Sustainability Proposals

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

Operational Management Controls

Operational Management

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

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

External Lighting

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

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

4.104 Any external lighting would comply with the I.S. EN 12464 part1. IS 3217:2013+A1:2017[5]. The external lighting would make use of high efficiency, low energy LED luminaires. The proposed development would also seek to minimise upwards light and obtrusive light and avoid light spill onto trees, hedgerows, the Baldonnel Stream and bird and bat boxes wherever possible to 1 lux and is cognisant of Bat Conservation Ireland guidance notes for consideration in the design of bat sensitive lighting schemes.

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

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

Internal Lighting

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

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

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

Security & CCTV

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

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

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

Firewater System

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

Major and Accidents and Disasters

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

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

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

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

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

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

5 DEMOLITION AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT

Introduction

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

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

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

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

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

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

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

Programme of Works

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

5.9 Based on the assumption that planning consent is secured in Quarter 4 (Q4) 2021, the demolition and construction works would commence in late 2021. The works are anticipated to be undertaken over a 60 month period, with a completion targeted of Q4 2026. Due to the size of the proposed development, it would be completed in phases, with the following indicative construction completion and start of operation dates:

- Phase 1A: Q1 2023
- Phase 1B: Q2 2023-Q4 2024
- Phase 2A: Q4 2024
- Phase 2B: Q4 2026

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

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

Description of Works

Background

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

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

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

Phasing

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

Table 5.1: Summary of Development Phasing

Phase	Key elements
1A	• Stream realigned with associated landscaping. • DUB 11.1 constructed and operational with 11 emergency generators. • Temporary 24 MW gas powered power source. • No permanent gas plant or other buildings. • Construction of the 20kV switchrooms.
1B	• Construction of half the permanent gas plant. • Removal of the temporary 24 MW gas powered power source. • Connection to EirGrid made to the south of Falcon Avenue for main power supply.
2A	• DUB11.1 and 11.2 constructed and operational with 22 total emergency generators. • Main power supply from the EirGrid site to the south of Falcon avenue. • Permanent gas plant will be operational to half capacity.
2B	• DUB11.1 and 11.2 operational with 22 total emergency generators. • DUB 12 constructed and operational with 11 emergency generators. • Main power supply from the EirGrid site to the south of Falcon avenue. • Permanent gas plant will be operational to full capacity.

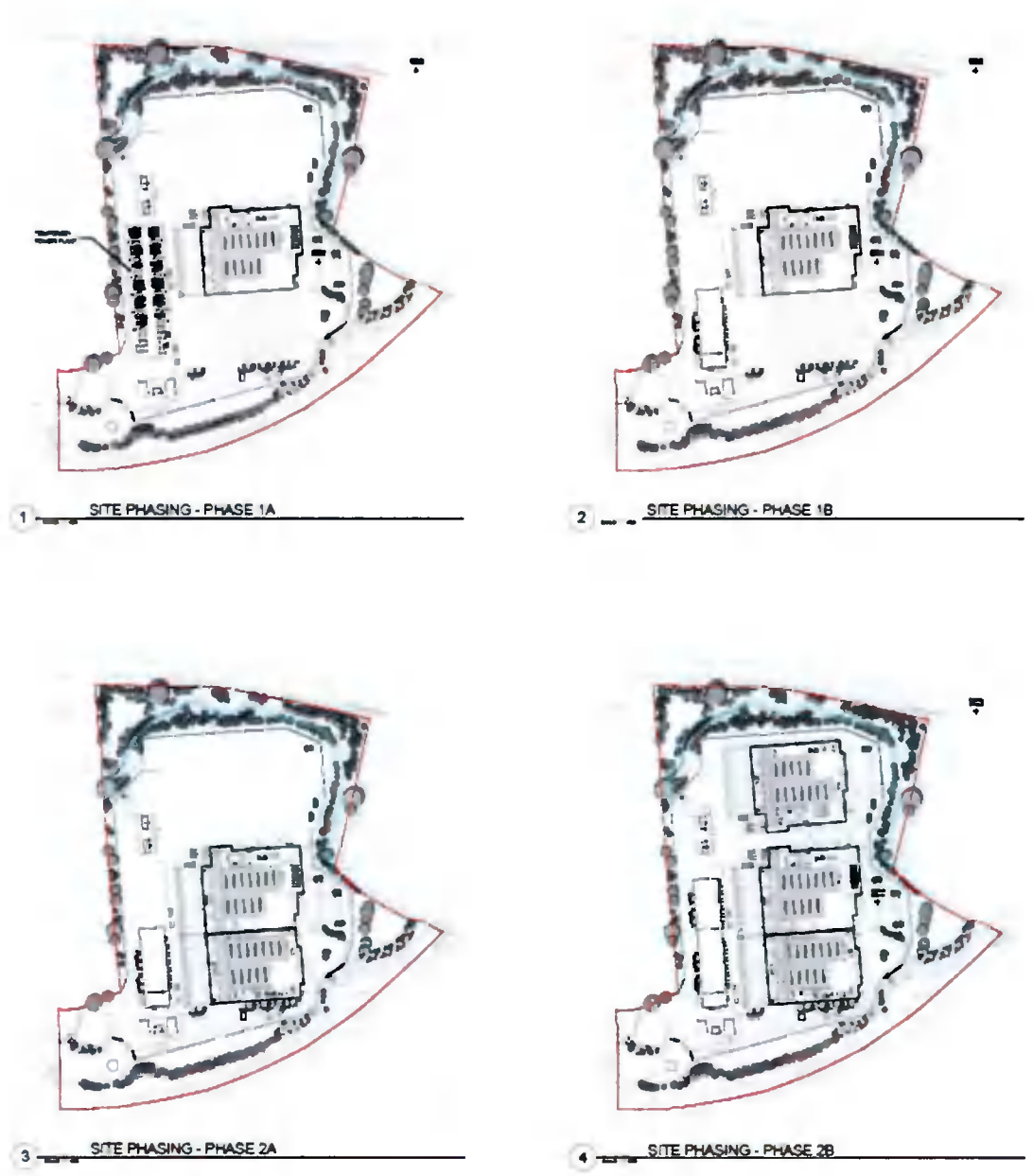


Figure 5.1: Proposed Development Phasing

Site Enabling Works

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

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

Site Offices/Welfare Facilities and General Site Access

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

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

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

Stream Realignment

5.20 The proposed realignment of the Baldonnel Stream (located in the northern portion of the site) would commence at the earliest opportunity in order to allow the stream and associated landscaping (including planting) to mature throughout the demolition and construction works programme and to enable the installation of site-wide services to serve the proposed development.

5.21 The existing east to west flowing stream is generally formed from a steep sided cutting on both sides of the stream with grass embankments. At the eastern end of the stream a few trees are present along the southern bank; however, these are dying back and of poor quality. At the downstream and of the Baldonnel Stream within the site, the stream enters a culvert below the neighbouring Boland's Garage site, initial CCTV survey have confirmed that the twin 600 mm (millimetre) culverts conveying water below the neighbouring site are in poor condition.

5.22 For the northern part of the site, the stream diversion route is well defined and separate to the existing stream channel (refer to Figure 5.2). It is proposed to protect the northern bank of the existing stream whilst the new realigned channel is formed, and earthworks undertaken.

5.23 All works would be confined to within the protection barriers situated 5 m from the northern bank of the existing stream. A temporary construction access point would be established off the Nangor Road using the existing house access, all material in and out of the site would be from this northern access point for the stream realignment works.

5.24 Works would progress from east to west with a construction compound established to the north-west corner of the site with works progressing westward.

5.25 Excavations and earthworks for the new channel and landscaping embankment north of the existing stream would be undertaken in line with an appropriate method statement and would carried out in line with the Irish Fisheries Guidelines.

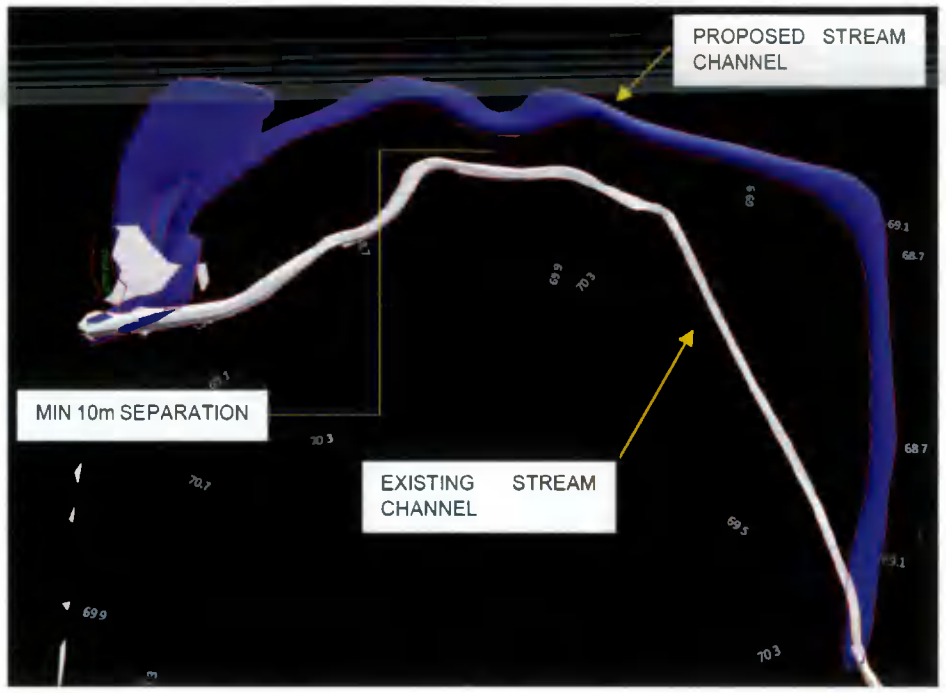


Figure 5.2: Existing and Proposed Stream Channel

5.26 Once the new channel, earthworks and landscaping has been undertaken the stream would be carefully diverted into the realigned stream.

5.27 The proposed realigned Baldonnel Stream is illustrated in Chapter 4: Proposed Development Description of this EIAR Volume and further information can be found in the 'Outline Construction and Environmental Management Plan for the diversion of the existing Baldonnel Stream'[1] (submitted separately with the planning application).

Demolition Works

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

5.29 Any asbestos identified from the Asbestos Register would be removed and disposed of by a fully licensed and qualified contractor before any other works are undertaken in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2010[2] and under an appropriate license from the Health and Safety Authority. During the internal strip-out and removal of asbestos, protection would be put in place.

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

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

[1] Pinnacle, 2021. Vantage Data Centre, Falcon Avenue, Profile Park – Outline Construction and Environmental Management Plan for the diversion of the existing Baldonnel Stream. July 2021.

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

Excavation Works

5.32 Following the completion of site enabling works, all structures will require foundations to structural engineer specifications. The foundations would require moderate scale excavations.

5.33 Where possible, noting the low risk of contaminants identified on-site following the site investigation works, appropriate material excavated during ground works would be re-used as part of earthworks and as temporary back-fill where necessary. It is proposed that some of the spoil generated will be reused under and as part of landscaped areas (including bunds) where suitable and/or in the formation level for the construction compound. Any temporary storage of spoil required will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

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

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

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

Temporary Works

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

Substructure Works

Foundations and Structure

5.38 Following the completion of enabling works. All structures will require foundations to structural engineer specifications. The building structures are likely to comprise either pre case concrete elements or a standard structural steel frame.

5.39 Foundations would be formed of pads and strips that would be founded on the bedrock underlying the site at an anticipated depth of 3 to 4m below ground level. Foundations would be advanced taking account of the ground conditions and environmental considerations.

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

Building Cores

5.41 The cores of the proposed facilities (i.e. DUB 11.1, 11.2 and 12) would incorporate the lifts, stairs and service risers and would be designed to provide the main lateral stability system for the buildings.

5.42 The concrete walls would be constructed from reinforced concrete.

Superstructure Works

5.43 It is anticipated that the proposed development buildings would be constructed of either pre cast concrete elements or a steel frame with reinforced concrete floor slabs.

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

Fit-out

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

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

Landscaping Works

5.47 Installation of the proposed landscaping would commence during the phasing sequence of the proposed development the realignment and the Baldonnel Stream and associated landscaping associated completed at the earliest opportunity. Landscaping associated with the data center facilities would be constructed upon substantial completion of construction works to minimise potential plant material loss. Topsoil would either be reused or imported to fill and shape landscaped areas.

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

Utilities and Service Installation

Utility Supply

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

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

5.51 The gas-fired power generation facility will connect to the network via a step-up transformer to 20 kV on site south of this building and then distribute to the EirGrid substation and would be called upon for use on local network drops. This power generation unit does not provide power directly to the data centres and is proposed in response to EirGrid DCC OPP regulations. Power is only available from the EirGrid ESB substation that is proposed South of Falcon Avenue.

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

5.53 Whilst the connection to the EirGrid is implemented DUB 11.1 is proposed to be powered using temporary gas generators that would be located in the west of the site. These would be in operation for 24 hours a day for an anticipated time period of up to 2 years. The plant would comprise 22 gas generators with flue stacks up to 25m in height, three battery storage modules that would only be used for stabilising

and providing a spinning reserve for the gas plant and two back up diesel generator for very limited usage in the event of a loss of power from the gas generators.

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

Transformers

5.55 To reduce electrical losses between HV/MV/LV conversions, the Applicant would install low loss transformers which comply with the Eco-design Directive 2009/125/EC[3] as a minimum.

Emergency Back-Up Generators

5.56 In the event of a loss of power supply, diesel powered back-up generators would be provided to maintain power supply. The back-up generators would be subject to periodic testing to ensure they remain serviceable and are only anticipated to be required in an exceptional event e.g. grid blackout.

Water

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

Foul Water Drainage

5.58 Foul water will discharge via a 225mmØ gravity foul sewer outfall into the existing 225mm Ø spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue. It is understood that the foul water drainage network has sufficient available capacity for the wastewater discharges during operation. An application to Irish Water will be made an appropriate time to agree the connection.

Telecommunications

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

- Virgin Media Fibre Cable;
- BT Fibre Cable;
- Colt Fibre Cable; and
- Eu Network Fibre Cable.

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

Vehicles and Plant

Vehicle Trips

5.61 Deliveries and removals would be scheduled to take place out of peak hours when congestion on the local road network is lower. Likely numbers of trips associated with on-site works are provided in Table 5.2 and is based on professional judgement that the demolition and construction traffic for the proposed development of 41,186 m^2 would be proportional (~52 %) to the construction traffic used for the site in the previous approved application (planning reference: SD20A/0121) of 80,269 m^2. Refer to Chapter 7: Transport of this EIAR Volume and Technical Appendix 7.3 of EIAR Volume 3 for further details.

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

5.63 Accordingly, it has been assumed that up to approximately 5 HGV trips would be made to the site each hour during the demolition and construction phase (one HGV arrival and one HGV departure every 12 minutes). It has also been assumed that up to 157 vehicular trips per day in either direction to and from the site would be made by construction personnel commuting to and from work.

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

Typical Construction Plant and Machinery

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

Table 5.2: Indicative Plant and Machinery

Plant	Site Enabling Works and Stream Alignment	Demolition	Substructure	Superstructure	Internal works / Fit-out	External Works
Excavator (wheeled and tracked)	✓	✓	✓			✓
Dumper	✓	✓	✓			✓
Hydraulic Cutters. Breaker	✓	✓	✓	✓		✓
Loading Lorries	✓					
Scaffold Construction	✓					
Generator	✓	✓	✓	✓	✓	✓
Electric Drills	✓			✓	✓	
Metal Cutter	✓			✓		
Electric Bolter	✓			✓		
Road Sweeper	✓	✓	✓	✓		✓
Lorries	✓	✓	✓	✓	✓	
Dozer		✓				
Pneumatic breaker		✓				
Compressor		✓				✓
Wheeled loader		✓				
Hand-held breaker		✓	✓			

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

Table 5.2: Indicative Plant and Machinery

Plant	Site Enabling Works and Stream Alignment	Demolition	Substructure	Superstructure	Internal works / Fit-out	External Works
Fork Lift		✓	✓	✓		✓
Water Pump		✓	✓			✓
Air Compressor		✓	✓	✓		
Lorry Mounted Concrete Pump			✓	✓	✓	✓
Hydraulic Vibratory Compactor			✓			
Scabbler			✓			
Crane			✓	✓		
Hydraulic Access Platforms				✓		
Welding Plant				✓		
Motor Batching Plant					✓	
Hydraulic Bender						✓
Breakers and Crunchers						✓

Construction and Contracting Strategy

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

Demolition and Construction Employment

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

Hours of Work

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

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

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

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

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

Health and Safety

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

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

Access and Parking Management

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

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

Materials Management

Material Selection

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

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

Materials Storage and Handling

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

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

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

Materials Waste Volumes and Management

5.80 Table 5.3 presents the estimated excavation, demolition and construction waste and end destination.

Table 5.3: Estimated Construction and Excavation Waste and End Destination

Waste Type	Estimated Quantities	Reuse		Recycle/ Recovery		Disposal	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	773	0	0	90	696	10	77
Timber	656	0	0	90	590	10	66
Plasterboard	234	0	0	90	211	10	23
Metals	188	0	0	100	188	0	0
Concrete	141	100	141	0	0	0	0
Other (including cabling, ducting, conduits, packaging, and plastic	351	0	0	80	281	20	70
Topsoil	39,432	100	39,432	0	0	0	0
Excavated materials	8,445	100	8,445	0	0	0	0
Total	**50,529**	**-**	**48,017**	**-**	**1,966**	**-**	**237**

5.81 Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services would generate approximately 5,278 m^3 of excavated materials. It is currently proposed that all excavated material would be reused on-site.

5.82 The importation of approximately 108,727 m^3 of fill materials would be required for construction of foundations and other ground preparation works.

Sensitive Receptors

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

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

Potential Environmental Impacts

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

5.85 A summary of the potentially significant environmental impacts that could arise during the demolition and construction stage and mitigation measures integral to the development proposals are provided in Table 5.4. Further detail and assessment of these likely impacts are provided in Chapters 6-15 in this EIAR Volume and EIAR Volume 2.

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

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

Receptor	Potential Impacts	CEMP Mitigation
Below ground Heritage Assets (Archaeology)	• Damage to potential *in-situ* archaeological remains (if present).	• Archaeological site evaluation prior to sub surface works, with further evaluation (e.g. including any watching briefs required during earthworks as necessary).
Transport and Pedestrian Infrastructure	• Temporary traffic disruption caused by site traffic and an increase in HGV movements	• Implementation of a traffic management plan. • Use of SDCC approved access points and routes to the site, with deliveries outside peak hours where possible (and abnormal loads at quiet times, subject to agreement with SDCC).
	• Transfer of mud and materials from vehicles onto public highways causing the potential for pollution hazards	• On-site wheel washing facilities.
	• Temporary disruption to pedestrian access and routes within the locality of the site.	• Implementation of a traffic management plan. • Maintenance of footpaths around the site, where possible, ensuring access is maintained for all.
Noise and Vibration	• Temporary increased noise levels at surrounding residential, industrial and commercial properties, from HGV vehicle movements and demolition and construction activities (e.g. breaking out, crushing, foundation installation , cutting, etc).	• Installation of 2.4 m site hoarding. • Agreement of working hours with SDCC, careful selection of quiet plant. • Appropriate siting and regular maintenance of plant. • Use of silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration.
	• Vibration impacts on local buildings, due to (e.g.) increased vibration from demolition works, foundations and use of HGVs within the site.	• The construction techniques proposed are considered unlikely to result in significant vibration impacts but the need for vibration monitoring and/or setting of vibration action levels would be discussed and agreed with SDCC.

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

Receptor	Potential Impacts	CEMP Mitigation
Air Quality	• Windblown dust generated from (e.g.) demolition works, earthworks, stockpiles, construction vehicle movements on unpaved surfaces and crushing.	• Dust suppression techniques, such as damping down, use of temporary screens and covering of stockpiles. • Preparation and implementation of a SWMP. • Appropriate sourcing of materials.
Soil and Groundwater	• Pollution incident through spill of fuels or chemicals, or discharge of sediment laden water and runoff.	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.
	• Siltation and contamination of surface water runoff and ground water.	• Use of settlement tanks, bunding and street sweeping to prevent contamination of the stormwater system.
	• Potential for soil contamination.	• Site investigations that have been undertaken have identified a low potential for soil and groundwater contamination at the application site. In the event that contamination is found, soil would be managed and an appropriate Remedial Strategy developed in conjunction with SDCC and the EPA.
Ecology	• Accidental spills and discharges from the storage of fuels and construction materials which may create pollution hazards. • Accidental release of surface water runoff containing elevated levels of suspended sediments or other contaminants	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.
	• Permanent damage and loss of habitats. • Injury or death of protected birds and animals.	• Works to remove trees to be undertaken outside of the bird breeding season of March to August in the event that nesting birds are encountered.
Natural Resource Use	• Waste generation and disposal of materials to landfill.	• Preparation and implementation of an SWMP. • Waste minimisation at source, with segregation and recycling of waste generated.
	• Use of natural resources	• Preparation and implementation of an SWMP. • Appropriate sourcing of materials.
Site Workers	• Release of asbestos during demolition	• Completion of Asbestos Surveys and removal of all identified asbestos materials by a specialist contractor as part of the demolition works.
	• Exposure of construction staff to contamination, if confirmed during planned site investigations works.	• Use of Personal Protective Equipment (PPE).
Local Amenity	• Temporary visual intrusion for nearby residents, occupiers of other land uses, pedestrians and passers-by. • Temporary visual intrusion of construction works on views into and out of the application site. • Temporary increases in road noise and vibration generated from construction vehicles. • Temporary increases in noise and vibration levels generated from the use of site plant and machinery. • Temporary generation of wind-blown dust nuisance from ground surfaces, stockpiles, vehicles, work faces and cutting and grinding of materials. • Temporary generation of exhaust emissions from lorries and plant delivering and removing materials including dust and particulates which may impact upon local air quality.	• Installation of 2.4 m site hoarding. • Standard, good site housekeeping. • Appropriate construction site layout. • On-site wheel washing facilities. • Dust management. • Demolition and construction traffic management. • Agreement of working hours with SDCC careful selection of quiet plant, appropriate siting and regular maintenance, use of temporary acoustic barriers around specific activities etc. • Setting of noise and vibration limits with associated monitoring during the works.

Mitigation and Scope of Environmental Management Controls

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

Proposed Site Management Controls

Construction Environmental Management Plan (CEMP)

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

- A commitment to environmental protection (all consultants and trade contractors would be invited to declare their support for this at tender stage);
- Documentation of measures to comply with environmental aspects of any planning conditions;

- Detailed control measures and activities to be undertaken to minimise likely environmental impacts, as well as associated roles and responsibilities;
- Target criteria for environmental issues, where practical, such as water and energy consumption;
- Any requirements for monitoring and record keeping;
- A dedicated point of contact during normal working hours and in emergencies with responsibility to deal with environmental issues if they arise; and
- A review and monitoring regime of on-site performance against the CEMP provisions by the project team and regular environmental audits of its implementation.

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

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

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

Considerate Constructors

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

Principal Contractor (or equivalent) and Management of Subcontractors

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

Environmental and Communication/Liaison Strategy

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

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

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

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

Emergencies and Environmental Incidences

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

Housekeeping and General Site Management

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

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

Nearby Residential Properties and Other Neighbours

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

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

Population and Human Health

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

Archaeology

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

Contaminated Soil

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

- Incorporate the reduction, reuse and recycle approach in terms of on-site soil excavations. The proposed works will be carefully planned to ensure only material required to be excavated will be,

with as much material left *in situ* as possible. Reuse of on-site excavated soil and capping with hardstand will minimise any increase in aquifer vulnerability.

- Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil.In the unlikely event that any potentially contaminated soils are encountered, the soil should be tested and classified as hazardous or non-hazardous in accordance with the EPA's Waste Classification -List of Waste & Determining if Waste is Hazardous or Non-Hazardous'[4] publication, HazWasteOnline tool[5] or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with EC Decision 2003/33/EC[6]. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.
- The effects of soil stripping and stockpiling will be mitigated against through the implementation of an appropriate earthworks handling protocol during construction within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.
- Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.
- EPA agreement will be obtained before re-using the spoil as a by- product. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product. Where material cannot be reused off site it will be sent for recovery or disposal at an appropriately authorised facility.
- All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers would be vetted for:
  - Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
  - Environmental Management status; and
  - Regulatory and Legal Compliance status of the Company.
- In order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:
  - Designation of a bunded refuelling areas on the site;
  - Provision of spill kit facilities across the site;
  - Where mobile fuel bowsers are used the following measures would be taken:
    - Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
    - The pump or valve would be fitted with a lock and would be secured when not in use;
    - All bowsers to carry a spill kit;
    - Operatives must have spill response training; and
    - Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:
  - Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
  - Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
  - All drums to be quality approved and manufactured to a recognised standard;
  - If drums are to be moved around the site, they would be secured and on spill pallets; and
  - Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.
- Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.
- Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses or drainage ditches.
- Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g. silt traps, 20m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

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

Water Resources

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

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

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
- Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
- Pumps or valves would be fitted with a lock and would be secured when not in use;
- All bowsers to carry a spill kit;
- Operatives must have spill response training; and
- Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:

[4] EPA 2018. Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous. July 2018 EPA

[5] HazWasteOnline, 2012. Waste Assessment Tool [online]. Available at: https://www.hazwasteonline.com/ [Accessed on 28/07/2021].

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

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they would be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

5.108 Potential pathways for contamination could be minimised as follows:

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

5.109 Subsoil would be excavated to facilitate the proposed development. Such works would be carefully planned to ensure as much material is left in situ as possible. Reuse of on-site excavated soil and capping with hardstand will minimise any increase in aquifer vulnerability. Construction works will require local removal of soil cover where levelling of the site is required and its use for re-instatement elsewhere on the site. It is envisaged that any soil excavated will be retained on-site and reused as fill material or landscaping. Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil.

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

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

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

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

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

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

Ecology

5.116 Pollution prevention measures as outlined in the preceding sections and in particular those associated with the stream diversion.

5.117 In order to reduce the amount of silt entering the stream during the initial realignment, the new stream channel will be constructed first, once complete and left to settle for a few days, the stream will then be redirected into the new channel.

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

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

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

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

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

Landscape and Visual

5.123 Measures would be undertaken to protect existing damage vegetation (such as trees and hedgerows) throughout the demolition and construction stage, such as exclusion zones around trees to avoid root damage.

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

Transport

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

- preferred hours of deliveries and removals (out of peak hours);
- agreed demolition and construction traffic routing and site access points;
- road cleaning facility provisioning;
- temporary traffic control measures;

- temporary and permanent access to the works – for personnel/vehicles;
- off-loading and storage areas;
- traffic management procedures for waste disposal vehicles;
- personnel and vehicle segregation;
- equipment, e.g. temporary fencing, signage etc.;
- temporary and permanent closures and diversions of footpaths; and
- site inductions.

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

Vehicle Routing

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

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

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

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

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

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

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

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

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

HGV Management

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

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

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

Parking Management and Staff Travel

5.138 A key aspect of the demolition and construction process would be the management of demolition and construction worker travel to and from the site. Construction workers would be encouraged to access the site by public transport, walking and cycling in order to reduce the potential impact of vehicle traffic during this temporary period. A series of measures would be implemented to encourage workers to travel using sustainable modes, which would form part of the traffic management plan. These may include:

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

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

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

Noise and Vibration

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

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

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

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

- Demolition operations will be organised with regard to positioning of plant and movement of vehicles so as to minimise noise adjacent to properties.
- Use of plant conforming with relevant Irish standards, directives or recommendations on noise or vibration.
- Works will only be carried out within agreed working hours. Restricted working hours (including Monday-Friday: 07:00-19:00, Saturday: 08:00-13:00, and no working on Sundays or Bank

Holidays). Planning of working hours to take account of the effects of noise and vibration upon persons in areas surrounding site operations and upon persons working onsite.

- Construction plant will be maintained in good condition with regards to minimising noise output and workers exposed to harmful noise and vibration.
- All drivers to site, including deliveries, will drive vehicles in a considerate manner in accordance with the specified speed limits with any failure to comply addressed as per infringements of the contractor's Project Health and Safety Plan.
- Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations and maintenance programmes.
- Starting-up plant and vehicles sequentially rather than all together. Plant, equipment and site vehicles will be switched off when not in use.
- Construction traffic will only use the designated routes as per the construction traffic management plan as outlined in Chapter 5: Construction Description.
- The transport of construction materials, spoil and personnel will be programmed and routed to reduce the risk of increased noise and vibration impacts.
- Adoption of quiet working methods, using plant with lower noise emissions, where reasonably practicable.
- Use of silenced and well-maintained plant conforming with the relevant Irish directives relating to noise and vibration. Vehicle and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers and/or mufflers, maintained in good working order and operated in such a manner as to minimise noise emissions.
- Construction plant and activities will be positioned to minimise noise at sensitive locations.
- Equipment that breaks concrete by munching or similar, rather than by percussion, will be used as far as is practicable.
- Mufflers will be used on pneumatic tools.
- Avoiding breaking out hard surfaces using percussive techniques, where reasonably practicable. Where practicable, rotary drills actuated by hydraulic or electrical power will be used for excavating hard materials.
- Controlled Demolition Techniques: In order to reduce the noise and vibration impacts associated with the demolition activities across the site, the works will be undertaken using controlled demolition techniques. This approach requires the demolition methodology to be planned meticulously in advance of works commencing to ensure potential environmental disturbances to surrounding receptors are minimised wherever possible i.e. noise, vibration, dust.
- Adoption of working methods that minimise vibration generation, where reasonably practicable;
- Locating plant away from noise and vibration sensitive receptors, where feasible;
- Use of site hoarding, assumed 2.4m high, and acoustic screening for static items of plant and work areas, where feasible;
- Avoiding unnecessary revving of engines and switch off equipment, when not required;
- Keeping internal haul routes well maintained and avoid steep gradients;
- Use of rubber linings for chutes and dumpers to reduce impact noise;
- Minimisation of drop height of materials;
- Carrying out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
- Providing briefings for all site-based personnel so that noise and vibration issues are understood, and mitigation measures are adhered to;
- Management of plant movement to take account of surrounding noise sensitive receptors, as far as is reasonably practicable; and
- Carrying out compliance monitoring of onsite noise and vibration levels to ensure that the agreed limits are being adhered to.

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

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

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

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

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

Air Quality

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

Table 5.5: Dust Mitigation Measures for Medium Risk Sites

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

Table 5.5: Dust Mitigation Measures for Medium Risk Sites	
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. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	• Plan site layout to locate dust generating activities as far as possible from receptors. • Use solid screens around dusty activities and around stockpiles. • Avoid site runoff of water and mud. • Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Keep site fencing barriers and scaffolding clean using wet methods. • Remove dusty materials from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below • Minimise emissions from stockpiles by covering, seeding, fencing, or damping down.
Operating Vehicle/ Machinery and Sustainable Travel	• Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. • Ensure vehicles switch off engines when stationary. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	• Only undertake cutting, grinding, or sawing equipment with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression. • Use enclosed chutes, conveyors, and covered skips. • Minimise drop heights of materials. • Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	• Avoid bonfires. • Avoid explosive blasting using appropriate manual or mechanical techniques. • Bag and remove any biological debris.
Measures Specific to Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression during demolition. • Avoid explosive blasting, using appropriate manual or mechanical alternatives.
	• Bag and remove any biological debris or damp down such material before demolition.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. • Avoid concrete scabbling where possible. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures Specific to Trackout	• Use water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving the site are appropriately covered. • Record inspections of haul roads in site log, including any remedial action taken. • Implement a wheel washing system. • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit. • Access gates to be located at least 10 m from the receptors where possible.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil. • Only remove the cover in small areas during work and not all at once.

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

Waste Management

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

5.152 The scope of the SWMP would cover the following:

- All excavations would be carefully monitored by a suitably qualified person to ensure that potentially contaminated soil is identified and segregated, if encountered. If any potentially contaminated material is encountered, it will be segregated from clean/inert material, tested, and classified as either non-hazardous or hazardous and further classified as clean, inert, non-hazardous, or hazardous in accordance with the EC Council Decision 2003/33/EC7, which establishes the criteria for the acceptance of waste at landfills. All excavated material would be used.
- Waste materials generated at the site compound would be stored in suitable receptacles in designated areas of the site compound.
- On-site segregation of waste materials would be carried out to increase opportunities for off-site reuse, recycling, and recovery, to ensure that the majority of construction materials are either recyclable or recoverable – it is anticipated that the following waste types, at a minimum, would be segregated: made ground, soils and stones and trees/shrubbery. In addition, the following wastes would be segregated at the site compound: organic (food) waste, packaging (paper/card/plastic), mixed dry recyclables and mixed non-recyclable waste.

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

- All waste contractors collecting waste from the site would hold a valid collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO).
- Construction wastes would be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, recycling, recover and/or disposal. As stated in the baseline section, there are numerous licensed waste facilities in the local region that have sufficient capacity to accept both hazardous and non-hazardous waste materials and could manage C&D waste from the proposed development.
- All waste leaving site will be reused, recycled, or recovered where possible to avoid material designated for disposal.
- All waste leaving the site would be transported by suitable permitted contractors and taken to suitably registered, permitted, or licenced facilities.
- All waste leaving the site would be recorded and copies of relevant documentation maintained.
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) would also be segregated and would be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager would be appointed by the main contractor to ensure effective management of waste during the excavation and construction works.
- All construction staff would be provided with training regarding the waste management procedures.
- The waste from delivers into the two-bay truck loading bay would be compacted on-site.

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

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

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

Recycling

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

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

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

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

Disposal

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

Climate

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

Table 5.6: GHG mitigation measures during construction and demolition stage

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

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

- Cycle parking would be provided, and this would be covered and secure;
- Facilities for changing and storing cycling clothes would be provided;
- The developer would investigate the provision of public transport vouchers to encourage workers to travel to the site by bus or rail;
- The contractor would encourage workers to car share where possible and would set up a car sharing database to identify where matches could be made;

- Incentives such as a free breakfast once a week for those walking, cycling, car sharing or using public transport would be provided;
- Selecting electrically driven equipment where possible in preference to internal combustion powered; hydraulic power in preference to pneumatic; and wheeled in lieu of tracked plant;
- Operating plant at low speeds where possible and incorporating automatic low speed idling; and
- Switching off vehicle engines where vehicles are standing for extended periods and avoid unnecessary revving of vehicle engines.

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

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

Cumulative Impacts

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

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

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

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

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

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

Deconstruction of Proposed Development

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

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

Summary

5.171 The development programme comprises the demolition of the existing residential property on the site, realignment of Baldonnel Stream and construction of the proposed development as described in Chapter 4: Proposed Development Description. Assuming planning permission is secured, on-site works are projected to start Q4 2021 and the construction works to be completed in Q4 2026, with a peak year of the works experienced in 2022.

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

6 POPULATION AND HUMAN HEALTH

Introduction

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

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

6.3 There are no technical appendices associated with this chapter.

Methodology

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

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

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

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

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

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

Assessment Scope

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

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

Technical Scope

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

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

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

- Generation of operation employment;
- Effects from increased traffic on health;
- Effects on amenity; and
- Effects from the gas-powered generation plant on health.

Spatial Scope

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

[1] European Commission, 2017. Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU). EU. 2017.
[2] Department of Health, 2013. Healthy Ireland Framework. A framework for improved health and wellbeing 2013-2025. Government of Ireland.
[3] Cave B, Fothergill J, Pyper R, Gibson G, Saunders P, 2017. Health in Environmental Impact Assessment: a primer for a proportionate approach. IEMA, Faculty of Public Health and Ben Cave Associates Ltd. Lincoln, England.
[4] PubMed MEDLINE database of biomedical and life sciences journal literature.
[5] WHO, 1948. WHO remains firmly committed to the principles set out in the preamble to the Constitution [online]. Available at: https://www.who.int/about/governance/constitution [Accessed on 06/07/2021].
[6] The health and wellbeing of those communities in the study area who have the potential to experience effects associated with the proposed development.
[7] This refers to the health and safety of workers employment by the proposed development, either during construction or operation.

Table 6.4: Population Age Ranges (2016)

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

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

Table 6.5: Population Ethnicity (2016)

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

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

Table 6.6: Population General Health (2016)

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

Employment

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

Table 6.7: At Work by Industry (2016)

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

Community Facilities

Residential Dwellings

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

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

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

Schools

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

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

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

Healthcare Facilities

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

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

Sensitive Receptors

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

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

Assessment of Effects

Demolition and Construction Effects

Employment Generation

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

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

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

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

Introduction of Resident Population

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

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

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

Air Quality Effects

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

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

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

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

Noise Effects

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

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

6.59 The noise assessment also reports that noise associated with demolition and construction stage traffic would not exceed the construction noise limit of 75 dB L_{Aeg} and is therefore considered minor negative and not significant in terms of EIA.

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

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

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

Transport and Accessibility Effects

6.63 The transport assessment in Chapter 7: Transport and Accessibility of this EIAR Volume reports that during the peak demolition and construction period (in 2022) there would be a maximum additional 220

vehicle movements per day (of which 63 would be heavy goods vehicles (HGV) and two highway links which would have an increase of over 30 % in vehicle movements. This increase in vehicle movements is reported to be slight, negative in nature and not significant in EIA terms in relation to pedestrian severance, delay, amenity, fear, and intimidation.

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

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

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

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

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

Amenity Effects

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

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

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

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

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

Operation Effects

Employment Generation

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

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

6.76 The magnitude of effect of increased employment on population and human health is considered to be medium on a receptor of medium sensitivity; therefore, the effect would be **not significant to slight**, **positive** in nature and **not significant** in terms of EIA.

Air Quality Effects

6.77 The air quality assessment in Chapter 8: Air Quality of this EIAR Volume considers the air quality effects during operation from the temporary gas power plant, emergency generators and permanent power plant.

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

6.79 With regards to the temporary gas power plant, the air quality assessment reports that the maximum results indicate that the ambient level concentrations due to emissions arising from the temporary power plant would be below the relevant NO_2 air quality standards (AQS). The temporary gas power plant would be in operation for approximately two years and the associated air quality effects are considered to be negative to slight and not significant.

6.80 The maximum result also indicates that the ambient level concentrations due to emissions arising from permeant power plant would also be below the relevant NO_2 AQS. The effects of the permanent power plant are considered long term to permeant, negative and not significant.

6.81 Modelling of the emergency generators has been undertaken within the air quality assessment to represent a worst-case scenario. Emergency generators would not be expected to operate for more than 24-48 hours per year. It is predicted that annual mean concentrations for 106 hours of operation would be below the relevant NO_2 AQS. The localised air quality effects of the emergency generators are considered long term, neutral and imperceptible (i.e. not significant).

6.82 The magnitude of effect of air quality effects on human health is considered to be low on a receptor of high sensitivity; therefore, the effect would be **non-significant to slight**, **negative** in nature and **not significant** in terms of EIA.

Noise Effects

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

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

6.85 Therefore, in terms of operation noise effects on human health the impact magnitude is considered to be low due to noise levels not exceeding operation noise limits. The effect would **be non-significant to slight, negative** in nature and **not significant** in terms of EIA.

Transport and Accessibility Effects

6.86 The transport assessment in Chapter 7: Transport and Accessibility of this EIAR Volume reports that during the operation stage, there would be an additional 164 vehicle movements per day and 12 deliveries. This equates to an estimated increase of over 30 % in Profile Park in 2026, which could result in severance or an increase in fear and intimidation. Total traffic flows on Profile Park are minor and a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is considered to be imperceptible to slight, negative in nature and not significant in EIA terms.

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

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

Amenity Effects

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

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

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

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

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

Completed Development Stage

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

Enhancement Measures

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

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

Demolition and Construction Residual Effects

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

- Employment Generation: **non-significant to slight (positive), not significant** in EIA terms.
- Introduction of Resident Population: **non-significant to slight (positive), not significant** in EIA terms
- Air quality effects: **non-significant to slight (negative), not significant** in EIA terms;
- Noise effects: **non-significant to slight (negative), not significant** in EIA terms;
- Transport effects: **non-significant to slight (negative), not significant** in EIA terms; and
- Amenity effects: **imperceptible (negative), not significant** in EIA terms.

Operation Residual Effects

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

- Employment Generation: **non significant to slight (positive), not significant** in EIA terms.
- Air quality effects: **non-significant to slight (negative), not significant** in EIA terms;
- Noise effects: **non-significant to slight (negative), not significant** in EIA terms;
- Transport effects- **non-significant to slight (negative), not significant** in EIA terms; and
- Amenity effects- **imperceptible (negative), not significant** in EIA terms.

Summary of Residual Effects

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

Table 6.8: Summary of Residual Population and Human Health Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Local Residents and Economy	Creation of Employment	None required	Non-significant – Slight	+	L	D/I	R	St

Table 6.8: Summary of Residual Population and Human Health Effects

Local Residents and Economy	Introduction of Resident Population	None required	Non-significant – Slight	+	L	D/I	R	St
Local residents	Air quality effects	None required	Non-significant – Slight	-	L	D/I	IR	St
Local residents	Noise effects	None required	Non-Significant – Slight	-	L	D	IR	St
Local residents	Transport effects	None required	Non-Significant – Slight	-	L	D	IR	St
Local residents	Amenity	None required	Imperceptible	-	L	D	R	St
Operation								
Local Residents and Economy	Creation of Employment	None required	Non-significant – Slight	+	L	D	IR	Lt
Local residents	Air quality effects	None Required	Non-significant – Slight	-	L	D/I	IR	Lt
Local residents	Noise effects	None Required	Non-significant – Slight	-	L	D	IR	Lt
Local residents	Transport effects	None required	Non-Significant – Slight	-	L	D	IR	Lt
Local residents	Amenity	None required	Imperceptible	-	L	D	IR	Lt

Notes:

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

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

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

Cumulative Effects

Intra-Project Effects

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

Inter-Project Effects

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

Table 6.9: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 [SD20A/0283]	No	This cumulative scheme would be constructed before the start of the demolition and construction stage of the proposed development.	Yes	The operation of the cumulative scheme would overlap with the opening year of the proposed development.
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	Yes	Demolition and construction of the cumulative scheme would overlap with the operation stage of the proposed development	No	The cumulative scheme would not be operational by Q4 2026, when the proposed development would be operational. The opening year of the cumulative scheme is 2028.
UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No	The opening year of this cumulative scheme is anticipated to be 2021; therefore, the demolition and construction stage would not overlap with the demolition and construction stage of the proposed development.	No	The cumulative scheme would be operational at the same time as the proposed development; however the air quality, noise and transport assessments have reported no significant operational cumulative effects.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	No	The cumulative scheme has already been constructed.	No	The proposed amendments to the cumulative scheme would not generate additional effects.
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	No	The cumulative scheme has already been constructed.	Yes	The cumulative scheme would be operational at the same time as the proposed development.
Cyrus One Townlands within Grange Castle South Business Park,	No	The cumulative scheme has already been constructed.	No	The proposed amendments to the cumulative scheme would not generate additional effects.

Table 6.9: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Baldonnel, Dublin 22 [SD20A/0295]				
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	No	Permission has not yet been granted. The application is due to be decided prior to submission.	No	Permission has not yet been granted. The application is due to be decided prior to submission.
Site proposed electrical connection and substation to EirGrid to the south	No	There will be a potential for overlap with the site's development works.	Yes	The EirGrid connection would power the site data centers.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	No	There will be a potential for overlap with the site's development works.	Yes	Gas fired power plant emission likely to overlap with proposed development.

6.101 Overall, there would be one likely demolition and construction cumulative effect and three operation effects.

Demolition and Construction Cumulative Effects

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

- UBC Properties [SD20A/0121] in respect of transport and accessibility effects.

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

Operation Cumulative Effects

6.104 Operation cumulative effects would arise from the following developments:

- Microsoft [SD20A/0283] in respect of transport and accessibility;
- Cyrus One [SD18A/0134] in respect of transport and accessibility;
- Site proposed electrical connection and substation to EirGrid to the south; and
- Centrica Business Solutions [SD21A/0167] in respect of air quality.

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

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

Summary of Assessment

Background

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

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

6.109 At the time of the 2016 Census, the Clondalkin Village SA population was 257. In terms of the population breakdown, Clondalkin Village has a lower-than-average younger population (0-19) and a significantly higher elderly population compared with Clondalkin Village SA and South Dublin County. When assessing population health. Clondalkin Village has a lower % of residents rating their health as good compared with Clondalkin Village ED and South Dublin County. The highest proportion of employment in Clondalkin Village SA is within the agriculture, forestry and fishing sector and the building and construction industry, compared with Clondalkin Village ED and South Dublin County as a whole.

Demolition and Construction Effects

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

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

Operation Effects

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

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

Cumulative Effects

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

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

6.116 The operation stage of Microsoft, Grange Castle Business Park (SD20A/0283) and Cyrus One, Grange Castle Business Park (SD18A/0134) cumulative schemes would overlap with the operation stage of the proposed development. The increase in traffic resulting from the cumulative development is not predicted to result in any significant effects on population and human health.

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

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

7 TRANSPORT AND ACCESSIBILITY

Introduction

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

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

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

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

Methodology

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

- International Legislation:
  - National Planning Framework (NPF) 2018[2]
- Regional Policy:
  - South Dublin County Council Development Plan 2016-2022[3]
- National guidance and industry standards:
  - IEMA Environmental Assessment for Road Traffic, 1993
  - EPA – Guideline on the Information to be contained in Environmental Impact Assessment Reports DRAFT, August 20174

National Planning Framework (NPF) 2019

7.5 The National Planning Framework (NPF) was published in February 2018 setting out a vision for Ireland in land use and planning terms to 2040. The NPF replaced the National Spatial Strategy once it was adopted as the long term land use and planning vision for Ireland.

7.6 National Strategic Outcome 6 of the NPF relates to the creation of "A Strong Economy Supported by Enterprise, Innovation and Skills". This strategic outcome is underpinned by a range of objectives relating to job creation and the fostering of enterprise and innovation. The following objective, relating to Information and Communications Technology (ICT) infrastructure is included under National Strategic Outcome 6:

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

7.7 The NPF also states that: "Ireland is very attractive in terms of international digital connectivity, climatic factors and current and future renewable energy sources for the development of international digital infrastructures, such as data storage facilities. This sector underpins Ireland's international position as a location for ICT and creates added benefits in relation to establishing a threshold of demand for sustained development of renewable energy sources."

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

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

South Dublin County Council Development Plan 2016-2022;

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

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

IEMA Environmental Assessment for Road Traffic, 1993

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

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

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

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

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

[1] Institute of Environmental Management and Assessment, 1993. Guidelines for the Environmental Assessment for Road Traffic.
[2] National Planning Framework, 2018
https://www.gov.ie/en/publication/daa56-national-planning-framework-ireland-2040-our-plan-npf-2018/

[3] South Dublin County Council Development Plan, 2016-2022
https://sdcc.ie/en/download-it/publications/south-dublin-county-council-development-plan-2016-2022-written-statement.pdf
[4] Environmental Protection Agency, August 2017, Guidelines on the Information to be contained in Environmental Impact Assessment Reports

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

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

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

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

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

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

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

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

Consultation

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

Table 7.1: Summary of Consultation

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

Assessment Scope

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

Technical Scope

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

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

Spatial Scope

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

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

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

7.25 The assessment has been undertaken when the perceived environmental impact is at its greatest during the operation stage, in 2026 and during the demolition and construction stage in 2022. The assessment has considered the Do Nothing scenario, which assumes no proposed development, against the Do Something scenario, which includes the same baseline traffic as the Do Nothing but also includes proposed development traffic.

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

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

Figure 7.1: Study Area

Temporal Scope

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

7.28 The assessment will consider the future years at which the peak demolition and construction traffic of the development occurs and when the proposed development is built out and fully operational. It has been assumed that the peak demolition and construction traffic would occur in 2022, whilst according to the indicative phasing programme the proposed development would be fully operational in 2026. The assessment scenarios are anticipated to be:

- Existing Baseline 2021;
- Demolition and Construction Baseline (2022 'Do Nothing');
- Demolition and Construction Baseline (2022 'Do Nothing') + cumulative development;
- Operational Year Baseline (2026 'Do Nothing') + cumulative development; and
- Operational Year Baseline (2026 'Do Nothing') + cumulative development + proposed development (2026 'Do Something').

Baseline Characterisation Method

Desk Study

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

- The approved SD20A/0121 Traffic Impact Assessment[5];
- Google Maps; and
- Road Safety Authority.

Field Study

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

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

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

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

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

Assessment Method

Methodology

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

Assessment Scenarios

Demolition and Construction Stage

7.34 The demolition and construction traffic assessment has been limited to the roads immediately adjacent to the application site and any roads further afield where the 30 % increase in traffic threshold is breached. Potential demolition and construction traffic impacts from the proposed development have been assessed based upon the number of vehicle movements identified in the previous approved SD20A/0121 application. The assessment focuses on the most intensive year in terms of the number of demolition and construction vehicle movements, which has been considered against the 2021 Baseline.

7.35 The demolition and construction stage will take place from approximately Q4 2021 to Q4 2026. It has been assumed that the most intensive year in terms of vehicle movements would be 2022.

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

Operation Stage

7.36 The proposed development is anticipated to be completed and fully operational in 2026, when all occupants will be on-site. The assessment would consider the full quantum of development at this future year.

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

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

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

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

Driver Delay

7.40 The assessment considers the duration of delays or benefits occurring to road users on the local highway network based upon the estimated increase in traffic resulting from the proposed development for the demolition and construction stage and the operation stage.

Accidents and Safety

7.41 The likely increase or decrease in the number of accidents resulting from the changes in traffic flows and composition for the demolition and construction stage and the operation stage has been considered. Personal Injury Accident (PIA) data has been obtained from the Road Safety Authority website for the five-year period 2011-2016. It should be noted that 2016 is the latest year when accident data is available.

Cumulative Stage

7.42 A review of cumulative schemes and their potential impacts on traffic flows on the local highway network has been undertaken. Predicted traffic flows generated by each of the following cumulative schemes have been considered:

- Microsoft – Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 (SD20A/0283);
- UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0121);
- UBC Properties -Grange Castle South Business Park, Dublin 22 (VA06S.308585);
- Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 (SD17A/0377);
- Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 (SD18A/0134);
- Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0295 - amendment to SD18A/0134);
- Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 (VA06S.309146); and
- SID Application to provide the proposed development (VDC DUB 1) permanent electrical connection to the EIR grid.

7.43 All the aforementioned cumulative schemes are located in close proximity to the site.

7.44 The traffic data associated with the selected cumulative developments has been sourced from their respective Traffic Impact Assessment reports on the South Dublin County Council planning portal. The operation stage of the "SD20A/0283" and "SD17A/0377" cumulative schemes as well as the demolition and construction stage of "SD20A/0121" scheme are anticipated to be online in the Operational Year (2026) of the proposed development and have been included in the assessment.

Assessment Criteria

7.45 The EPA and IEMA Guidelines were reviewed in order to identify appropriate significance criteria applicable to the assessment.

7.46 Paragraph 4.5 of the IEMA Guidelines states that: *"For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible".*

7.47 Under EPA guidelines quality effects are described as either:

- Positive – a change which improves the quality of the environment (such as reduction of traffic, travel time or patronage, or provision of a new service, access or facility);
- Neutral – no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error; and
- Negative – a change which reduces the quality of the environment (such as increase of traffic, travel time, patronage or loss of service or facility).
- Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.48 The significance of pedestrian severance, delay, amenity, fear and intimidation effects has been determined by considering future baseline traffic flows obtained from the traffic surveys, as well as the potential impact of the proposed development in terms of change in traffic flows on each link within the study area by reference to the IEMA Guidelines and applying professional judgment.

Pedestrian Severance

7.49 The IEMA Guidelines acknowledge that the measurement and prediction of severance is extremely difficult and that the correlation between the extent of severance and the physical barrier of a road is not clear. It notes that there are no predictive formulae which give simple relationships between traffic factors and levels of severance. However, the IEMA Guidelines do accept that in general, marginal changes in traffic flows are, by themselves, unlikely to create or remove severance.

7.50 Factors which need to be considered when determining severance comprise road width, traffic flows, speed of traffic, the presence of pedestrian crossing facilities and the number of pedestrian movements across the affected route.

7.51 The IEMA Guidelines suggest that:

- Changes in flow of up to 30 % would produce slight changes in severance;
- Changes in flow of up to 60 % would produce moderate changes in severance; and
- Changes in flow of up to 90 % would produce substantial changes in severance. It is recognised that these are guidelines only and are highly dependent on existing ambient traffic levels. They are not considered to be definitive measures of severance and should be used with care and regard paid to specific local conditions. The guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian Delay

7.52 The IEMA Guidelines note that changes in the volume, composition and or speed of traffic may affect the ability of people to cross-roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The IEMA Guidelines do not set any thresholds for absolute or actual changes in delay, recommending instead that assessors use their judgment to determine the significance of the impact.

7.53 The IEMA Guidelines refer to a report published by the Transport Research Laboratory (TRL) as providing a useful approximation for determining pedestrian delay. The TRL research[6] concludes that the mean pedestrian delay was found to be eight seconds at flows of 1,000 vehicles per hour, and below 20 seconds at 2,000 vehicles per hour for various types of crossing condition.

7.54 A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold for assessment (equating to a mean 10 second delay for a link with no pedestrian facilities) in the TRL report. Below this flow, pedestrian delay is unlikely to be a significant factor. This is deemed a robust starting point for narrowing down the modelled routes within the study area and ensuring the routes selected exceeded the suggested threshold of analysis in IEMA Guidelines. It should be noted that for controlled forms of pedestrian crossing the pedestrian delays are less.

7.55 As a result, any road with a two-way flow of less than 1,400 vehicles is deemed to have a negligible effect. Roads above this are assessed on the basis of professional judgment.

Pedestrian Amenity

7.56 IEMA Guidelines define pedestrian amenity as the relative pleasantness of a journey and may be influenced by fear and intimidation if they are relevant. As with pedestrian delay, pedestrian amenity is considered to be affected by traffic volumes and composition along with pavement width and pedestrian activity. The IEMA Guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flows are halved or doubled.

7.57 The Guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian Fear and Intimidation

7.58 A number of factors are considered relevant in determining changes in the level of fear and intimidation experienced by pedestrians and cyclists including volume of traffic; percentage of HGVs; speed of traffic; proximity to people; and the availability and quality of pedestrian infrastructure.

7.59 The IEMA Guidelines sets out the criteria in Table 7.2 for measuring the effects of fear and intimidation.

Table 7.2: Pedestrian Fear and Intimidation Criteria

Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18-hr HGV Flow	Average Speed (mph)
Extreme	1,800+	3,000+	20+
Great	1,200 – 1,800	2,000 – 3,000	15 - 20
Moderate	600 – 1,200	1,000 – 2,000	10 - 15

7.60 The IEMA Guidelines stress the need for professional judgment when applying the above criteria. Accordingly, the guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Driver Delay

7.61 IEMA Guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. Professional judgment has been applied to determine the significance of residual effects.

Accidents and Safety

7.62 There is no formal published guidance for the assessment of accidents and safety. Therefore, professional judgment has been applied to assess the implications of local circumstances and the proposed development's likely effect which may increase or decrease the risk of accidents.

Receptor Sensitivity/Value Criteria

Highway Network

7.63 The potential receptors are the users of transport networks within the relevant study area. The sensitivity of a road can be defined by the vulnerability of the user groups who are likely to use it, i.e. the elderly or children. A sensitive area may be where pedestrian activity is high, near a school, or an accident black spot. it also takes into account the existing nature of the road, i.e. an existing residential area is likely to be more sensitive than an A road.

7.64 Professional judgement has been used to define the value of receptors in accordance with LA 1047 Section 3.1.

7.65 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 7.3

Table 7.3: Receptor Sensitivity Criteria

Sensitivity	Criteria
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.
Medium	Receptors of moderate sensitivity to traffic flow: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.
Very Low	Receptors with very low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

Impact Magnitude Criteria

7.66 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 7.4.

Table 7.4: Impact Magnitude Criteria

Impact	Assessment Criteria			
	Low	Medium	High	Very High
Severance	Increase in total traffic flows of 30 % or under.	Increase in total traffic flows of 30 % – 60 %.	Increase in total traffic flows of 60 % - 90 %.	Increase in total traffic flows of 90 % and above.
Pedestrian Severance, Delay, Amenity, Fear and Intimidation	This has been assessed on a case by case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Threshold for judging the significance of changes to pedestrian amenity where the traffic flows is halved or doubled.			
Driver Delay	This has been assessed on a case by case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Impacts are only likely to be significant when the			

[6] Transport Research Laboratory, 1991. The Estimation of Pedestrian Numbers

[7] LA 104 Environmental assessment and monitoring, Rev 01, DMRB, July 2019

Table 7.4: Impact Magnitude Criteria				
Impact	**Assessment Criteria**			
	Low	**Medium**	**High**	**Very High**
	traffic on the network surrounding the development is already at, or close to, the capacity of the system.			
Accidents and Safety	Accident data for the local area have been reviewed and professional judgement have been applied to assess the implications of potential increase/decrease in traffic.			

Scale of Effect Criteria

7.67 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 7.5. The matrix has been informed by the EPA Guidelines.

Table 7.5: Scale of Effect Criteria				
Magnitude	**Sensitivity of Receptors**			
	Very Low	**Low**	**Medium**	**High**
Low	Imperceptible	Not Significant	Slight	Slight
Medium	Not Significant	Slight	Slight	Moderate-Significant
High	Slight	Slight	Moderate-Significant	Very Significant
Very High	Slight	Moderate-Significant	Very Significant	Profound

7.68 Based on professional judgement, moderate-significant, very significant and profound effects are considered significant in EIA terms.

7.69 Where the existing baseline HGV or total traffic flows are very minor, a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic may still be considered to be negligible or slight. In these instances, appropriate professional and experienced judgements have been made.

7.70 The description of effects set out in Table 7.6 are in accordance with EPA Guidance.

Table 7.6: Description of Effects	
Effect Characteristic	**Description**
Significance	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects	
Momentary	Effects lasting from seconds to minutes.
Brief	Effects lasting less than a day.
Temporary	Effects lasting less than a year.
Short term	Effects lasting one to seven years.
Medium term	Effects lasting seven to fifteen years.
Long term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years.
Reversible	Effects that can be undone, for example through remediation or restoration.
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Type of Effects	
Indirect effects	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
'Do-nothing' effects	The environment as it would be in the future should the subject project not be carried out.
'Worst case' effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminant effects	When the full consequences of a change in the environment cannot be described.
Irreversible effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Nature of Effect Criteria

7.71 The nature of the effect has been described in accordance with EPA Guidance as either positive, neutral, or negative as follows:

- Positive - A change which improves the quality of the environment;
- Neutral – No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error;

- Negative – A change which reduces the quality of the environment.

Assumptions and Limitations

7.72 The assessment has relied on 2019 traffic survey data extracted from the approved SD20A/0121 Traffic Impact Assessment. It has been assumed that these data sets have been reported correctly.

7.73 It has been assumed that the AM and PM peak from each cumulative scheme will occur at the same peak periods with the 2019 traffic survey data.

7.74 TEMPRO growth rates have been applied to 2019 baseline data to forecast 2022 and 2026 future baseline traffic data.

Baseline Conditions

Existing Baseline

7.75 The following paragraphs provide an overview of the current baseline transport and accessibility conditions within the study area considering pedestrian and cycle facilities and access; public transport accessibility; and the operation of the existing highway network. Consideration is also given to the existing baseline flows where available. This analysis provides the baseline context against which the transport movements and accessibility of the proposed development have been assessed.

Local Highway Network

7.76 The site is accessed off Profile Park which is a street-lit dual carriageway providing access to the businesses within Profile Park and forms a junction with the R134 New Nangor Road and Grange Castle Business Park. Profile Park is subject to a 50 km/hr speed limit.

7.77 The site is located adjacent to the R134 New Nangor Road which is a street-lit single carriageway road and is subject to a 40 km/h speed limit. The R134 connects the R120 to the west and R136 to the east.

7.78 The R136 is a street-lit dual carriageway road subject to an 80 km/h speed limit. The R136 connects the N4 to the north with the N7 to the south. The R136 accommodates two lanes for general traffic and a bus lane in each direction, a shared foot/ cycle path of approximately 3m are present on both sides of the highway.

7.79 Traffic data from various sources including traffic surveys commissioned in December 2019 has been used to inform the assessment and to provide baseline traffic flows. Table 7.7 presents the baseline traffic figures 2019 AADT, % HGV and link speed limits.

7.80 2019 baseline AM and PM peak hour traffic flow and distribution diagrams are presented in Technical Appendix 7.1.

Table 7.7: 2021 Baseline Traffic Data

Location	Direction	Speed Limit/kph	2021 Baseline	
			24hr AADT	% HGV
R120 Adamstown Road (N)	SB	80	5,026	5%
	NB	80	4,341	11%
R134 New Nangor Road (W)	EB	40	6,397	8%
	WB	40	5,269	9%
R120 Adamstown Road (S)	SB	80	4,069	6%
	NB	80	4,511	4%
R134 New Nangor Road (E)	EB	40	5,674	8%
	WB	40	5,258	9%
	SB	60	3,387	10%
Baldonnel Road (S)	NB	60	2,917	9%
R134 New Nangor Road (W)	EB	40	6,003	8%
	WB	40	5,117	10%
Kilcarbery Park (N)	SB	40	1,212	19%
	NB	40	1,167	26%
R134 New Nangor Road (E)	EB	40	6,911	9%
	WB	40	6,484	11%
Profile Park	SB	50	276	20%
	NB	50	248	14%
R134 New Nangor Road (W)	EB	40	5,947	8%
	WB	40	5,539	9%
Grange Caste Business Park (N)	SB	40	2,658	11%
	NB	40	2,639	11%
R134 New Nangor Road (E)	EB	40	7,766	11%
	WB	40	7,547	12%
Grange Caste Business Park (S)	SB	40	125	0%
	NB	40	120	0%
R134 New Nangor Road (W)	EB	40	6,986	10%
	WB	40	6,781	11%
R136 Grange Caste Road (N)	SB	80	8,321	4%
	NB	80	9,005	4%
R134 New Nangor Road (E)	EB	40	7,693	7%
	WB	40	6,653	7%
R136 Grange Caste Road (S)	SB	80	13,127	7%
	NB	80	14,302	6%
R134 New Nangor Road (W)	EB	40	7,804	11%
	WB	40	7,294	11%

Public Transport

Bus Services

7.81 The nearest bus stops are located in both directions on the R134 Nangor Road, within 600 m of the site, from which frequent routes operate between the site and Dublin city centre. The bus stops are served by three bus services, which are presented in Table 7.8.

National Rail

7.82 Clondalkin/Fonthill railway station is located at approximately 3 km to the north-east of the site from which frequent commuter services operate to/from Dublin city.

7.83 Citywest Campus Luas Tram Stop is approximately 4 km to the southeast of the site from which frequent tram services to Dublin city and beyond can be accessed.

Walking and Cycling Network

Pedestrians and Cyclists

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

7.85 Pedestrian and cyclist access to the proposed development will be via Profile Park where footpaths of approximately 3 m are provided on both sides of the road.

7.86 Profile Park intersects with the R134 New Nangor Road at a four-arm roundabout. Pedestrian crossing facilities with dropped kerbs and tactile paving are provided an all arms of the roundabout, except the northern arm (Kilcabery Park).

7.87 A shared use footway/cycleway of approximately 5 m is provided on the northern side of the R134 New Nangor Road, whilst shared foot / cycle paths of approximately 3 m are present on both sides of the R136.

7.88 Signal-controlled toucan crossings with dropped kerbs and tactile paving are provided on all arms of the R134 New Nangor Road/R136.

Accident Data

7.89 All reported accidents between 2012-2016, within the locality of the application site are identified in Technical Appendix 7.2.

7.90 A summary of the accidents is presented in Table 7.9.

Table 7.9: 2012-2016 Accident Data

Year	Severity			
	Slight	Serious	Fatal	Total Accidents
2012	1	0	0	1
2013	1	0	0	0
2014	2	0	1	3
2015	6	0	0	6
2016	4	0	0	4

7.91 One fatal accident occurred at the R134 New Nangor Road / R136 junction in 2014, with the remaining accidents within the study area reported as slight.

7.92 Most of the accidents occurred at the R134 New Nangor Road / R136 junction, with 3 slight accidents reported at the Profile Park/R134 New Nangor Road junction.

Future Baseline

7.93 The assessment has considered future years of 2022 (peak demolition and construction stage) and 2026 (fully operational year).

7.94 The proposed development will house data processing equipment, that will serve various businesses and enterprises that deliver on-line data services to the area. The building will have 24/7 operation with secure access, few visitors and occasional deliveries. The proposed development will have a small administrative component (offices and maintenance) for support personnel for the facility. Average staff on site per day will be approximately 90 for the full development.

Table 7.8: Bus Services

Service/Bus Stop	Bus Route	Frequency (minutes)		
		Monday	Saturday	Sunday
13	Grange Castle - Harristown	EB: 15mins (05:50-23:30) WB: 15mins (05:30-23:30)	EB: 15mins (06:10-23:30) WB: 15mins (06:10-23:30)	EB: 15mins (07:00-23:30) WB: 15mins (07:00-23:30)
68	Hawkins St.- Newcastle/Greenogue Business Park	EB: 60mins (06:00-00:15) WB: approx. 60mins (06:00-00:15)	EB: 60mins (06:35-00:15) WB: approx. 60mins (06:40-23:30)	EB: 75mins (10:15-00:25) WB: 75mins (09:00-23:30)
68X	Newcastle/Greenogue Business Park -Hawkins St.	1 service at 07:30	N/A	N/A

7.95 There would be two entry points from Falcon Avenue, with a security barrier and guard house to restrict general access to the site. HGVs and deliveries will access the site via the West Entry. South main Entry will provide a separate access for employees, visitors via car, pedestrian or cycle access aligned to the existing path and cycle routes around the site. with a two-bay loading dock.

7.96 The proposed development will be served by 144 car parking spaces that will be located generally to the east of the data center, of which 6 spaces will be disabled spaces and 14 of these spaces will be provided for electrical charging vehicles. Covered bicycle parking provision will be provided within the site for 66 cycles.

Local Highway Network

7.97 The 2026 Baseline 'Do Nothing' traffic flows for the highway network are shown in Table 7.11. Unit 5.5 of the TII Project Appraisal Guidelines (Link-Based Traffic Growth Forecasting) has been used to apply growth factors to 2019 traffic data to generate the future baseline. The future baseline also includes cumulative schemes. The factors applied are:

Table 7.10: Growth Factor

Years	Growth Factor
2019-2021	1.010
2019-2022	1.015
2019-2026	1.035

Table 7.11: 2026 Baseline ('Do Nothing') Traffic Data

Location	Direction	2026 Baseline
		24hr AADT
R120 Adamstown Road (N)	SB	5,276
	NB	4,558

Table 7.11: 2026 Baseline ('Do Nothing') Traffic Data

Location	Direction	2026 Baseline 24hr AADT
R134 New Nangor Road (W)	EB	6,707
	WB	5,598
R120 Adamstown Road (S)	SB	4,255
	NB	4,775
R134 New Nangor Road (E)	EB	6,106
	WB	5,621
Baldonnel Road (S)	SB	3,729
	NB	3,278
R134 New Nangor Road (W)	EB	6,300
	WB	5,360
Kilcarbery Park (N)	SB	1,242
	NB	1,195
R134 New Nangor Road (E)	EB	7,373
	WB	6,877
Profile Park	SB	283
	NB	254
R134 New Nangor Road (W)	EB	6,386
	WB	5,909
Grange Caste Business Park (N)	SB	2,722
	NB	2,702
R134 New Nangor Road (E)	EB	8,249
	WB	7,965
Grange Caste Business Park (S)	SB	128
	NB	123
R134 New Nangor Road (W)	EB	7,450
	WB	7,180
R136 Grange Caste Road (N)	SB	8,534
	NB	9,249
R134 New Nangor Road (E)	EB	7,931
	WB	6,855
R136 Grange Caste Road (S)	SB	13,662
	NB	14,833
R134 New Nangor Road (W)	EB	8,288
	WB	7,706

Public Transport

7.98 No public transport improvements within the study area are proposed to be implemented by 2026. Therefore, it has been assumed that the future public transport baseline in 2026 would be the same as the existing public transport baseline.

7.99 All vehicular traffic will access the site to the south via the four-arm roundabout on Profile Park which leads to a roundabout on the R134 New Nangor Road.

Walking and Cycling

7.100 No improvements to the walking and cycling facilities within the study area are proposed to be implemented by 2026.

7.101 Pedestrians and cyclists will continue to access the site via Profile Park, with pedestrian and cycle routes aligned with existing routes around the site.

Sensitive Receptors

7.102 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 7.12. These have been based on the criteria identified in Table 7.3.

Table 7.12: Summary of Sensitive Receptors

Receptor	Sensitivity
Pedestrians and Cyclists	High
Local highway network	Low
Road Users	Medium

Assessment of Effects

7.103 The following section describes the potential transport and accessibility impacts and effects which could arise as a result if the proposed development during the demolition and construction stage and the operation stage.

Demolition and Construction Effects

7.104 It has been assumed that the demolition and construction traffic for the proposed development of 40,589 sqm will be proportional (≈51%) to the construction traffic used for the site in the approved SD20A/0121 application (80,269sqm).

Local Highway Network

7.105 It has been assumed that the peak demolition and construction period would be in 2022 when there would be a maximum of 220 demolition and construction vehicle movements per day, as identified in Table 7.13.

Table 7.13: Maximum Daily Demolition and Construction Stage Trip Generation

	Arrivals		Departures		Total	
	Car	HGV	Car	HGV	Arrivals	Departures
Daily	157	63	157	63	220	220

7.106 Light and heavy vehicle construction traffic has been distributed across the surrounding network in the same manner as in the previous approved SD20A/0121 application. Light construction traffic has been distributed based upon the 2019 traffic surveys, whilst heavy construction traffic would travel to the site from the N7 national road and from the M50 motorway orbital motorway, via the R136 and R134 regional roads, and depart along the same routes.

7.107 Table 7.14 identifies two highway links which would have an increase over 30% in demolition and construction vehicle movements.

Table 7.14: %Increase between Do Nothing and Do Something

Location	Direc-tion	2022 Do Nothing 24hr AADT	2022 Do Something 24hr AADT	%Increase
R120 Adamstown Road (N)	SB	5,179	5,191	0%
	NB	4,475	4,475	0%
R134 New Nangor Road (W)	EB	6,584	6,612	0%
	WB	5,496	5,496	0%
R120 Adamstown Road (S)	SB	4,177	4,177	0%
	NB	4,688	4,702	0%
R134 New Nangor Road (E)	EB	5,997	6,022	0%
	WB	5,520	5,520	0%
Baldonnel Road (S)	SB	3,664	3,664	0%
	NB	3,222	3,222	0%
R134 New Nangor Road (W)	EB	6,185	6,211	0%
	WB	5,262	5,262	0%
Kilcarbery Park (N)	SB	1,218	1,218	0%
	NB	1,172	1,172	0%
R134 New Nangor Road (E)	EB	7,241	7,429	3%
	WB	6,752	6,915	2%
Profile Park	SB	278	466	68%
	NB	250	438	76%
R134 New Nangor Road (W)	EB	6,272	6,297	0%
	WB	5,802	5,802	0%
Grange Caste Business Park (N)	SB	2,671	2,671	0%
	NB	2,652	2,652	0%
R134 New Nangor Road (E)	EB	8,100	8,288	2%
	WB	7,820	7,983	2%
Grange Caste Business Park (S)	SB	126	126	0%
	NB	121	121	0%
R134 New Nangor Road (W)	EB	7,316	7,504	3%
	WB	7,050	7,213	2%
Grange Caste Road (N)	SB	8,374	8,382	0%
	NB	9,076	9,097	0%
R134 New Nangor Road (E)	EB	7,783	7,819	0%
	WB	6,727	6,761	1%
Grange Caste Road (S)	SB	13,409	13,541	1%
	NB	14,558	14,677	1%
R134 New Nangor Road (W)	EB	8,138	8,326	2%
	WB	7,566	7,728	2%

7.108 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30 % has been identified (as shown in red).

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.109 The demolition and construction stage would generate movements by HGVs and construction workers. It has been considered that these would have a temporary minor impact on the local road network. In addition, a Construction Management Plan (CMP) would be prepared by the contractor, when appointed, that would require construction traffic including both construction plant and materials deliveries to be programmed to avoid peak traffic periods on the surrounding local and strategic road network.

7.110 Due to the length of the proposed demolition and construction stage, any demolition and construction impacts are considered short term in accordance with EPA Guidance. However, demolition and construction vehicle movements would fluctuate throughout the 60-month demolition and construction stage. Signs and temporary barriers would be used to inform the public of changes to walking, cycling or highway routes during the demolition and construction stage.

7.111 Pedestrians are sensitive to traffic flows and considered to have a high receptor sensitivity.

7.112 Across the assessed highway network, only flows on Profile Park are anticipated to exceed the 30% severance threshold. However, the total traffic flows on Profile Park are minor and a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is considered to be low. Traffic on Profile Park would increase from 250 24hr AADT 2022 Do Nothing to 438 24hr AADT in 2022 Do Something. Pedestrians can be safely accommodated by footpaths of approximately 3m provided on both sides of Profile Park. Pedestrians can cross the road via the informal pedestrian crossing with dropped kerbs and tactile paving on the approach to the R134 New Nangor Road / Profile Park roundabout. The speed limit on Profile Park is 50kph.

7.113 Therefore, it is considered that overall, the impact magnitude is low and the overall effect would therefore be **Slight Negative** and **not significant**.

Driver Delay

7.114 It is anticipated that there may be some delay to road users at times due to demolition and construction vehicles entering/exiting the application site. However, the CMP would commit to ensuring deliveries are co-ordinated to ensure vehicles would not be waiting on the local highway, and that wherever feasible deliveries would be undertaken outside peak hours.

7.115 Due to the length of the proposed demolition and construction stage any demolition and construction impacts are considered short term. However, demolition and construction vehicle movements would fluctuate throughout the 60-month demolition and construction stage.

7.116 Road users are considered to have a medium sensitivity to traffic flow.

7.117 The impact magnitude would be low due to the potential increase in HGV and private vehicle demolition and construction traffic movements. In addition, measures would be implemented in the CMP to manage the volume of demolition and construction traffic and proposed safety measures. The effect would therefore be **Slight Negative** and **not significant**.

Accidents and Safety

7.118 Impacts from the demolition and construction stage of the proposed development would be temporary.

7.119 The accident analysis does not indicate a prevailing road safety issue which could be made worse by the demolition and construction works.

7.120 Road users, pedestrians and cyclists are all recognised as receptors to accidents and safety, pedestrians and cyclists are considered to have a high sensitivity.

7.121 The impact magnitude is considered to be low due to the traffic flows associated with the demolition and construction works. The effect on accidents and safety would therefore be **Slight Negative** and **not significant.**

Operation Effects

7.122 The proposed development access hierarchy gives precedence to walking, cycling and public transport over private vehicles. The proposed development is focussed on people, including considered provision for people to be able to travel actively, sustainably and safety.

7.123 It has been assumed that the proposed development will be fully operational in 2026.

Proposed Development Trip Generation

7.124 The total vehicle trip generation for the proposed development is presented in Table 7.15.

Table 7.15: Proposed Development Trip Generation- Operation Stage

	Arrivals		Departures		Two-Way	
Total Vehicles	**Total Vehicles**	**Deliveries**	**Total Vehicles**	**Deliveries**	**Total Vehicles**	**Deliveries**
Daily	82	6	82	6	164	12

7.125 The total daily trip generation profile for the proposed development during the operation stage can be found in Appendix 7.4.

Local Highway Network

7.126 All vehicular traffic will access the site via the four-arm roundabout on Profile Park which leads to a roundabout on the R134 New Nangor Road.

7.127 Table 7.16 presents the baseline traffic figures 2026 Do Nothing and Do Something Annual Average Daily Traffic flow (AADT). The table also identifies the % change between the Do Nothing and the Do Something. The future baseline includes background growth (including cumulative schemes).

7.128 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30 % has been identified (as shown in red).

Table 7.16: %Increase between Do Nothing and Do Something

Location	Direction	2026 Do Something	
		24hr AADT	**%Increase**
R120 Adamstown Road (N)	SB	5,281	0%
	NB	4,558	0%
R134 New Nangor Road (W)	EB	6,719	0%
	WB	5,598	0%
R120 Adamstown Road (S)	SB	4,255	0%
	NB	4,782	0%
R134 New Nangor Road (E)	EB	6,118	0%
	WB	5,621	0%
Baldonnel Road (S)	SB	3,729	0%
	NB	3,278	0%
R134 New Nangor Road (W)	EB	6,313	0%
	WB	5,360	0%
Kilcarbery Park (N)	SB	1,242	0%
	NB	1,195	0%
R134 New Nangor Road (E)	EB	7,455	1%
	WB	6,947	1%

Table 7.16: %Increase between Do Nothing and Do Something

Location	Direction	2026 Do Something	
		24hr AADT	**%Increase**
Profile Park	SB	365	29%
	NB	336	32%
R134 New Nangor Road (W)	EB	6,398	0%
	WB	5,909	0%
Grange Caste Business Park (N)	SB	2,722	0%
	NB	2,702	0%
R134 New Nangor Road (E)	EB	8,331	1%
	WB	8,035	1%
Grange Caste Business Park (S)	SB	128	0%
	NB	123	0%
R134 New Nangor Road (W)	EB	7,532	1%
	WB	7,250	1%
Grange Caste Road (N)	SB	8,540	0%
	NB	9,262	0%
R134 New Nangor Road (E)	EB	7,954	0%
	WB	6,878	0%
Grange Caste Road (S)	SB	13,708	0%
	NB	14,872	0%
R134 New Nangor Road (W)	EB	8,370	1%
	WB	7,776	1%

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.129 Pedestrians would access the site from one access / egress point from Profile Park Road to the south, which leads to a roundabout on the R134 New Nangor Road.

7.130 Impacts from the operation of the proposed development would be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.131 Pedestrians are considered to have a high sensitivity to changes in traffic flows.

7.132 Table 7.16 identifies an increase of over 30% on Profile Park in 2026 when comparing the Do Nothing with the Do Something scenario. An increase of traffic at 32% (NB) on Profile Park is anticipated as a result of the proposed development which could result in severance or an increase in fear and intimidation. Total traffic flows on Profile Park are minor and a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is considered to be negligible or slight. Traffic data on Profile Park would increase from 254 24hr AADT to 336 24hr AADT in 2026 Do Something. Pedestrians can be safely accommodated by footpaths of approximately 3m provided on both sides of Profile Park, whilst they can cross the road via the informal pedestrian crossing with dropped kerbs and tactile paving on the approach to the R134 New Nangor Road / Profile Park roundabout. Further, given that only one direction of Profile Park has an increase over 30 % in traffic, the speed limit of 50 Kph and the pedestrian routes of high standards on both sides of the road, it is considered that over all the highway network assessed, the impact magnitude is low.

7.133 The overall effect would therefore be **Slight Negative** and **not significant**.

Driver Delay

7.134 Classified traffic turning count survey of the junction of Profile Park with the R134 New Nangor Road was carried out in December 2019. The AM Peak hour total through the junction was 1,347 vehicles between 07:30-08:30. The PM peak hour total throughput of the junction was 1,190 vehicles between 16:30 – 17:30.

7.135 The development net total vehicle generation is estimated to be a small increase on this baseline junction load (4.4 % in AM Peak and 4.8 % in PM Peak), which is unlikely to cause negative effects on the junction performance.

7.136 As journeys would distribute from this point to the wider highway network, effects thereon would be more disperse beyond this junction.

7.137 Impacts from the operation of the proposed development are considered to be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.138 Road users are considered to have a medium sensitivity to changes in traffic flows.

7.139 The impact magnitude would be low due to the anticipated small increase in peak hour traffic resulting from the proposed development. The effect on driver delay would therefore be **Slight Negative** and **not significant**.

Accidents and Safety

7.140 The proposed development would be designed in accordance with appropriate design standards.

7.141 Impacts from the operation of the proposed development would be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.142 The accident analysis does not indicate a prevailing road safety issue which could be made worse by the new development site.

7.143 Road users, pedestrians and cyclists are all recognised as receptors to accidents and safety, pedestrians and cyclists are considered to have a high sensitivity.

7.144 The impact magnitude is considered to be low due to the low traffic flows associated with the proposed development, the high standard of design of the proposed development and commitment to safety and reducing danger and fear associated with traffic. The effect on accidents and safety would therefore be **Slight Negative** and **not significant.**

Additional Mitigation

Demolition and Construction Stage

7.145 No additional mitigation measures beyond the CMP and measures already described in the 'Potential Impacts and Likely Effects' would be required for the demolition and construction stage.

Operation Stage

7.146 No additional mitigation measures beyond the measures already described in the 'Assessment of Effects' would be required for the operation stage.

Enhancement Measures

7.147 No additional enhancement measures beyond the measures already described in the 'Assessment of Effects' would be required for the demolition and construction stage.

Demolition and Construction Residual Effects

7.148 No additional mitigation would be required; therefore the residual demolition and construction effects remain as reported in the assessment of effects section:

- Slight Negative and not significant for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight Negative and not significant for Driver Delay;
- Slight Negative and not significant for Accidents and Safety;

Operation Residual Effects

7.149 No additional mitigation would be required; therefore, the residual operation effects remain as reported in the assessment of effects section:

- Slight Negative and not significant for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight Negative and not significant for Driver Delay;
- Slight Negative and not significant for Accidents and Safety;

Summary of Residual Effects

7.150 Table 7.17 provides a tabulated summary of the outcomes of the Transport and Accessibility assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 7.17 Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ / -	L / U	R / IR	D / ID	M B T St Mt Lt P**
Demolition and Construction Stage								
Pedestrians	Change in Pedestrian Severance, Delay, Amenity, Fear and Intimidation	None	Slight	-	L	R	D	St
Road Users	Change in Driver Delay	None	Slight	-	L	R	D	St
Road Users, Pedestrians and cyclists	Change in Accidents and Safety	None	Slight	-	L	R	D	St
Operation Stage								
Pedestrians	Change in Pedestrian Severance, Delay, Amenity, Fear and Intimidation	None	Slight	-	L	R	D	Lt
Road Users	Change in Driver Delay	None	Slight	-	L	R	D	Lt
Road Users, Pedestrians and cyclists	Change in Accidents and Safety	None	Slight	-	L	R	D	Lt

Notes:

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

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

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

Cumulative Effects

Intra-Project Effects

7.151 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in EIAR Volume 1, Chapter 16: Cumulative Effects.

Inter-Project Effects

7.152 Table 7.18 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 7.18: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 - (SD20A/0283)	No	This cumulative scheme would be constructed before the start of the demolition and construction stage of the proposed development.	Yes	Operation stage will overlap with the opening year of the proposed development. Considered to be in close proximity to the application site.
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 - (SD20A/0121)	Yes	Demolition and construction traffic will overlap with the operational stage of the proposed development.	No	Development will not be operational by the fully operational year of the proposed development, therefore no effects considered likely. Opening year of the cumulative scheme is 2028.
UBC Properties - Grange Castle South Business Park, Dublin 22- (VA06S.308585)	No	Opening year of this cumulative development is anticipated to be 2021, therefore demolition and construction stage will not overlap with the opening year of the proposed development, therefore no effects considered likely.	No	The Grange Castle South Business Park EIAR describes a very low trip generation which professional judgement indicates would result in negligible associated traffic expected on each link within the study area. The proposed Clutterland substation does not require any full-time staff to operate it on a daily basis.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 - (SD17A/0377)	No	The cumulative development has already been constructed.	No	It was not possible to locate all supporting transport documents but those available indicate that the proposed amendments under this application SD17A/0377 will not generate additional traffic to the previously permitted SD12A/0002.

Table 7.18: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 – (SD18A/0134)	No	The cumulative development has already been constructed.	Yes	Operation stage will overlap with the opening year of the proposed development. Considered to be in close proximity to the application site.
Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 – (SD20A/0295)	No	According to the reports the construction works should be complete. Number of trips anticipated to be generated are very low (approximately 25HGVs between January 2021 and June 2021).	No	It was not possible to locate all supporting transport documents but those available indicate that the proposed amendments under this cumulative scheme will not generate additional traffic to the previously permitted SD18A/0134.
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 – (VA06S.309146)	No	No permission has been granted yet. Due to be decided prior to the application.	No	No permission has been granted yet. Due to be decided prior to the application.
SID Application to provide the proposed sites (VDC DUB 1) permanent electrical connection to the EIR grid	No	Construction activities related to this cumulative scheme will be undertaken jointly with construction works of the proposed development. Based upon similar schemes (VA06S.308585) the number of trips anticipated to be generated are very low.	No	Based on VA06S.308585 application schemes similar to this cumulative development don't require any full-time staff to operate it on a daily basis.

Demolition and Construction Cumulative Effects

7.153 The assessment undertaken includes all the cumulative schemes that overlap with the demolition and construction stage of the proposed development.

7.154 The demolition and construction stage of SD20A/0121 (Grange Castle South Business Park) would overlap with the operation stage of the proposed development.

7.155 The appointed demolition and construction contractor(s) and Applicant would consult neighbouring schemes on the programme and local effects of the demolition and construction works, such as pedestrian routes, for example. In addition, collaboration around the scheduling of vehicle movements would be undertaken so that if works coincide with other demolition and construction activity already taking place within the immediate vicinity of the application site, the cumulative effect of dismantling and construction traffic can be minimised.

7.156 It should be noted that the SID application is not permitted development and therefore has not been considered with the formal assessment. However, the SID application (assuming permitted) will be under construction during the same time as the demolition and construction stage of the proposed development. It is estimated there will be 40 demolition and construction vehicles per 12 hour day, equating to 4 additional vehicles an hour and therefore not considered to be significant.

Operation Cumulative Effects

7.157 The assessment undertaken includes all the cumulative schemes that overlap with the operation stage of the proposed development and may generate additional traffic on the local highway network

7.158 In relation to each of the cumulative schemes, the demolition and construction stage of UBC properties, Townlands within Grange Castle South Business Park (SD20A/0121) cumulative scheme would overlap with the operation stage of the proposed development. Cumulative assessment has been carried out by identifying the demolition and construction programme / start date of the cumulative scheme. It has been assumed that the year of peak construction traffic (2021) would also occur during the operation stage of the proposed development, thus representing a worst-case scenario.

7.159 Trip generation and distribution for the demolition and construction stage has been extracted from the supporting Traffic Impact Assessment.

7.160 The operation stage of Microsoft, Grange Castle Business Park (SD20A/0283) and Cyrus One, Grange Castle Business Park (SD18A/0134) cumulative schemes would overlap with the operation stage of the proposed development. Cumulative assessment has been carried out by identifying the operation stage programme / start date of the cumulative schemes.

7.161 Trip generation and distribution for the operation stage has been extracted from the supporting Environmental and Traffic Impact Assessments.

7.162 Daily trip generation and distribution diagrams for the cumulative scheme and the proposed development can be found in Technical Appendix 7.3

7.163 The traffic flows from these developments have been included within the Do Nothing baseline of the assessment, and are therefore not considered to be significant.

7.164 The SID application will be operational during the operation stage of the proposed development, however no significant daily traffic flows in relation to the operation of the SID application are anticipated.

Summary of Assessment

Background

7.165 This chapter has detailed the potential Transport and Accessibility effects due to the demolition and construction stage and the operation stage of the proposed development. The assessment of the demolition and construction stage and the operation stage have been undertaken taking into account the relevant national and local guidance and regulations.

7.166 The pedestrian and cycle environment in the site vicinity is of a high standard, with wide, well-lit lengths of dedicated and segregated off-road cycle and pedestrian routes. This would allow for future employees

of the application site to walk, cycle or use public transport and complete their journeys by alternatives to the private vehicle.

Demolition and Construction Effects

7.167 I has been assumed that the demolition and construction traffic for the proposed development of 40,589 sqm will be proportional (≈51%) to the construction traffic used for the site in the approved SD20A/0121 application (80,269sqm).

7.168 The peak demolition and construction period would be in 2022 with a maximum of 220 demolition and construction vehicle movements per day.

7.169 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30 % has been identified.

7.170 There would be some increase in demolition and construction traffic during the 60 month programme of works. However, the effects of the demolition and construction traffic on the sensitive receptors would be short term as follows:

- Slight Negative and not significant for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight Negative and not significant for Driver Delay;
- Slight Negative and not significant for Accidents and Safety.

7.171 A CMP would require construction traffic including both construction plant and material deliveries to be programmed to avoid peak traffic periods on the surrounding local and strategic road network and minimise any effect on the local highway network and road, pedestrian and cycle users. No additional mitigation would be required for the demolition and construction stage.

7.172 Therefore, it is considered that the demolition and construction stage would result in a non-significant effect on Transport and identified receptors, and as such would not give rise to significant effects on Transport and Accessibility.

Operation Effects

7.173 The proposed development will be fully operational in 2026 and is anticipated to generate 164 two-way vehicle trips.

7.174 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30 % has been identified in 2026 when comparing the Do Nothing with the Do Something scenario.

7.175 There would be in an increase in traffic resulting from the operation of the proposed development. The effects of the operation stage would be permanent during the operation of the proposed development, however, should the site cease operation the effect would be reversible. All effects are considered likely.

- Slight Negative and not significant for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight Negative and not significant for Driver Delay;
- Slight Negative and not significant for Accidents and Safety.

7.176 Overall, it is considered that the operational proposed development would result in a non-significant effect on Transport and identified receptors, and as such would not give rise to significant effects on Transport and Accessibility.

7.177 No additional mitigation would be required for the operation stage.

Cumulative Effects

7.178 The cumulative effects of the proposed development, and neighbouring schemes has been considered within the traffic assessment.

7.179 The demolition and construction stage of SD20A/0121 (Grange Castle South Business Park) would overlap with the operation stage of the proposed development.

7.180 The operation stage of Microsoft, Grange Castle Business Park (SD20A/0283) and Cyrus One, Grange Castle Business Park (SD18A/0134) cumulative schemes would overlap with the operation stage of the proposed development.

7.181 Whilst there will be an increase in traffic resulting from the cumulative schemes during both the demolition and construction stage and the operation stage, overall, there are no significant effects anticipated as a result of the cumulative impacts and therefore no mitigation proposed.

8 AIR QUALITY

Introduction

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

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

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

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

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

Methodology

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

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

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:

- 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[11];

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 Holman et al, 2014. IAQM Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London.
12 Moorcroft and Barrowcliffe. et al., 2017, Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.
13 Environmental Protection Agency Office of Environment Enforcement (OEE), 2019. Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).
14 USEPA, 2011. