards (AQSs) associated with emissions from proposed development combustion engines (emergency generators and MFGP). The main pollutant of concern in relation to emissions from the combustion engines is NO_2 and the assessment concentrates on the impacts of NO_2 emissions on human health receptors. In relation to carbon monoxide (CO), sulphur (SO_2), PM_{10}, $PM_{2.5}$ and benzene no detailed modelling was undertaken as combustion engines emissions of these pollutants' would be significantly lower when compared with NOx emissions relative to their respective ambient air quality standard. Ensuring compliance with NO_2 air quality standards would ensure compliance of other pollutants.

8.16 It is considered that the proposed development would not give rise to any odour impacts and associated effects and odour is not assessed as part of the EIAR Chapter.

Spatial Scope

8.17 The study area for the demolition and construction stage assessment is defined as up to 350 m from the site boundary for the assessment of demolition and construction dust emissions, and 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) as per the IAQM guidance on the Assessment of Dust from Demolition and Construction[12].

8.18 For the operation stage assessment, the study area encompasses the application site, representative off-site receptors identified as at risk of impacts from the proposed development and receptor Cartesian grids with the site at the centre, as recommended by EPA AG4 guidance[14]. The off-site receptors and receptor grids are presented in the Baseline Conditions section of this EIAR. The study area also considers identified neighbouring cumulative development and commercial activities adjacent to the site (see Chapter 1: Introduction).

Temporal Scope

8.19 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary and short term (1-3 years) in nature and from the operation stage which would be expected to be long-term to permanent in nature (i.e., more than 10 years).

8.20 The assessment of the phased delivery of the proposed development has been undertaken in line with the information provided in Chapter 5: Construction Description of this EIAR Volume. The works are anticipated to be undertaken over a 30-month period, with a completion targeted of Q4 2024. Due to the size of the proposed development, it would be completed in two phases. The development phasing details relevant for the air quality assessment are as follow:

- Phase 1:
  - Construction and operation of Data Center DUB 11 with 22 emergency diesel generators, and North MFGP to support DUB 11. South MFGP building / slab constructed but not operational.
  - The MFGP would use Hydrotreated Vegetable Oil (HVO) as a fuel source, whilst a EirGrid GIS substation to the south of Falcon Avenue is permitted, and constructed.
- Phase 2:
  - DUB 12 operational and MFGP South generators installed and operational.
  - Main power supply from EirGrid Substation to the south of Falcon Avenue for main power supply.
  - Phase 2 will see DUB 11 and DUB 12 operational, with 36 emergency diesel generators, and the MFGP operational to full capacity with gas from Gas Network Ireland (GNI) as a fuel source. MFGP

18 https://www.npws.ie/legislation/eu-directives

19 https://www.npws.ie/legislation/irish-law

8.21 The above phasing has informed the identification of the potential worst-case scenarios for air quality to ensure that the worst possible emissions are reported at each receptor location. As part of the air quality assessment scenarios presented in Table 8.1 have been considered to assess the impacts of the operational stage.

Table 8.1: Air Quality Assessment Operation Stage Scenarios

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

Baseline Characterisation Method

Desk Study

8.22 To establish baseline air quality conditions in the study area, relevant data was reviewed and assessed. Local air quality monitoring data was obtained from EPA air quality continuous monitoring network[20] and from cumulative schemes EIAR[21].

8.23 Traffic flows were provided by the project transport consultant (Ramboll) as per Chapter 7: Transport and Accessibility.

8.24 The cumulative air quality impacts for the cumulative developments described in Chapter 2: EIA Process and Methodology have been extracted from the EIARs submitted as part of the planning applications.

Field Study

8.25 No site-specific field study was undertaken at the site as the data collected from other sources was deemed to be adequate and representative of the site and local air quality conditions.

Assessment Method

8.26 The assessment has been based on the planning application drawings and plans and the development description presented in Chapter 4: Proposed Development Description, as well as reported in Chapter 5: Construction Description.

8.27 Full details of both demolition and construction stage, and operation stage assessment methodology, data and modelling parameters are provided in Technical Appendix 8.1 in the EIAR Volume 3.

20 EPA, 2021, EPA Website: http://www.epa.ie/whatwedo/monitoring/air/ [Accessed on 30/06/2021]
21 South Dublin County Council, 2021. Available at: h http://www.sdublincoco.ie/Planning/Details?p=1&r=SD21A%2F0167&regref=SD21A%2F0167 [Accessed on 04/08/2021]

Methodology

Demolition and Construction Stage

8.28 During the demolition and construction stage, the main potential impacts would be dust annoyance and locally elevated concentrations of PM_{10}. These impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. Separation distance is also an important factor as significant dust annoyance is usually limited to within a few hundred metres of its source. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

8.29 Likely effects associated with demolition and construction dust emissions, unlike other air borne pollutants, cannot be accurately predicted and quantified because they are highly dependent on local weather conditions and mitigation measures implemented at source. This assessment has followed the guidance published by the IAQM on the assessment of the effects of demolition and construction on air quality[12].

8.30 The guidance recommends that the risk of dust emission magnitude is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from demolition and construction stage activities. The risk of dust arising in sufficient quantities to cause annoyance and/or health impacts is determined using four risk categories: high, medium, low, or negligible. Depending on the level of risk for each activity, appropriate mitigation is selected. Full details of the dust risk assessment methodology which includes the assessment criteria are provided in Technical Appendix 8.1 in the EIAR Volume 3.

Operation Stage

8.31 Air dispersion modelling was carried out using Atmospheric Dispersion Modelling System (ADMS 5)[22] to ensure that adequate stack height was selected to aid dispersion of the emissions and achieve compliance with the NO_2 human health ambient air quality standards beyond the site boundary, considering the existing baseline level on ambient air quality concentrations.

8.32 ADMS is recommended as an appropriate model to assess the impact of air emissions from industrial facilities in the EPA Guidance AG4[14]. ADMS uses representative meteorological data for the local area and plant emissions data to predict ambient concentrations of pollutants in the vicinity of the site. A detailed description of the ADMS 5 model is provided in Technical Appendix 8.1 in the EIAR Volume 3. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site, building configuration, etc. Full details of the model parameters are presented in Technical Appendix 8.1 in the EIAR Volume 3.

8.33 The proposed development Scenario 1 will consist of the details described in Table 8.1 with the following number engine parameters:

- MFGP with 6 generators and associated 30 metres flues, using HVO as the fuel source.

The proposed development Scenario 1 Emergency Scenario will consist of:

- Building DUB 11with 22 diesel emergency back-up generators and associated 22.3 metres flues.

8.34 The proposed development Scenario 2 will consist of:

- MFGP with 11 generators and associated 30 metres flues, using natural gas as a fuel source.

8.35 The proposed development Scenario 2 and Scenario 3 Emergency Scenario will consist of:

- Building DUB 11and DUB12 with 36 diesel emergency back-up generators and associated 22.3 metres flues.

22 Available at: http://www.cerc.co.uk/environmental-software/ADMS-model.html [Accessed on 25/07/2021]

8.36 For dispersion modelling purposes it is assumed that for all relevant scenarios, the MFGP and emergency generators would to be operating continuously all year round for the assessment of NO_2 annual average and hourly impacts.

8.37 Controlled maintenance including periodic testing of the emergency diesel generators is required so that they are ready to be started at full load during an emergency power failure. The testing regime and testing times are not currently known, but based on professional experience, the generators are likely to be tested one generator at a time and sequentially with a periodic testing regime of weekly run test at reduced load and quarterly at full load. The periodic test would be expected run for a short period of time between 30 minutes to one hour. Given the expected short period of testing operation and the elevated exhaust improving dispersion, it is unlikely that the NO_2 ambient air quality standards would be exceeded. When in use in an emergency, all the generators could be operational at full load and therefore the impacts during an emergency are higher than those when individual or groups of generators are being routinely tested. The impacts during the testing regimes have been scoped out of the modelling assessment and the emergency operation have therefore been assessed as the worst-case scenario.

8.38 The operation of the emergency generators has been assessed according to the methodology published by the UK Environment Agency guidance[16,17]. The UK guidance is a conservative probabilistic approach which uses the emergency generators maximum hourly emissions to determine the number of hours that all the generators could operate simultaneously in any one year with a 1% chance of exceeding the 1-hour mean objective based on the worst modelled meteorological year. The USEPA methodology[15] to assess the 1-hour NO_2 ambient AQS considers that a probabilistic method is too conservative and proposes to model impacts from intermittent emissions based on an average hourly rate (i.e., maximum hourly rate factored to a certain number of more realistic operating hours), rather than maximum hourly emissions. Given the conservative approach of the UK guidance, this assessment considers the UK guidance more suitable for protection of sensitive receptors and to demonstrate compliance with the ambient AQS and therefore it has been used to assess the likelihood of exceedance of the 1-hour NO_2 ambient AQS.

8.39 Following the UK Environment Agency methodology, the hourly emissions and the allowable operating hours for emergency operation were estimated from a statistical analysis of the likelihood of breaching the 1-hour objective for NO_2 concentrations by using the hypergeometric distribution function. The allowable operating hours were calculated for a 1% probability of exceeding the one-hour mean objective at the most impacted receptor location. In accordance with the emissions from specified generators guidance, in an emergency when the operating period is greater than one hour, the calculated probability has been multiplied by 2.5. For compliance with the annual mean objectives, the predicted concentrations were scaled to the total annual operating hours that the generators were determined to run for the 1% probability of exceeding the one-hour mean objective.

8.40 The likelihood of exceeding the 1-hour mean objective also considers the baseline pollutant concentrations in the vicinity of the site. For the short-term assessment, the background concentration is assumed to be twice the annual mean background concentration. As the dispersion modelling was undertaken for NOx emissions, for estimating the number of exceedances of the hourly mean NO_2 objective, the exceedance concentration in the model was set as follows:

- Model exceedance concentration = (200 – twice annual mean background)/0.35.

8.41 For scenarios 1 to 3, guidance on air emissions risk assessments produced by the UK Environment Agency[23] was used to support an assessment of the overall impact of the emissions resulting from the installations to confirm that the emissions are acceptable (i.e., do not cause significant environmental pollution). Emissions of NOx from combustion sources include both nitric oxide (NO) and NO_2, with the majority being in the form of NO. During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex combustion reactions, because of high temperature, to NO. In ambient air, NO is oxidised to form NO_2, a more harmful form of NOx with more significant health impacts.

For this assessment, the conversion of NOx to NO_2 has been estimated using the worst-case assumptions set out in the UK Environment Agency guidance:

- For the assessment of long term (annual mean) impacts at receptors 70% of NOx is converted to NO_2; and
- For the assessment of short term (hourly mean) impacts at receptors 35% of NOx is converted to NO_2.

8.42 The UK Environment Agency assumptions offer a worst-case assessment as the conversion rates may be conservative as the oxidation of NO to NO_2 is not an instantaneous process particularly at short distance from the emissions source where the maximum impacts are predicted to occur.

8.43 Tall buildings can have a substantial impact on the dispersion of pollutants from stacks, as a result of building downwash i.e., pollutants being drawn down in the wake of a building, giving rise to high concentrations close to the base of the buildings. The buildings include in the ADMS model are shown in Technical Appendix 8.1 in the EIAR Volume 3. An initial model run was undertaken to confirm the flues heights would ensure adequate dispersion

8.44 To undertake the assessment, the emergency generators and MFGP engines were allocated their own flues and the flues combined in ADMS in triples or quadruples when adjacent, according to the plan's configuration. The location and flue parameters used in the model are shown in Technical Appendix 8.1 in the EIAR Volume 3.

8.45 The dispersion modelling has been undertaken with five years of hourly sequenced meteorology data for the years 2015 to 2019 inclusive, from Casement Aerodrome which is approximately 1 km to the south of the site. Adopting the maximum hourly stack emissions across the five years of meteorological data will ensure the worst-case long and short-term concentrations from the stacks are considered within the assessment. The Casement Aerodrome windroses are presented in Technical Appendix 8.1 in the EIAR Volume 3.

8.46 For the emergency generators and the MFGP, emission rates, volumetric flowrates and stack parameters have been provided by the lead project consultant, Burns & McDonnell. Flue heights and diameters were taken from the CAD layout drawings. The emergency generators and MFGP model input data used in the model is provided in Table 8.2.

8.47 HVO is a fuel made from feedstocks including virgin and recycled vegetable oil; fat fractions from food wastes; algae and municipal waste and sludge, where these fats and oils undergo hydrotreating. HVO has an almost identical chemical composition to petroleum-diesel, but is derived from renewable resources. This similarity allows for HVO to be used in existing diesel engines without modification and is compatible with existing diesel infrastructure and stations. Literature and tests performed on stationary engines to assess the NOx emission benefits of HVO relative to diesel are limited. This assessment considered the findings of a back-to-back tests performed at Caterpillar's Large Engine Center on a Cat® 3516E 3,000 ekW diesel generator set running on diesel and HVO, detailed in Technical Appendix 8.1 in the EIAR Volume 3. The test showed that at a 50% load and lower, the HVO shows a NOx reduction of up to approximately 40%, but at higher loads no obvious reductions were visible. As the MFGP engines are expected to run at 90% load, this assessment therefore considered that the MFGP using HVO as the fuel source would have the same NOx emissions as if it was using diesel as a reasonable worst case. The assessment assumes a Selective Catalytic Reduction (SCR) efficiency with 95% NOx emission reduction was included in the MFGP design.

23 UK Environment Agency. Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit. [Accessed on 04/08/2021]

Table 8.2: Stack Emissions Modelling Input Parameters

Plant	Equipment	Temperature (°C)	Volume Flux (Am^3/s)	Height (m)	Diameter (m)	NO_2 Emission Rate at discharge conditions (g/s)
MFGP on HVO	WÄRTSILÄ 34SG 9.8 MW, SCR	355	33.0	30	1.2	1.4
MFGP on Gas	WÄRTSILÄ 34SG 9.8 MW, SCR	360	28.4	30	1.2	0.2
Emergency Generators	CAT 3516E, EM4789	422	10.0	22.3	0.6	4.2

8.48 It should also be noted that further assessment of the data center emissions will be required at the detailed design stage as part of the Environmental Permit application for the proposed development. The NOx emission concentrations from the MFGP and emergency generators comply with the requirements of the Medium Combustion Plant Directive (MCPD). The MFGP will include selective catalytic reduction (SCR) and the NOx emissions comply with the Industrial Emissions Directive.

Cumulative Stage

8.49 The cumulative impact scenario includes the impact of the proposed development, as outlined above, combined with emissions from nearby cumulative developments with granted permission or due to be decided, subject to availability of cumulative scheme information in the public domain. Cumulative effects have been included in this Chapter following the review the cumulative schemes EIARs submitted as part of the planning applications as outlined in Chapter 2: EIA Process and Methodology

8.50 Existing IE licensed emissions points, such as Pfizer, Takeda and Grange backup power, have air emission points emitting air pollutants on a continuous basis over the course of a year. Other nearby data center facilities, such as AWR, Cyrus One, Google Ireland and Microsoft, have emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis. The emergency generators emission points associated with the nearby data storage facilities were not considered for the purpose of this assessment.

Assessment Criteria

8.51 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

Demolition and Construction Stage

8.52 The sensitivities of people to dust soiling effect has been classified as low, medium, or high, in line with the IAQM guidance criteria, as set out in Table 8.2.

Table 8.2: Sensitivities of People to Dust Soiling Effect– Demolition and Construction Stage

Sensitivity	Criteria
Low	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics, or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • First occupants moving into residential dwellings on a large, phased housing development; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums, and other culturally important collections, medium- and long-term car parks and car showrooms.

Operation Stage

8.53 To protect human health, national and European statutory bodies defined health or environmental-based AQS for a range of air pollutants. There are no degrees of sensitivity of receptors to poor air quality, rather, the assessment is based on whether members of the public are likely to be present for the proposed averaging period of the objective and air quality significance criteria are assessed based on compliance with the appropriate standards or limit values.

8.54 The AQS are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects on human health (including sensitive sub-groups) or ecosystems. In general, these are concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects. Standards are values often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

8.55 The applicable standards in Ireland include the Air Quality Standards Regulations 2011[8,10], which incorporate European Commission Directive 2008/50/EC[2], and set limit values for NO_2, PM_{10} and $PM_{2.5}$ relevant to this assessment, as described in Table 8.3.

Table 8.3: Human Health Air Quality Standard

Pollutant	Time Period	Value
NO_2	Annual Mean for protection of Human Health	40 µg/m^3

Table 8.3: Human Health Air Quality Standard

Pollutant	Time Period	Value
	1-hour mean	200 μg/m³ not to be exceeded more than 18 times a year
Particulate Matter (as PM_{10})	24 hours mean	50 μg/m³ not to be exceeded more than 35 times per year
	Annual mean	40 μg/m³
$PM_{2.5}$	Annual mean	25 μg/m³

8.56 The AQS Regulations 2011 state that compliance with the limit values shall not be assessed at the following locations:

- where members of the public do not have access and there is no fixed habitation;
- on factory premises or at industrial installations; and
- on the carriageway/central reservation of roads except where there is normally pedestrian access.

Impact Magnitude Criteria

Demolition and Construction Stage

8.57 The criteria provided in the guidance produced by the IAQM[12] was used to assess the potential risk of impacts to air quality from demolition and construction stage activity in the absence of mitigation during demolition and construction stage of the proposed development. The methodology combines the magnitude of dust emissions together with the sensitivity of the receptor to identify low, medium, or high risk of dust impacts in the absence of mitigation for the four stages of construction: demolition, earthworks, construction and trackout.

Operation Stage

8.58 The operation of the emergency generators has been assessed according to the methodology published by the UK Environment Agency [16,17] to determine the statistical likelihood of exceedance of the NO_2 hourly limit value. The allowable hours for emergency operation are estimated from a statistical analysis of the likelihood of breaching the hourly mean NO_2 AQS (considering baseline pollutant concentrations).

8.59 The hypergeometric probability distribution test (see Appendix 8.1 in Volume 3 for more details) provides an estimate of the probability of breaching the AQO given random use of the generators for a total number of operating hours per year. Table 8.4 shows how the calculated probabilities are judged; the 1% probability is normally used as the benchmark to calculate the allowable operating hours during emergency operation; if the generators had a life of less than 20 years then it may be possible to use the 5% probability level although this does not increase the allowable operating hours significantly.

Table 8.4: Probability Significance for hourly mean NO_2 AQS

Probability	Significance
1%	Indicates exceedance is highly unlikely
5%	Indicates that exceedance is unlikely provided generator lifetime is less than 20 years
>5%	Indicates potential for exceedance

8.60 To assess the potential impacts and associated likely effects of the MFGP and emergency generators, the 5 years worst case NO_2 modelled concentration at sensitive receptors, known as process contribution (PC), were added to the background concentrations to obtain the process environmental contribution (PEC). The PEC was then compared with the relevant ambient AQS to assess the significance of the air quality effects associated with the proposed development emissions.

8.61 To consider the model uncertainty, this assessment also refers to the recommendations outlined within the EPA AG4 guidance[14]. The guidance recommends that if the facility is operated continually at close to the maximum licenced mass emission rate the PC should be less than 75% of the ambient AQS and less than this where background levels account for a significant fraction of the ambient air quality standard based on the formula:

- Maximum Allowable Process Contribution= 0.75*(AQS-Background)

8.62 Based on the above and the average background concentrations in the study area described in the baseline conditions section of the Chapter, the annual mean PC should not exceed the value of 17.0 μg/m³ and the 1-hour average PC should not exceed the value of 137.3 μg/m³.

Scale of Effect Criteria

Demolition and Construction Stage

8.63 The IAQM guidance recommends that no assessment of the significance of dust effects is made without mitigation in place, as mitigation is assumed to be secured by industry best practice, planning conditions, legal requirements or required by regulations. With appropriate mitigation in place, the effect of demolition and construction stage dust emission impacts on air quality is always assessed as not significant. The purpose of the demolition and construction stage dust assessment has therefore been to identify the appropriate level of mitigation to employ.

8.64 Using the IAQM assessment methodology to identify the appropriate level of mitigation, and on the assumption that the identified mitigation measures are applied and are commensurate with the risk of potential dust impacts, the guidance indicates that that the potential for dust effects to arise during the demolition and construction stage would be at worst 'slight adverse' and would be temporary in nature.

Operation Stage

8.65 The potential impact to air quality from the proposed development plant is a breach of the ambient air quality standards as a result of air emissions from the proposed development plant engines.

8.66 In determining the significance of reported effects, consideration has been given to the type of effect i.e., direct, indirect, or secondary, the geographical extent of the effect and the duration of the effect i.e. temporary which is considered to be either short term (up to seven years) or medium term (7-15 years), long term (15 to 60 years) or permanent (>60 years or more).

Nature of Effect Criteria

8.67 The nature of the effect has been described as either negative, neutral, or positive as outlined in Chapter 2: EIA Process and Methodology.

Assumptions and Limitations

8.68 The assessment has relied on data extracted from the EPA and planning application EIAR air quality assessments. It has been assumed that the data sets have been reported correctly.

8.69 There are many components that contribute to the uncertainty in predicted concentrations. Although the model has been extensively validated against field data sets and their use has gained wide acceptance, no computer-based model is able to totally replicate actual conditions as it is required to simplify real-world conditions into a series of algorithms. The model used in this assessment is also dependent upon several sources of data which will have inherent uncertainties associated with them.

8.70 Tall buildings can have a substantial impact on the dispersion of pollutants from stacks, as a result of building downwash i.e., pollutants being drawn down in the wake of a building, giving rise to high concentrations close to the base of the buildings. ADMS5 can take account of this potential impact by the inclusion of rectangular buildings in the model. The buildings included within the modelling were based on the interpretation of the development parameters and plans.

8.71 The terrain within the study area is relatively flat with slopes less than 10 %, and therefore terrain effects have not been included within the modelling.

8.72 Emission rates, volumetric flowrates and flue parameters have been based on data provided by the project Architect consultant, Burns & McDonnell. It has been assumed that the up-to-date data sets have been provided and reported correctly.

8.73 Overall, when considering the assumed number of operating hours; the approach taken to meteorological conditions; and the assumed NOx to NO_2 relationship, the assessment is expected to over-predict the impacts of the proposed development. The approach used therefore provides a robust assessment.

Baseline Conditions

Existing Baseline

8.74 Under the Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC), Ireland designated four air quality zones for the purpose of air quality management and assessment[24]. In terms of air monitoring, the development site is within Dublin Zone A.

NO_2

8.75 Air Quality monitoring is carried out by the EPA and local authorities at Dublin Zone A urban and suburban background locations. A summary of the closest and most representative monitoring locations is presented in Table 8.5 and the locations shown in Figure 8.1.

Table 8.5: Measured Annual Average NO_2 Concentrations (μg/m³)

Station	Type	Distance from Site (km)	2015	2016	2017	2018	2019	5 years Average
Ballyfermot	Suburban Background	≈ 6.5	16	17	17	17	20	17
Rathmines	Urban Background	≈ 11.8	18	20	17	20	22	19
Dun Laoghaire	Suburban Background	≈ 21.1	16	19	17	19	15	17
Swords	Suburban Background	≈ 21.8	13	16	14	16	15	15
AQS			40					

8.76 Measured NO_2 concentrations at the closest background automatic monitoring station to the site, Ballyfermot, have been well below the ambient AQS with an average annual mean concentration of approximately 17 μg/m³ between 2015-2019.

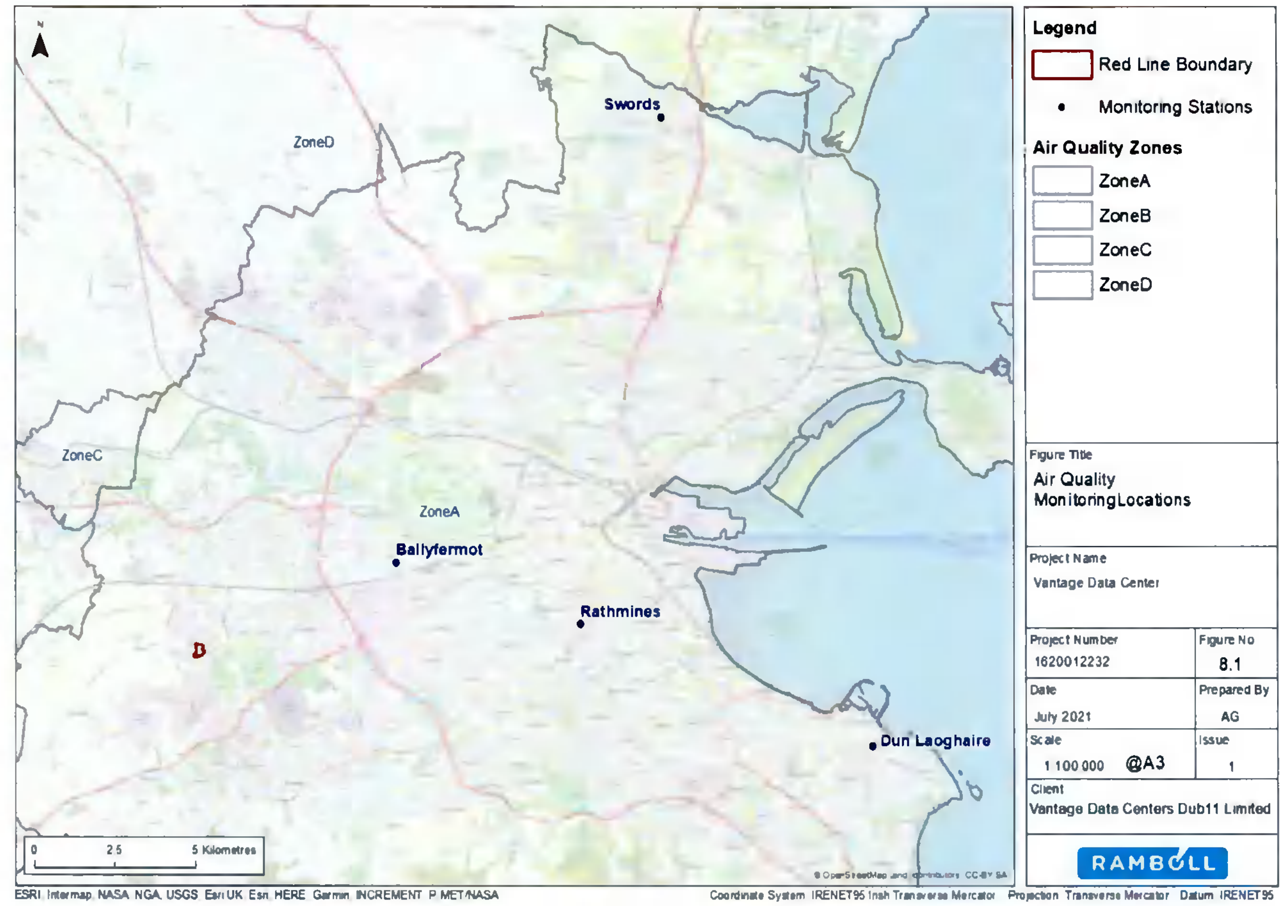


Figure 8.1: Air Quality Monitoring Locations

Particulates (PM_{10} and $PM_{2.5}$)

8.77 Measured continuous PM_{10} monitoring carried out within Dublin Zone A background locations have been well below the ambient AQS with an average annual mean concentration of approximately 15 μg/m³

8.78 Measured continuous $PM_{2.5}$ monitoring carried out within Dublin Zone A locations have been well below the ambient AQS with an average annual mean concentration of approximately 11 μg/m³.

Assessment of Monitoring Data

8.79 Ballyfermot background station is the closest station to the site and would therefore be considered representative of the air quality within study area. Measured NO_2 and PM_{10} at Ballyfermot have been well below the relevant AQS and therefore background concentrations at the site and within the study area would be expected to be below the AQS.

8.80 Measured $PM_{2.5}$ within Dublin Zone A have been well below the relevant AQS and therefore $PM_{2.5}$ background concentrations at the site and within the study area would be expected to be below the AQS.

8.81 For the purposes of this assessment, Ballyfermot NO_2 average background concentration measured between 2015-2019 with the value of 17 μg/m³ has been used to estimate the PEC.

Sensitive Receptors

8.82 The site is surrounded by large commercial areas occupied by industrial uses to the north and south within the Kilcarbery Park, Grange Castle Business Park and Profile Park. The closest occupied residential properties are located at the north eastern site boundary and approximately 480 m south-east of the

24 https://www.epa.ie/air/quality/zones/ [Accessed on 04/08/2021]

proposed site boundary along the Baldonnel Road. Residential development is primarily located in Deansrath, Clondalkin, approximately 800 m the east of the site. The residential property within the site boundary is no longer in residential use and is proposed to be demolished as part of the development.

8.83 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and hourly mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes and temporary residence caravan parks. The locations of existing receptors were chosen to represent locations where impacts from the proposed development are likely to be the greatest.

8.84 The existing receptors identified as being sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised Table 8.6 and displayed on Figure 8.2. Existing receptor locations were modelled at a height of 1.5 m and 4.5 representing typical two storey property with exposure at ground floor and top floor level.

Table 8.6: Summary of Sensitive Receptors

Receptor ID	Location	X (m)	Y (m)	Type Exposure
R1	New Nangor Road	703782	730868	Residential
R2	Nangor Road	703515	730878	Commercial/Industrial
R3	Nangor Lea, Nangor Road	704067	730927	Residential
R4	Castlegrange Green	704731	731119	Residential
R5	Oldcastlepark Lawn Caravan park	704658	731156	Residential
R6	Oldcastlepark Lawn Caravan park	704652	731171	Residential
R7	Kilbride House, Baldonnel Road	703686	730091	Residential
R8	Casement Aerodrome, Baldonnel	703654	730026	Commercial/Residential
R9	Casement Aerodrome, Baldonnel	703482	730024	Commercial/Residential
R10	Aungierstown, Baldonnel Road	703286	730109	Residential
R11	Aungierstown, Baldonnel Road	703257	730117	Residential
R12	Aungierstown, Baldonnel Road	703200	730136	Residential
R13	Aungierstown, Baldonnel Road	703129	730165	Residential
R14	Baldonnel Road	703027	730288	Residential
R15	Baldonnel Road	703014	730327	Residential
R16	Baldonnel Road Residential	702964	730384	Residential
R17	Baldonnel Road	703024	730476	Residential
R18	Baldonnel Road	702940	730528	Residential
R19	Baldonnel Road	702897	730569	Residential
R20	Baldonnel Road	702876	730595	Residential
R21	Baldonnel Road Comex Mc Kinnon	702850	730615	Commercial/Residential

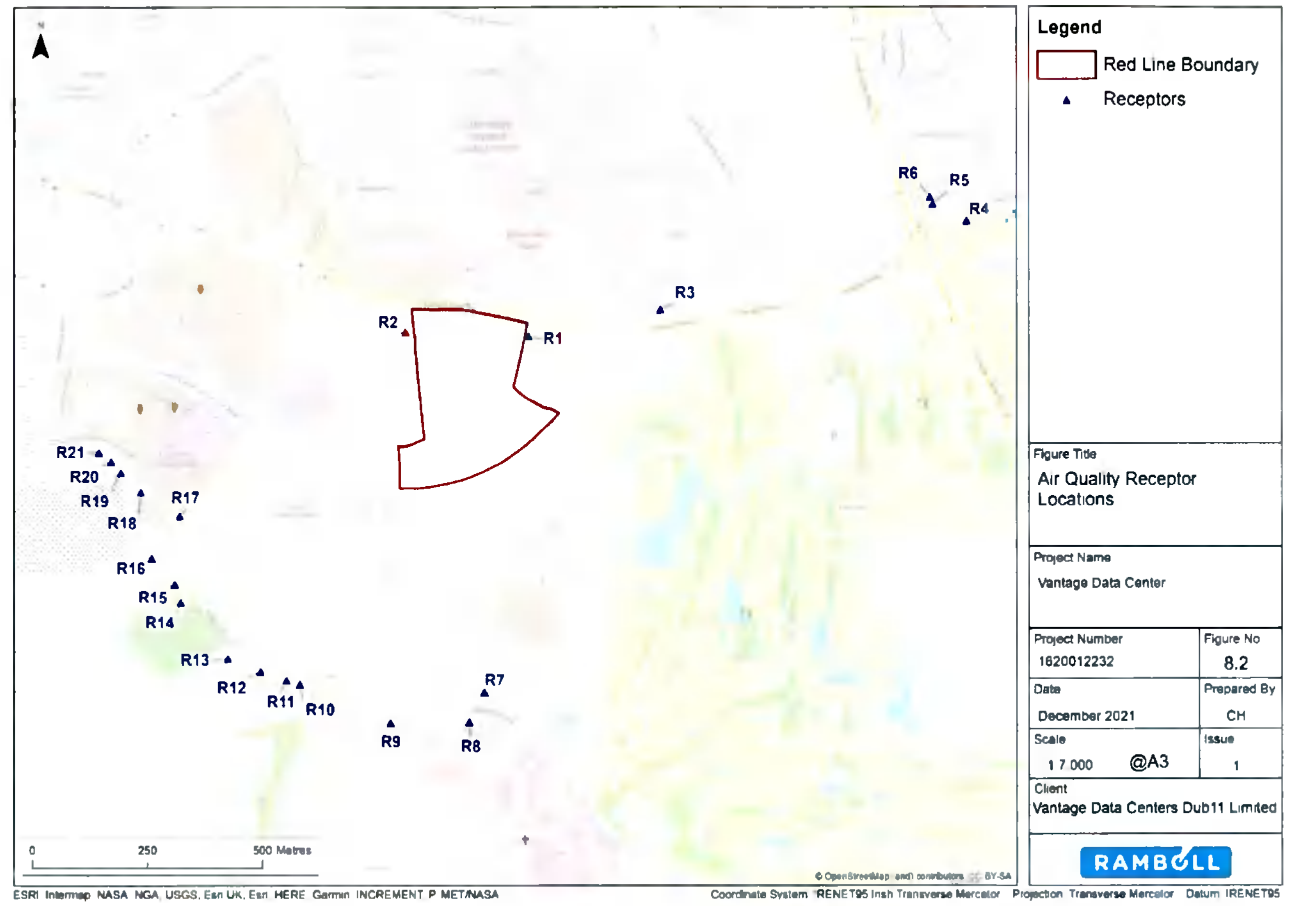


Figure 8.2: Air Quality Receptor Locations

8.85 Concentrations were also predicted for a grid of receptors (contours) mapped with sufficient resolution to ensure all localised "hot-spots" were identified and to visually demonstrate the pattern of dispersion, as recommended by EPA AG4 guidance. The grids were based on a Cartesian grid with the site at the centre and are described in Table 8.7.

Table 8.7: Receptor Grids

Grid	Measure	Spacing (m)
Outer Grid	5x5 km	500
Middle Grid	3x3 km	100
Inner Grid	500x500 m	20

Assessment of Effects

Demolition and Construction Effects

8.86 The main activities with potential to cause emissions of dust construction will include:

- Demolition of existing buildings;
- Earthworks and site preparation, including the Baldonnel Stream Enhancements;
- Construction of building structures, including foundations;
- Materials Handling such as storage of materials in stockpiles and spillage;
- Construction of on and off-site highway improvements; and
- Hard and soft landscaping.

8.87 Dust impacts would be greatest in dry weather following long periods without rain and with the wind blowing towards sensitive receptors. Depending on wind speed and turbulence it is likely that most of the dust will be deposited within 100 m of the source. Meteorological data for Casement Aerodrome, shown in Technical Appendix 8.1 in EIAR Volume 3, suggests that prevailing winds are typically south-westerly.

8.88 The risk of potential air quality impacts from demolition, earthworks, construction and trackout (the transport of dust and dirt from the application site onto the public road network) was assessed according to guidance developed by the IAQM to identify the appropriate level of mitigation.

8.89 Using the evaluation criteria within the IAQM's Guidance, the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 8.8 based on information presented in Chapter 5: Construction Description of this Volume.

Table 8.8: Dust Emission Impact Magnitude for Proposed Development Works

Activity	Dust Emission Magnitude	Justification
Demolition	Small	Demolition of the former residential property within the site. The total building volume is estimated to be <20,000 m^3. Demolition activities would occur at height of more than 10 m above ground level.
Earthworks	Large	Total site area over 10,000 m^2.
Construction	Large	The proposed development would have a total estimated construction volume of over 100,000 m^3.
Trackout	Medium	HDV movements over the course of the worst-case phase would be up to 10-50 HDV movements in one day. Unpaved road length would be between 50 m- 100m.

8.90 The closest sensitive receptors to construction activity within 350 m of the site would be residential property directly adjacent to the north east boundary of the site, identified as Receptor R1 in Table 8.6, and the car garage, identified as receptor R2.

8.91 The next stage of the process is to define the sensitivity of the assessment area to dust soiling and human health impacts. This process combines the sensitivity of the receptor with the distance from the source to determine the overall sensitivity. The sensitivity of the area to dust impacts (considering distance to construction activity) is provided in Table 8.9.

Table 8.9: Sensitivity of Study Area to Dust Impacts

Sensitivity to Dust Soiling	Sensitivity to Human Health Impacts
Medium: 1-10 sensitive receptors within 20 m of the site.	Low: 1-10 sensitive receptors within 20 m of the site. Average measured PM_{10} concentrations are below 24 $\mu g/m^3$ (see Baseline Conditions section).

8.92 The dust emission magnitude determined in Table 8.8 has been combined with the sensitivity assessment in Table 8.9 to define the risk of impacts for each stage of the proposed development works in the absence of mitigation, as shown in Table 8.10.

Table 8.10: Risk of Dust Impacts in Absence of Mitigation at Proposed Development

Sensitivity of Study Area	Dust Emission Magnitude for Each Phase of Works			
	Demolition (Small)	Earthworks (Large)	Construction (Large)	Trackout (Medium)
Dust Soiling (Medium)	Low Risk	Medium Risk	Medium Risk	Low Risk
Human Health (Low)	Negligible Risk	Low Risk	Low Risk	Low Risk

8.93 Therefore, using professional judgement, the overall risk of dust impacts in the absence of mitigation has been assessed as the highest resulting risk, i.e. as being Medium Risk.

Embedded Mitigation and Standard Good Practice

8.94 The control of dust and construction traffic emissions from a demolition and construction site relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended IAQM guidance to reduce impacts from medium risk sites is provided Table 8.11. The mitigation measures for both direct impacts and those from traffic would be detailed within the site's CEMP. It is noted that these measures have already been accounted for in EIAR Chapter 5: Construction Description of this Volume.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display name and contact details of responsible person for dust issues on the site boundary (e.g. hoarding) in addition to head/regional office contact information. • Display the head or regional office contact information.
Dust Management Plan	• Develop and implement a Dust Management Plan (DMP) which is included as part of the CEMP.
Site Management	• Record all complaints and incidents in a site log. • Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. • Make the complaints log available to the Local Authority if requested. • Record any exceptional dust incidents on- or off-site. • Hold regular liaison meeting with other high-risk construction sites within 500 m.
Monitoring	• Undertake daily on and off-site visual inspections where there are nearby receptors. • Carry out regular inspections to ensure compliance with the DMP and record results in the site logbook.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	• Plan site layout to locate dust generating activities as far as possible from receptors. • Use solid screens around dusty activities and around stockpiles. • Avoid site runoff of water and mud. • Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Keep site fencing barriers and scaffolding clean using wet methods. • Remove dusty materials from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below • Minimise emissions from stockpiles by covering, seeding, fencing, or damping down.
Operating Vehicle/ Machinery and Sustainable Travel	• Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. • Ensure vehicles switch off engines when stationary. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	• Only undertake cutting, grinding, or sawing equipment with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression. • Use enclosed chutes, conveyors, and covered skips. • Minimise drop heights of materials. • Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	• Avoid bonfires. • Avoid explosive blasting using appropriate manual or mechanical techniques. • Bag and remove any biological debris.
Measures Specific to Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression during demolition. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. • Avoid concrete scabbling where possible. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures Specific to Trackout	• Use water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• Ensure vehicles entering and leaving the site are appropriately covered. • Record inspections of haul roads in site log, including any remedial action taken. • Implement a wheel washing system. • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit. • Access gates to be located at least 10 m from the receptors where possible.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil. • Only remove the cover in small areas during work and not all at once.

8.95 The IAQM's guidance recommends that no assessment of the significance of demolition and construction stage effects is made without mitigation in place. With the implementation of the CEMP, CLP (i.e. the measures outlined in Chapter 5: Construction Description), the demolition and construction dust and on-site vehicle emissions effects in the study would be **Negative**, **Temporary to Short-term** and **Imperceptible** i.e. **Not Significant** in terms of EIA.

Operation Effects

Phase 1

Multifuel Generation Plant

8.96 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 1 MFGP is provided in Table 8.12.

Table 8.12: Scenario 1 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	2.3	5.7	17.4	19.7	49.2
R2	0.1	0.3	17.4	17.5	43.8
R3	2.0	5.0	17.4	19.4	48.5
R4	0.9	2.3	17.4	18.3	45.8
R5	1.0	2.5	17.4	18.4	46.0
R6	1.0	2.5	17.4	18.4	46.0
R7	0.1	0.3	17.4	17.5	43.8
R8	0.1	0.2	17.4	17.5	43.7
R9	0.1	0.2	17.4	17.5	43.7
R10	0.1	0.2	17.4	17.5	43.7
R11	0.1	0.2	17.4	17.5	43.7
R12	0.1	0.2	17.4	17.5	43.7
R13	0.1	0.3	17.4	17.5	43.8
R14	0.2	0.6	17.4	17.6	44.1

Table 8.12: Scenario 1 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R15	0.3	0.7	17.4	17.7	44.2
R16	0.3	0.9	17.4	17.7	44.4
R17	0.5	1.2	17.4	17.9	44.7
R18	0.6	1.5	17.4	18.0	45.0
R19	0.6	1.6	17.4	18.0	45.1
R20	0.6	1.6	17.4	18.0	45.1
R21	0.6	1.5	17.4	18.0	45.0
AQS	**40**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.97 The maximum predicted annual mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.98 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be comfortably below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be below 75% of the ambient NO_2 annual AQS at all assessed receptors, with maximum PEC predicted at receptor R1 where concentrations would be approximately 49% of the NO_2 annual AQS.

8.99 The geographical variation in annual mean NO_2 PC concentrations (without background) of the MFGP emissions are shown in Figures 8.3.

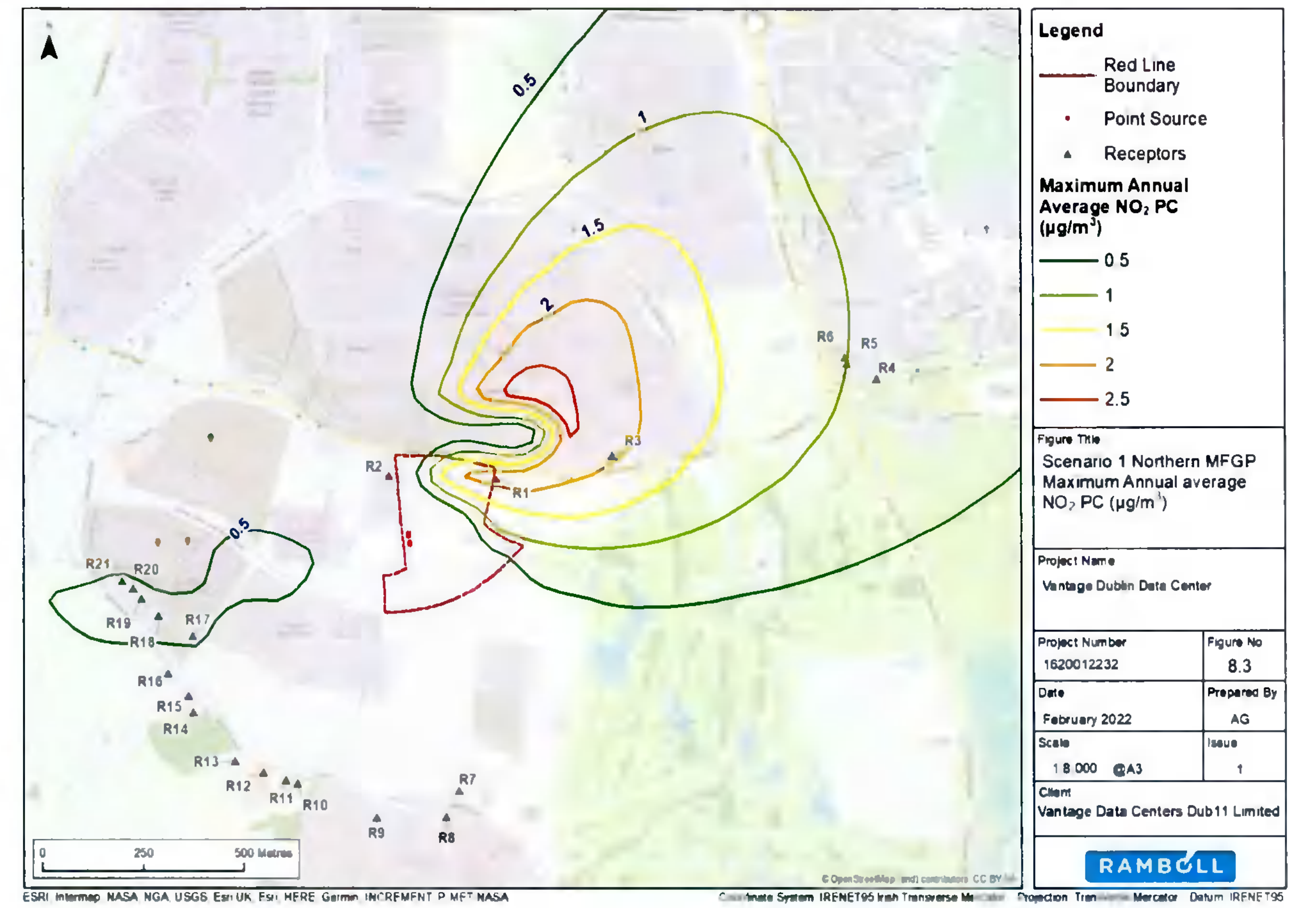


Figure 8.3: Scenario 1 Northern MFGP Maximum Annual Average NO_2 PC (µg/m³).

8.100 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 1 MFGP plant is provided in Table 8.13.

Table 8.13: Scenario 1 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	10.6	5.3	34.8	45.4	22.7
R2	5.3	2.7	34.8	40.1	20.1
R3	7.8	3.9	34.8	42.6	21.3
R4	3.5	1.8	34.8	38.3	19.2
R5	3.7	1.9	34.8	38.5	19.3
R6	3.7	1.9	34.8	38.5	19.3
R7	5.3	2.6	34.8	40.1	20.0
R8	4.8	2.4	34.8	39.6	19.8
R9	4.1	2.0	34.8	38.9	19.4
R10	4.5	2.3	34.8	39.3	19.7
R11	4.7	2.3	34.8	39.5	19.7
R12	5.0	2.5	34.8	39.8	19.9

Table 8.13: Scenario 1 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R13	5.5	2.8	34.8	40.3	20.2
R14	5.6	2.8	34.8	40.4	20.2
R15	5.7	2.8	34.8	40.5	20.2
R16	5.9	3.0	34.8	40.7	20.4
R17	7.2	3.6	34.8	42.0	21.0
R18	6.6	3.3	34.8	41.4	20.7
R19	6.5	3.2	34.8	41.3	20.6
R20	6.2	3.1	34.8	41.0	20.5
R21	6.1	3.1	34.8	40.9	20.5
AQS	**200**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.101 The maximum predicted 1-hour mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.102 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, maximum predicted PEC (including background) would be approximately 23% of the ambient NO_2 1-hour AQS.

8.103 The geographical variation in the 1-hour mean (99.8th percentile) concentrations (without background) of the MFGP emissions are shown in Figures 8.4.

8.104 Given the temporary operation of the Scenario 1 MFGP from approximately Q4 2023 to Q1 2025 the air quality localised effects are **Temporary to Short-term**, **Negative** and **Imperceptible,** i.e. **Not Significant** in terms of EIA.

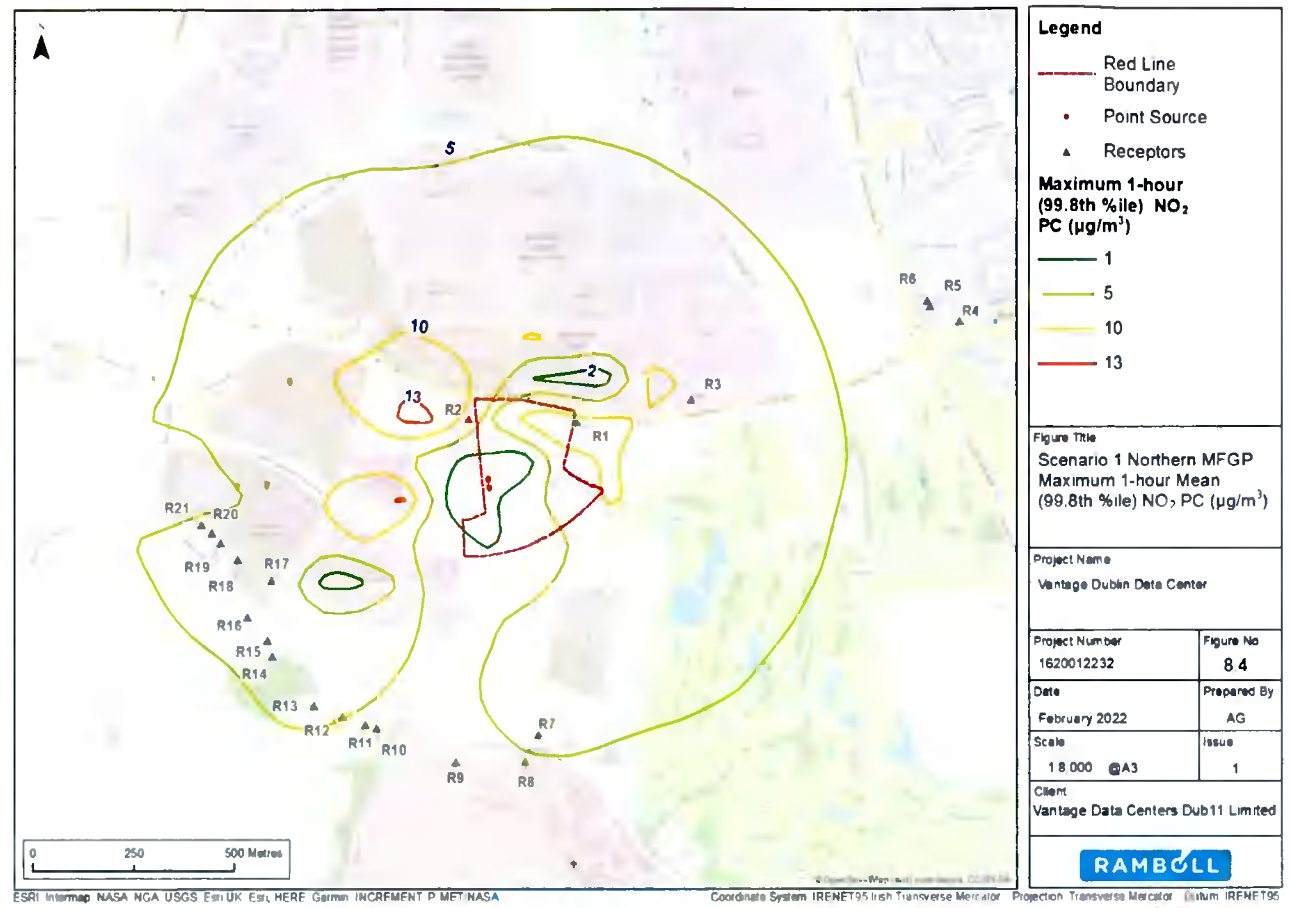


Figure 8.4: Phase 1 Northern MFGP Maximum 1-hour mean (99.8th percentile) NO_2 PC (µg/m³).

Emergency Generators

8.105 The modelling has been undertaken to determine the DUB 11 emergency operation with a 1% probability of exceeding the 1-hour objective. The detailed results of the dispersion modelling at the sensitive receptors identified in Table 8.6 are shown in Technical Appendix 7.2 in Volume 3.

8.106 Table 8.14 shows the results of the modelling for the highest impacted receptor for any of the assessed receptor locations.

Table 8.14: Scenario 1 DUB11Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability of exceeding the 1-hour mean objective
DUB 11 Emergency Generator	780

8.107 The DUB 11. Emergency Generators would operate for 780 hours to reach a 1% probability of exceeding the objective the 1-hour mean objective.

8.108 Table 8.15 shows the maximum predicted annual mean NO_2 concentrations at the worst-case receptor with the highest predicted concentration for the DUB 11 Emergency Generator maximum of 780 emergency operation hours. It should be recognised however that it is extremely unlikely that the generators will be required to operate for maximum number of hours determined emergency generators would not be expected to operate for more than 24-48 hours per year.

Table 8.15: Scenario 1 DUB11 Emergency Generators Maximum Annual Mean Concentrations for 680 hours Operation

Receptor	Operating hours for 1% probability	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	780	6.7	16.8	17.4	24.1	60.3

8.109 The maximum predicted 1-hour mean PC concentrations for 780 hours operation of the DUB 11 emergency generators occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.110 The maximum results indicate that the ambient level concentrations due to emissions arising from the DUB 11 emergency generator would be below the relevant NO_2 AQS. For the worst-case year modelled and receptor, predicted PEC (including background) would be approximately 60% of the ambient NO_2 annual AQS.

8.111 The localised air quality effects of the DUB 11 emergency generators are **Long-term**, **Negative** and **Imperceptible**, i.e. **Not Significant** in terms of EIA.

Phase 2

Multifuel Generation Plant

8.112 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 2 MFGP are provided in Table 8.16.

Table 8.16: Scenario 2 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	0.6	1.6	17.4	18.0	45.1
R2	0.1	0.2	17.4	17.5	43.7
R3	0.5	1.3	17.4	17.9	44.8
R4	0.2	0.5	17.4	17.6	44.0
R5	0.2	0.6	17.4	17.6	44.1
R6	0.2	0.6	17.4	17.6	44.1
R7	0.0	0.1	17.4	17.4	43.6
R8	0.0	0.1	17.4	17.4	43.6
R9	0.0	0.1	17.4	17.4	43.6
R10	0.0	0.1	17.4	17.4	43.6
R11	0.0	0.1	17.4	17.4	43.6
R12	0.0	0.1	17.4	17.4	43.6
R13	0.0	0.1	17.4	17.4	43.6
R14	0.1	0.2	17.4	17.5	43.7
R15	0.1	0.2	17.4	17.5	43.7
R16	0.1	0.3	17.4	17.5	43.8
R17	0.2	0.4	17.4	17.6	43.9
R18	0.2	0.4	17.4	17.6	43.9
R19	0.1	0.4	17.4	17.5	43.9
R20	0.1	0.4	17.4	17.5	43.9
R21	0.1	0.3	17.4	17.5	43.8
AQS	**40**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.113 The maximum predicted annual mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.114 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be approximately 45% of the ambient NO_2 annual AQS.

8.115 The geographical variation in annual mean NO_2 PC concentrations (without background) of the MFGP emissions are shown in Figures 8.4.

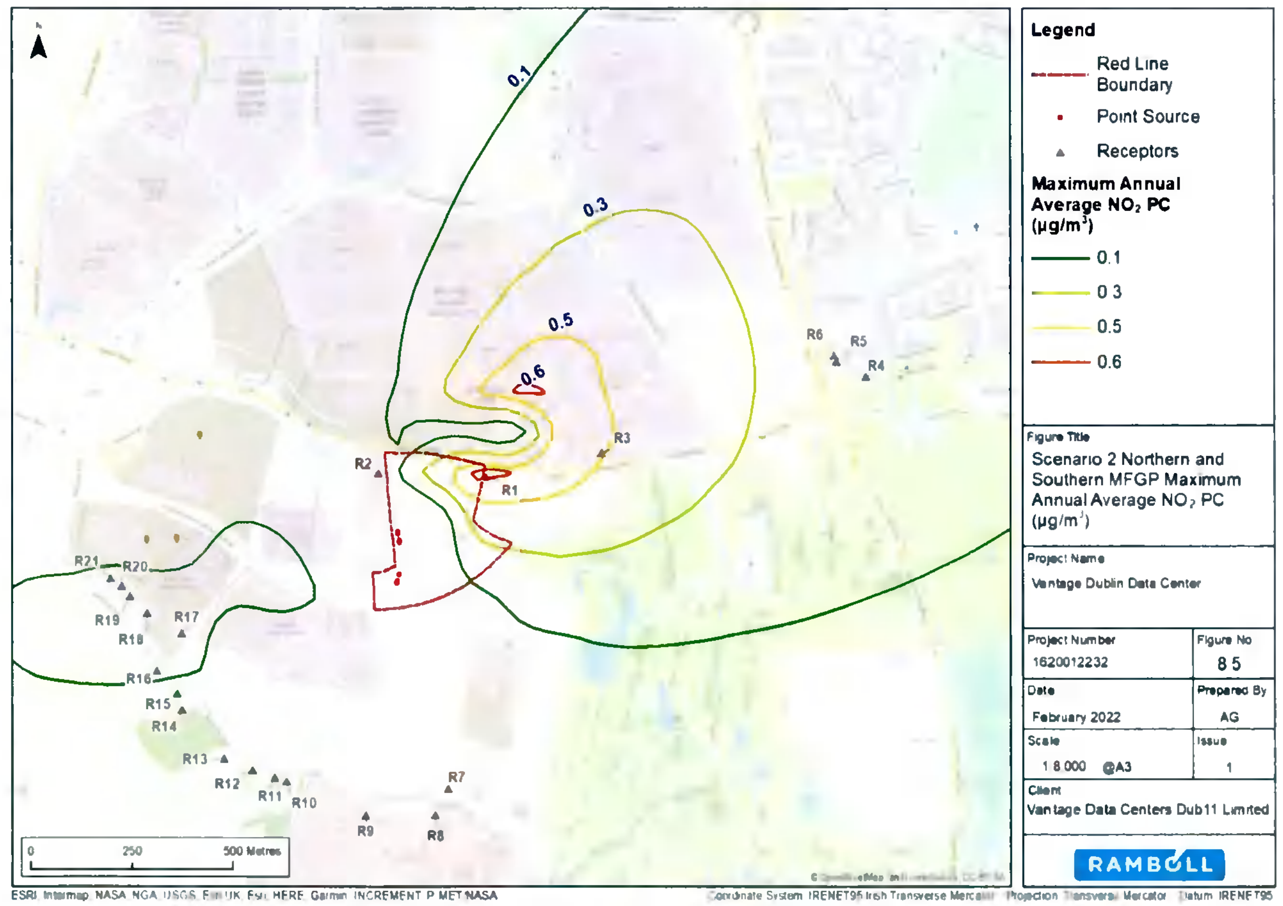


Figure 8.5 Scenario 2 Northern and Southern MFGP Maximum Annual Average NO_2 PC (µg/m³).

8.116 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario MFGP are provided in Table 8.17.

Table 8.17: Scenario 2 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	1.9	0.9	34.8	36.7	18.3
R2	2.7	1.4	34.8	37.5	18.8
R3	1.5	0.8	34.8	36.3	18.2
R4	0.7	0.4	34.8	35.5	17.8
R5	0.8	0.4	34.8	35.6	17.8
R6	0.8	0.4	34.8	35.6	17.8
R7	1.4	0.7	34.8	36.2	18.1
R8	1.2	0.6	34.8	36.0	18.0
R9	1.1	0.5	34.8	35.9	17.9
R10	1.1	0.6	34.8	35.9	18.0
R11	1.2	0.6	34.8	36.0	18.0
R12	1.3	0.7	34.8	36.1	18.1
R13	1.3	0.6	34.8	36.1	18.0
R14	1.3	0.6	34.8	36.1	18.0
R15	1.4	0.7	34.8	36.2	18.1
R16	1.4	0.7	34.8	36.2	18.1
R17	1.6	0.8	34.8	36.4	18.2
R18	1.5	0.7	34.8	36.3	18.1
R19	1.4	0.7	34.8	36.2	18.1
R20	1.3	0.7	34.8	36.1	18.1
R21	1.3	0.6	34.8	36.1	18.0
AQS	**200**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.117 The maximum predicted 1-hour mean PC concentrations occurs at receptor R2, the commercial property to the west of the site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.118 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be approximately 19% of the ambient NO_2 1-hour AQS.

8.119 The geographical variation in the 1-hour mean (99.8th percentile) concentrations (without background) of Scenario 2 MFGP emissions are shown in Figures 8.4.

8.120 The localised air quality effects of the of the MFGP are considered **Long-term to Permanent**, **Negative**, and **Imperceptible**, i.e., **Not Significant** in terms of EIA.

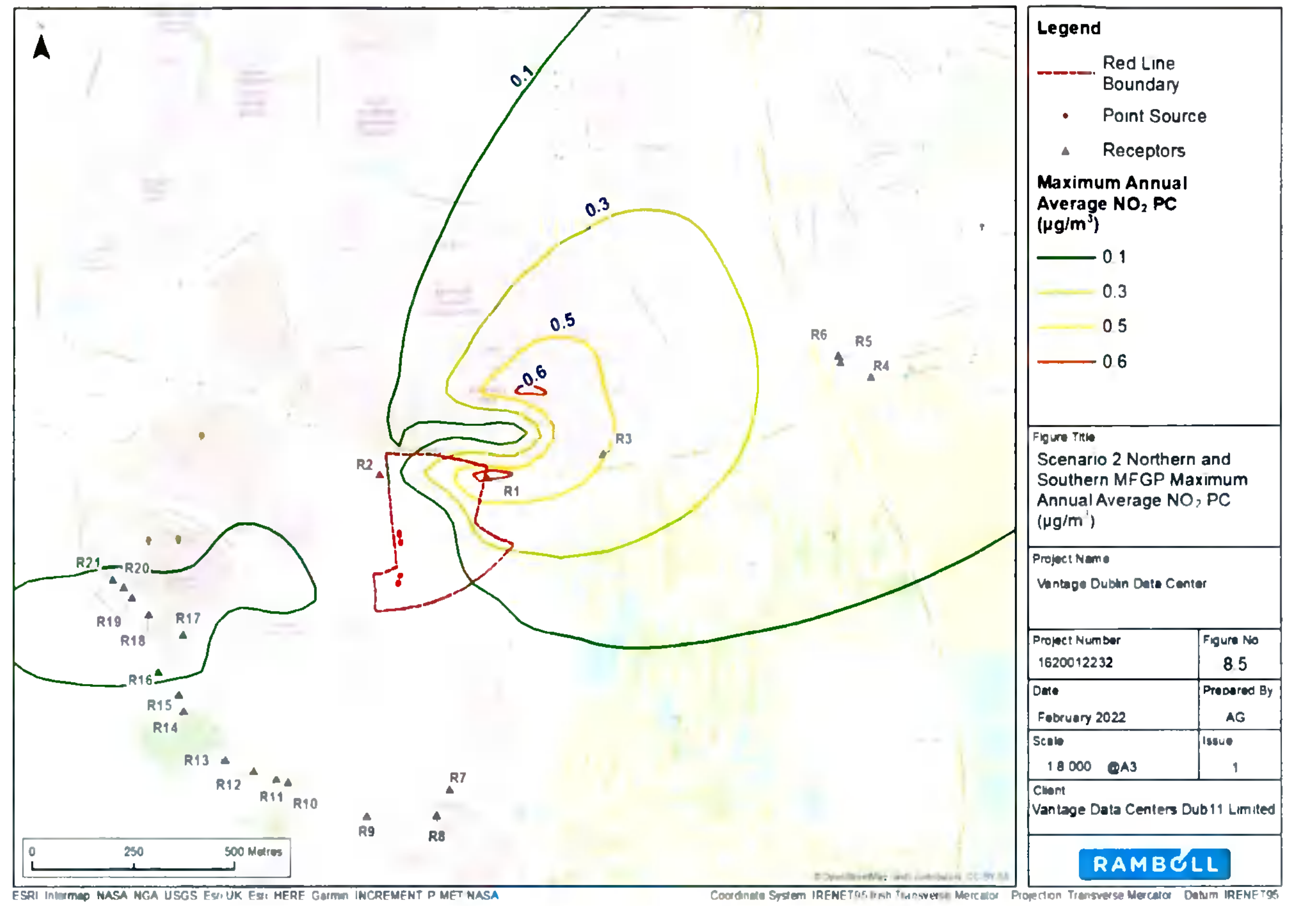


Figure 8.6: Scenario 2 Northern and Southern MFGP Maximum 1-hour mean MFGP (99.8th percentile) NO_2 PC (µg/m³).

Emergency Generators

8.121 The modelling has been undertaken to determine the DUB 11 and DUB 12 emergency operation with a 1% probability of exceeding the objective. The detailed results of the dispersion modelling at the sensitive receptors identified in Table 8.6 are shown in Technical Appendix 8.2 in Volume 3.

8.122 Table 8.18 shows the results of the modelling for the highest impacted receptor for any of the assessed receptor locations.

Table 8.18: DUB11 and DUB12 Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability of exceeding the 1-hour mean objective
DUB 11 and DUB 12 Emergency Generator	82

8.123 The DUB 11and DUB 12 Emergency Generators would operate for 82 hours to reach a 1% probability of exceeding the 1-hour mean objective.

8.124 Table 8.19 shows the maximum predicted annual mean NO_2 concentrations at the worst-case receptor with the highest predicted concentration for the DUB 11 and DUB 12 Emergency Generator maximum of 82 emergency operation hours. It should be recognised however that it is unlikely that the generators will be required to operate for maximum number of hours determined emergency generators would not be expected to operate for more than 24-48 hours per year.

Table 8.19: DUB11 and DUB12 Emergency Generators Maximum Annual Mean Concentrations for 106 hours Operation

Receptor	Operating hours for 1% probability	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	82	1.1	2.9	17.4	18.5	46.4

8.125 The maximum results indicate that the ambient level concentrations due to emissions arising from the emergency generators would be below the relevant NO_2 AQS. For the worst-case year modelled and receptor, predicted PEC (including background) would be approximately 46% of the ambient NO_2 annual AQS.

8.126 The localised air quality effects of the emergency generators are considered **Long-term to Permanent**, **Negative**, and **Imperceptible**, i.e., **Not Significant** in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

8.127 No significant negative effects are predicted and consequently no additional mitigation is required.

Operation Stage

8.128 No significant negative effects are predicted and consequently no additional mitigation is required.

Enhancement Measures

8.129 No enhancement measures are proposed in respect of air quality.

Demolition and Construction Residual Effects

8.130 With the IAQM recommended mitigation measures include within the CEMP, the residual demolition and construction effects remain as reported in the assessment of effects section

- **Negative**;
- **Temporary to Short-term**; and
- **Imperceptible.**

8.131 These are **Not Significant** in terms of EIA.

Operation Residual Effects

8.132 As no additional mitigation would be required, the residual operation effects of the Phase 1 MFGP remain as reported in the assessment of effects section:

- **Temporary to Short-term**;
- **Negative**; and
- **Imperceptible.**

8.133 These are **Not Significant** in terms of EIA.

8.134 As no additional mitigation would be required, the residual operation effects of the Phase 2 MFGP remain as reported in the assessment of effects section:

- **Long-term to Permanent**;
- **Negative**; and
- **Imperceptible.**

8.135 These are **Not Significant** in terms of EIA.

8.136 As no additional mitigation would be required, the residual operation effects of the Phase 1 and 2 emergency generators remain as reported in the assessment of effects section:

- **Long-term to Permanent**;
- **Negative**; and
- **Imperceptible.**

These are **Not Significant** in terms of EIA.

Summary of Residual Effects

8.137 Table 8.20 provides a tabulated summary of the outcomes of the air quality assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 8.20: Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Existing Off-site Human Health and Amenity	Dust Soiling and PM_{10} due to demolition and construction works	None required	Imperceptible	-	L	D	R	T to St
Existing Off-site Human Health	Change in NO_2, PM_{10} and $PM_{2.5}$ levels due to vehicle emissions	None required	Imperceptible	-	L	D	R	T to St
Operation								
Existing Off-site Human Health	Change in NO_2, PM_{10} and $PM_{2.5}$ levels due to vehicle emissions	None required	Not significant	-	L	D	IR	Lt to P
Existing Off-site Human Health	Change in NO_2 levels due to Phase 1 MFGP	None required	Imperceptible	-	L	D	R	T to St
Existing Off-site Human Health	Change in NO_2 levels due to Phase 2 MFGP	None required	Imperceptible	-	L	D	IR	Lt to P
Existing Off-site Human Health	Change in NO_2 levels due to Phase 1 and Phase 2 emergency generators	None required	Imperceptible	-	L	D	IR	Lt to P

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

Table 8.20: Summary of Residual Effects

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

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

Cumulative Effects

Intra-Project Effects

8.138 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Cumulative Effects.

Inter-Project Effects

8.139 A review of potential cumulative schemes has been undertaken as listed in Chapter 1: Introduction and Chapter 2: EIA Process and Methodology.

8.140 The demolition and construction stage cumulative effects exercise has been undertaken for cumulative schemes within 350 m of the proposed development as demolition and construction stage effects of cumulative schemes beyond 350 m are not expected to combine with the demolition and construction effects of the proposed development according to IAQM guidance.

8.141 Table 8.21 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 8.21: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Takeda	No	Development constructed.	Yes	Gas fired power plant emission to the north west of the site likely to overlap with proposed development.
Pfizer	No	Development constructed.	Yes	Gas fired power plant emission north east of the site likely to overlap with proposed development.
Google data center	No	Development constructed.	No	Development located to the south west of the site. Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	No	Development constructed.	No	Development located to the north of the site. Cumulative effects assessed and considered unlikely and not significant.
[SD20A/0283]				
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	No	Development located to the west beyond 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No	Scheme located west of the site at the edge of the 350m distance considered. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	No significant air emissions expected.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	No	Development located beyond the 350m of the site and constructed.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Equinix (Ireland) Ltd, Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	Yes	Development located to the southeast of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	No	Development located to the west beyond the 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.

Table 8.21: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0295]	No	Development located to the west beyond the 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	No	Development located to the west beyond the 350m of the site.	No	No significant air emissions expected.
Site proposed electrical connection and substation to EirGrid to the south	No	Development located immediately to the south of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	No significant air emissions expected.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	Yes	Development located immediately to the south of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	Yes	Gas fired power plant emission likely to overlap with proposed development.

Demolition and Construction Cumulative Effects

8.142 Demolition and construction significant cumulative effects are unlikely to occur as the Equinix and Centrica Business Solutions development is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are **not significant**, alone or in combination.

Operation Cumulative Effects

8.143 Cumulative effects have been included in this Chapter following the review the cumulative scheme EIAR submitted as part of the:

- Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22, Planning Application reference SD20A/0283[25], hereafter referred to as Microsoft; and
- Centrica Business Solutions Profile Park, Baldonnel, Dublin 22 planning application reference SD21A/0167[26], hereafter referred to as Centrica.

8.144 The Microsoft application assessed the NO_2 impacts for the continuous operation of the gas generators, testing of the back-up diesel generators, operation of the back-up generators, and the cumulative impact from the Pfizer facility and Takeda facility at the worst-case residential receptors and concluded that "*Operations from the Grange Castle Server Centre including the proposed gas generator compound development will not result in any off-site exceedance of the applicable ambient air quality standards*". The cumulative operations geographical variation contour figures for annual mean show that predicted concentrations hot spots are within the Microsoft site and the pollutants dispersion follows the prevailing wind direction towards the north east. A reproduction of the Microsoft contours figures is shown in Technical Appendix 7.2 in Volume 3. Similarly, the 99.8th percentile 1-hour concentrations predicted concentrations hot-spots are within the Microsoft site and to the south west of Microsoft. The Microsoft, Pfizer, and Takeda annual average and 1-hour worst case predicted concentrations therefore would not overlap with the proposed development worst case predicted concentrations and cumulative impacts with the proposed development would be unlikely and imperceptible.

8.145 The Centrica application proposes to develop a gas fired plant with capacity to generate up to 125MW of electricity at the site located in Profile Park to the south of the proposed development. The air quality assessment included the impacts of the Centrica application gas fired plant and the cumulative impacts of the existing IE licensed emissions points Pfizer, Takeda, and Grange backup power. The Centrica application is therefore considered to be representative of all the cumulative developments as it includes the permitted permanent point sources emissions and the potential future point source in the study area.

8.146 The Centrica application reported the maximum results outside its red line boundary "*even if no residential receptors were near the location of this maximum*" which is considered too conservative. However, the geographical variations contour figures allow to infer the predicted NO_2 concentrations at relevant sensitive receptors. A reproduction of the Centrica contours figures is shown in Technical Appendix 7.2 in Volume 3.

8.147 The Centrica application maximum predicted concentrations alone or cumulative with Pfizer, Takeda and the Grange Castle Backup Power Facility are summarised in Table 8.22.

25 South Dublin County Council, 2021. Microsoft, 2020. Microsoft Operations Ireland Ltd Grange Castle Business Park Dub14 & Dub15 Data Centres & Central Administration Building Environmental Impact Assessment Report Volume I Written Statement. Available at: http://www.sdublincoco.ie/Planning/Details?p=1&r=SD20A%2F0283&regref=SD20A%2F0283 [Accessed on 04/08/2021]

26 South Dublin County Council, 2021. Tobin Consulting Engineers, 2021. Profile Park Power Plant Environmental Impact Assessment report (EIAR). Available at: http://www.sdublincoco.ie/Planning/Details?p=1&r=SD21A%2F0167&regref=SD21A%2F0167 [Accessed on 04/08/2021]

Table 8.22: Maximum Predicted Cumulative Schemes Assessment

Development	Averaging Period	Maximum reported NO_2 PC outside site boundary (µg/m³)	Maximum concentration at sensitive receptors (µg/m³)
Centrica Power Plant (alone)	Annual Mean	12.0	1-2 (Receptor R1) 2-4 (Receptor R3)
	1-hour (99.8th %ile)	115.9	50-70 (Receptor R1 and R3)
Centrica Power Plant, Pfizer, Takeda, and the Grange Castle BackUp Power Facility	Annual Mean	12.3	Not available
	1-hour (99.8th %ile)	115.9	

8.148 The Centrica cumulative maximum annual average results with Pfizer, Takeda and the Grange Castle Backup Power Facility are marginally higher than with Centrica power plant alone and the 99.8th percentile 1-hour results are equal. Similar to Microsoft results, the Centrica results show that cumulative impacts of the proposed development with Pfizer, Takeda and the Grange Castle Backup Power Facility would be unlikely and imperceptible.

8.149 The Centrica maximum cumulative results at the proposed development worst case sensitive receptor results are presented in Table 8.23.

Table 8.23: Proposed Development Cumulative Results

Averaging period	Receptor	AQS (µg/m³)	Proposed Development NO_2 PC (µg/m³)	Centrica NO_2 PC (µg/m³)	Cumulative			
					NO_2 PC (µg/m³)	PC % AQS	Annual Mean PEC (µg/m³)	PEC % AQS
Phase 1/Scenario 1								
Annual Mean	R1	40	2.3	2	4.3	10.7	21.7	54.2
1-hour (99.8th %ile)	R1	10.6	70	80.6	200	40.3	115.4	57.7
Phase 2/Scenario 2								
Annual Mean	R1	40	0.6	2	2.6	40	6.6	20.0
1-hour (99.8th %ile)	R2/R1*	200	2.7	70	72.7	200	36.4	107.5

* Phase 2 worst case receptor for 1-hour (99.8th %ile) average period for the proposed development emissions would be receptor R2. Centrica contour figures, however, do not show predicted concentrations at this receptor location and therefore Centrica results are receptor R1, as the second worst case receptor, results are presented for Centrica NO_2 PC.

8.150 The maximum cumulative annual average results indicate that the ambient level concentrations due to emissions arising from Phase 1 MFGP and Centrica power plant would be below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the predicted PEC (including background) would be approximately 54% of the ambient NO_2 annual AQS at the worst-case receptor.

8.151 The maximum 1-hour average results indicate that the ambient level concentrations due to emissions arising from Phase 1 MFGP and Centrica power plant would be below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the predicted PEC (including background) would be approximately 58% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.152 Centrica power plant construction is expected to commence in 2022 and the plant is expected to be fully operational in 2024/2025 subject to timely receipt of the necessary statutory consents. Based on the proposed development phasing, with Phase 1 MFGP using HVO as the fuel source to be replaced by gas by early 2025. During Phase 1 there is potential for both plant operations to overlap for a short period of less than a year. However, during Phase 2 the MFGP plant will be run on natural gas operating 24 hours a day, seven days a week. During Phase 2, both plant operations would overlap.

8.153 Given the temporary operation of the Phase 1 MFGP from approximately Q4 2023 to Q1 2025, the cumulative air quality effects of Phase 1 MFGP is considered short term, negative and imperceptible, i.e. not significant in terms of EIA.

8.154 Given the long-term operation of the Phase 2 MFGP, the cumulative air quality effects of Phase 2 MFGP is considered long term, negative and imperceptible, i.e. not significant in terms of EIA

8.155 Phase 2 MFGP operation maximum results indicate that the ambient level concentrations due to emissions arising the MFGP operation on natural gas and Centrica power plant are below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the annual average predicted PEC (including background) would be approximately 50% of the ambient NO_2 AQS and the 1-hour predicted PEC (including background) would be approximately 54% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.156 The cumulative air quality effects of Phase 2 MFGP are considered **long term, negative** and **not significant** in terms of EIA.

Summary of Assessment

Background

8.157 This chapter has detailed the potential air quality effects due to the construction and operation stages of the proposed development. The assessment of construction and operation stages has been undertaken considering the relevant national and local guidance and regulations. Potential sources of emissions have been identified and assessed in the context of existing air quality and the nature and location of receptors.

8.158 The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 microgram (PM_{10}), typically generated during demolition and construction activities and nitrogen dioxide (NO_2), typically generated by road traffic and combustion engines.

8.159 Air quality monitoring data was obtained from the EPA monitoring stations to establish the status of existing air quality. The data was used as the basis for air quality modelling and predictions.

8.160 NO_2 concentrations at the site and within the study area would be expected to be similar to measured concentrations at the closest monitoring sites and therefore likely to comfortably meet the relevant air quality objectives.

Demolition and Construction Effects

8.161 During the demolition and construction works, there is the potential for vehicle emissions and dust emissions to arise at existing off-site human health receptors, as well as a loss of amenity at nearby existing residential and commercial properties.

8.162 The predicted annual average demolition and construction traffic flows are not expected to exceed the Institute of Air Quality Management (IAQM) guidance threshold such as to require formal assessment. In addition, traffic flows would be controlled through the implementation of the Construction

Environmental Management Plan (CEMP). The effects of demolition and construction related traffic emissions would be temporary and not of a scale that would give rise to significant effects.

8.163 Based on criteria set out in the IAQM guidance, the construction works would present a medium risk of negative effects from dust impacts in the absence of appropriate mitigation. With the implementation of suitable mitigation measures, already incorporated within the proposed development's CEMP, it is anticipated that dust effects could be mitigated to at worst result in temporary negative, but not significant, effects at existing off-site receptors.

8.164 Overall, the demolition of existing buildings on the site and construction of the proposed development would result in an imperceptible effect on air quality and identified receptors, and as such would **not give rise to significant negative effects** on air quality in terms of EIA.

Operation Effects

8.165 The predicted annual average completed development traffic flows are not expected to exceed the Institute of Air Quality Management (IAQM) guidance threshold such as to require formal assessment. The effects of operation stage related traffic emissions would be long-term and not of a scale that would give rise to significant effects.

8.166 Concentrations of NO_2 have been predicted for several worst-case locations representing existing sensitive receptors in the study area.

8.167 The potential impact to air quality during the operation stage of the proposed development is a breach of the ambient air quality standards because of air emissions from the proposed development MFGP and emergency engines. The modelled predicted concentrations are below the relevant objectives at all the existing receptor locations for the operation stages.

8.168 It is considered that the operation of the proposed development Phase 1 with the multifuel generation plant, expected to be operational up to approximately Q1 2025 using HVO as the fuel source, would result in a temporary to short term Negative Imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. The operation of Phase 2 with the multifuel generation plant running on natural gas, would result in a negative imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. The operation of the proposed development emergency generators would result in an imperceptible effect on air quality and identified receptor that is **Not Significant in terms of EIA**.

Cumulative Effects

8.169 Demolition and construction stages of approved cumulative schemes within 350 m of the proposed development are not expected to combine with the demolition and construction stage of the proposed development. Significant cumulative effects are unlikely to occur as each scheme is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are not significant, alone or in combination.

8.170 The assessment predicted the combined cumulative air quality concentrations arising from cumulative schemes in the study area. It is considered that the cumulative operation of the proposed development during Phase 1, when the MFGP will be run on HVO which is expected to be operational for up to 2 years would result in a temporary to short term negative imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. During Phase 2, when the MFGP plant will be run on natural gas, the operation would be significantly longer, and is predicted to result in long term negative imperceptible effects i.e. **Not Significant in terms of EIA** on air quality and identified receptors.

8.171 Overall, no significant long term cumulative effects on air quality are anticipated as a result of the operation of the proposed development.

Profile Park Data Centre
Residential Based Receptors
Figure 1

Key

- Development Boundary
- 500m Study Area
- Panel Boundary
- Glare Possible at Receptor
- Non-Reflection Zones

Neo Office Address:
Johnstown Business Centre, Johnstown House, Naas, Co. Kildare

Date: 02/12/2021
Drawn By: Scott Griffin
Scale (A3): 1:5,000
Drawing No: NEO00867/001IA

neo ENVIRONMENTAL

Profile Park Data Centre Road Based Receptors Figure 2

Key

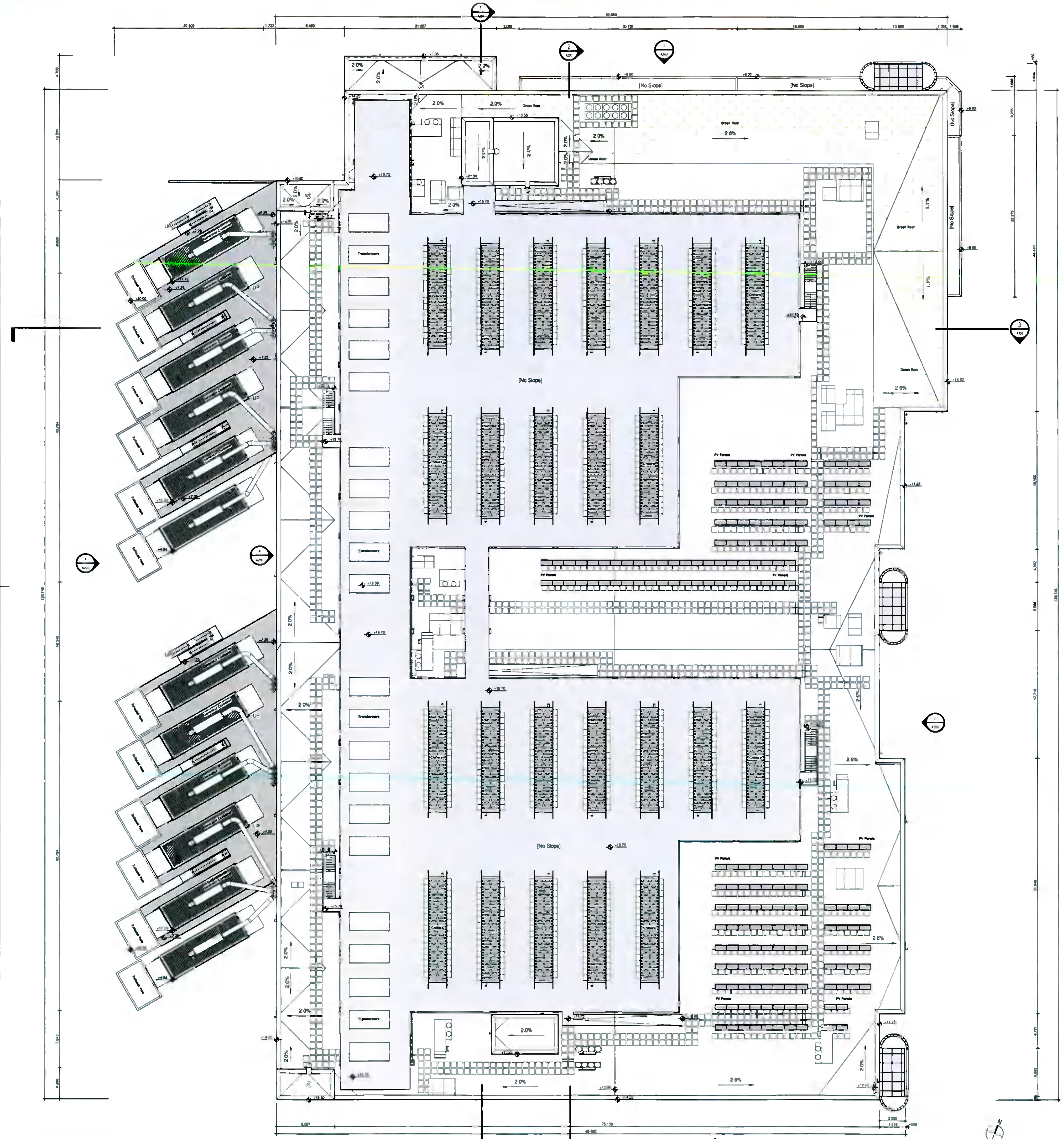
- Development Boundary
- Panel Boundary
- 500m Study Area
- Glare Not Possible at Receptor
- Glare Possible at Receptor
- Non-Reflection Zones

Neo Office Address:
Johnstown Business Centre, Johnstown House, Naas, Co. Kildare

Date: 02/12/2021
Drawn By: Scott Griffin
Scale (A3): 1:5,000
Drawing No: NEO00867/002IA

neo ENVIRONMENTAL

EMERGENCY GA
LOADING DOCK
GREEN SCREENING
FENCE
GATE
STAFF PARKING
19 P
OFFICES
DUB 11.1
SWITCH
ROOMS
BURIED FUEL TA
ACCESS LOCATIONS
STAFF PARKING
37 P
DUB 11.2
SP TANK
STAFF PARKING
42 P
DUB 12
TWIN ST
GENER
OFFICES
STAFF PARKING
37 P
GATE
GATE
GATE
EFER TO KFLA DRAWING
DUB 1-DR-SP-C150-V0-WS2-KFA
FOR FULL LANDSCAPING DETAILS
RIPAR
OUNDARY FROM BANK
XISTING STREAM SURVEY WITH NO AMENDMENT
REVISED PARKING TO 137 spaces Total
N

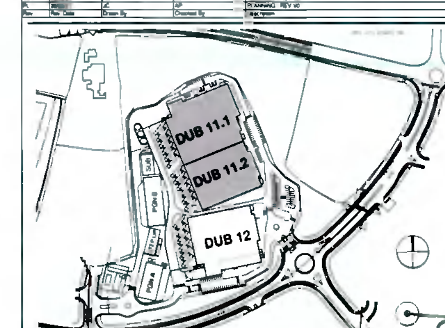


1 DUB11- OVERALL ROOF PLAN
SCALE 1:200

SPACE ALLOCATION LEGEND

- BREAK ROOM/COMMUNITY AREA
- CIRCULATION
- CONFERENCE
- CRAH/PDU/CDP GALLERIES
- DATA CENTER
- IDF
- LOBBY
- MMR/POE
- NON CRITICAL SUPPORT
- OFFICE (CUSTOMER)
- OFFICE (VDC)
- SHIPPING/RECEIVING
- STORAGE (CUSTOMER)
- STORAGE (VDC)

BURNS McDONNELL
www.burnsmcd.com/locations/birmingham
www.burnsmcd.com/services



PLANNING SUBMITTAL
NOT FOR
CONSTRUCTION

Client: VANTAGE DATA CENTERS

Architect/Engineer: BURNS McDONNELL

Associate Architect: Hyphen

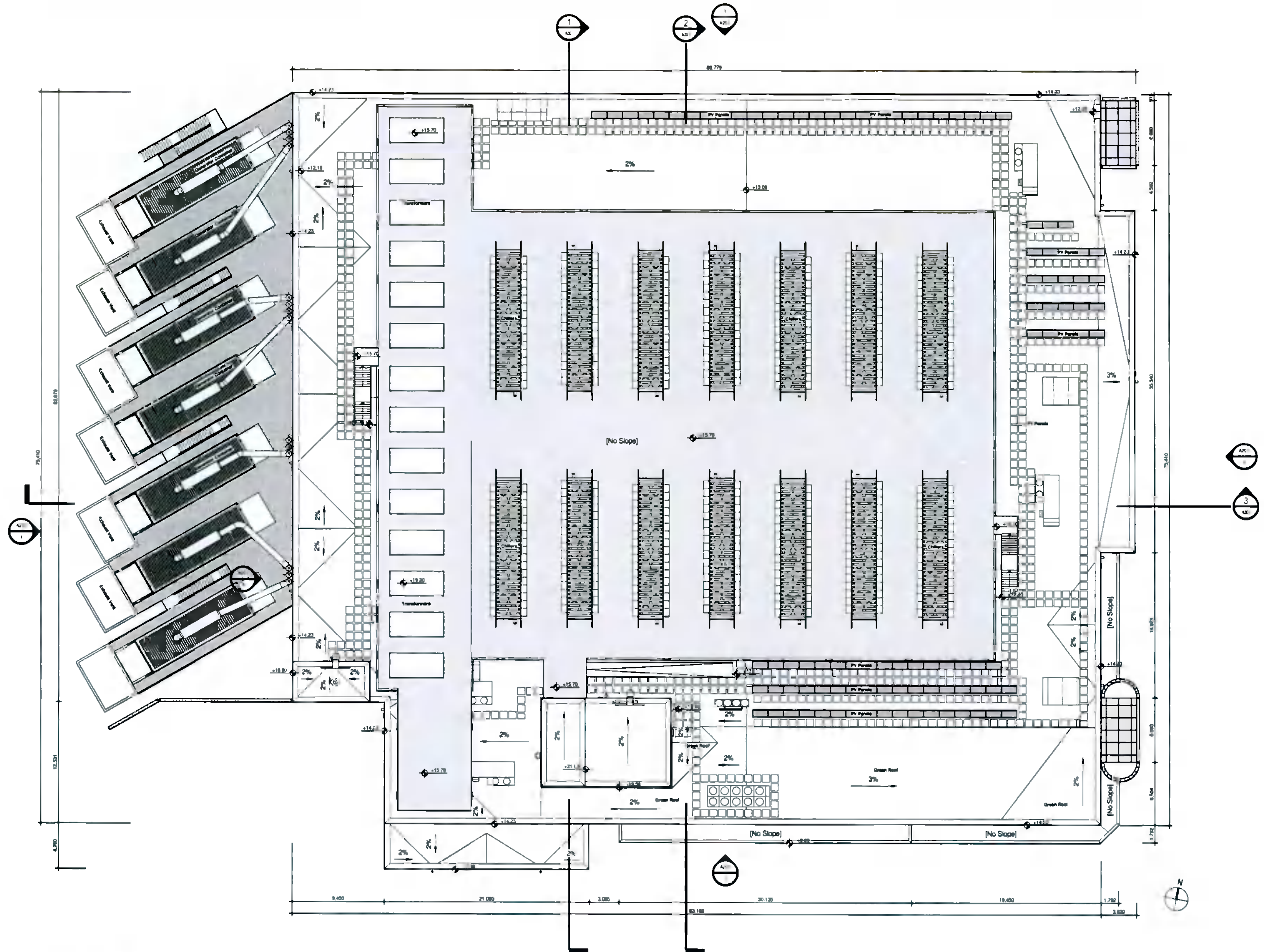
BIM coordinator	Approved by	Checked by	Drawn by
J Bugallo	J Mullen	J Bushell	A Dudzinski

Project address
Profile Park, Dublin 22, Ireland
53°19'1.40"N , 6°26'40.80"W

Drawing title
Architectural Layout
Roof Plan
Overall Plan 32MW

Sheet number
A102

Format / Size	Scale	Status	Date	File Code	
A0	1:200	PL	23/12/21	DUB11-DR-03-A102-V1 PL BMD	V1



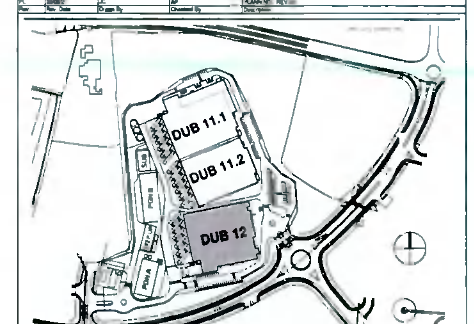
1 DUB12 ROOF PLAN

BURNS McDONNELL

www.burnsmcd.com/locations/birmingham
www.burnsmcd.com/services

SPACE ALLOCATION LEGEND

- BREAK ROOM/COMMUNITY AREA
- CIRCULATION
- CONFERENCE
- CRAH/PDU/CDP GALLERIES
- DATA CENTER
- IDF
- LOBBY
- MMR/POE
- NON CRITICAL SUPPORT
- OFFICE (CUSTOMER)
- OFFICE (VDC)
- SHIPPING/RECEIVING
- STORAGE (CUSTOMER)
- STORAGE (VDC)



VANTAGE

BURNS McDONNELL

Hyphen

J Bugallo | J Mullan | J Bushell | A Dudzinski

Profile Park, Dublin 22, Ireland
53°19'1.40"N , 6°26'40.80"W

Architectural Layout
Roof Plan
Overall Plan For DUB12

A112

1 : 200 | PL | 23/12/21 | DUB12-DR-02-A112-V1-PL-BMD | V1

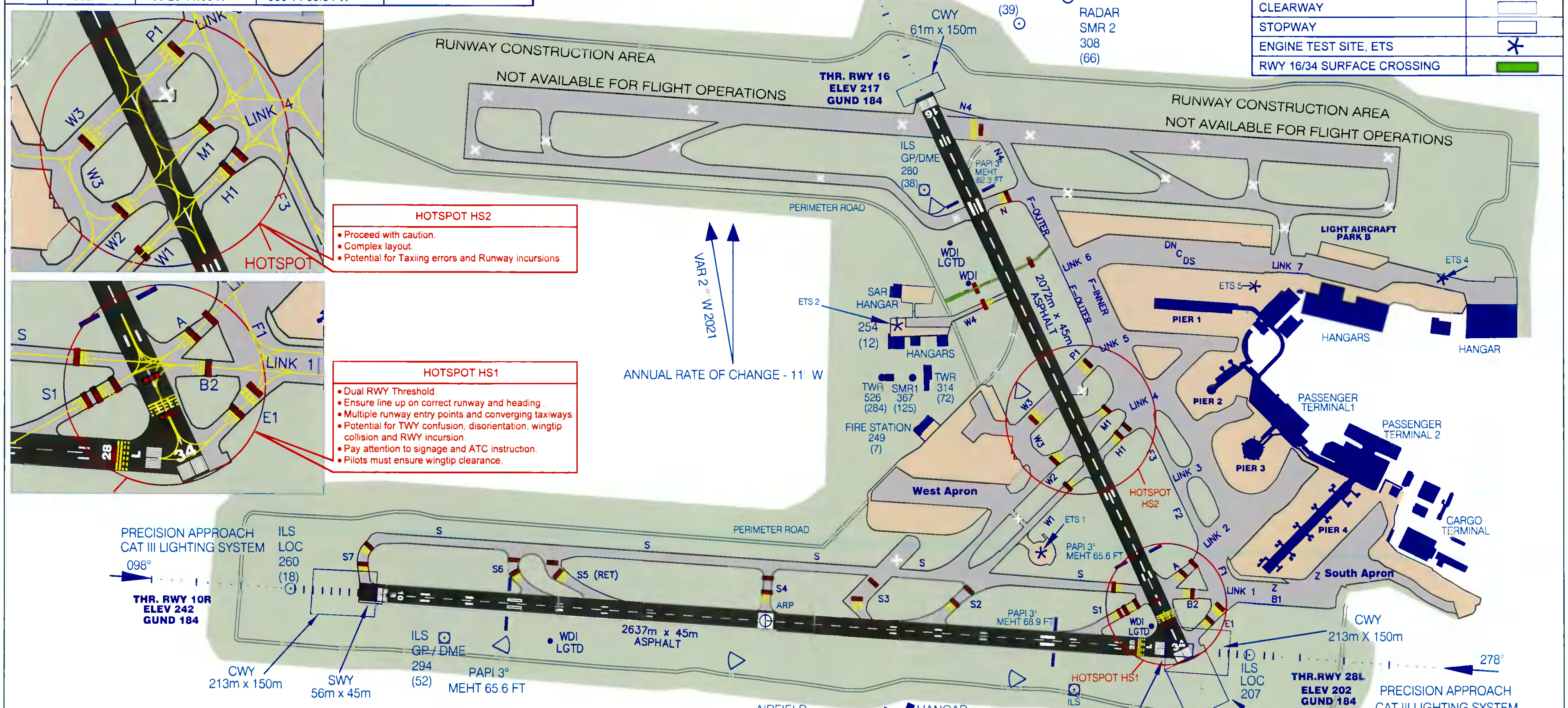
PLANNING SUBMITTAL
NOT FOR
CONSTRUCTION

AERODROME CHART - ICAO	53 25 17 N 006 16 12 W ELEV 242 FT	TWR 118.600MHz ATIS 124.530 GND 121.800MHz CLEARANCE DELIVERY 122.985 GND 125.885MHz

RWY	DIRECTION	THR		BEARING STRENGTH
10R	98°	53 25 20.75 N	006 17 24.27 W	PCN 70/R/B/W/T
28L	278°	53 25 12.94 N	006 15 02.08 W	
16	159°	53 26 13.16 N	006 15 43.12 W	PCN 75/R/D/W/T
34	339°	53 25 11.66 N	006 14 58.54 W	

CONSULT NOTAM FOR LATEST INFORMATION — **DUBLIN AIRPORT/ IRELAND**

LEGEND	
RVR	◁
DISUSED PAVEMENT	
STOPBAR	
RUNWAY HOLDING POSITION MARKINGS	
HOT SPOT	○
CLEARWAY	
STOPWAY	
ENGINE TEST SITE, ETS	✱
RWY 16/34 SURFACE CROSSING	



NOTE 1	RWY 10R/28L IS PROVIDED WITH 7.5M WIDE ASPHALT SHOULDERS
NOTE 2	ALL TAXIWAYS 23M WIDE EXCEPT TWY W4: 15M, LINK 1: 33M, LINK 2: 65M, LINK 3: 42M, LINK 4: 73M, B1 AND B2: 24M, S5: 30M, F1: 25M, M1 AND W2: 25M
NOTE 3	TAXIWAY S5 IS THE ONLY RAPID EXIT TAXIWAY (RET) AT DUBLIN AIRPORT
NOTE 4	BEARINGS ARE MAGNETIC
NOTE 5	LINEAR DIMENSION IN METRES
NOTE 6	ELEVATIONS IN FEET AMSL
NOTE 7	HEIGHT IN FEET ABOVE AERODROME ELEVATION SHOWN IN BRACKETS
NOTE 8	REFER TO AD 2.20 FOR INFO RELATING TO THE RWY 16/34 SURFACE CROSSING

CHANGES: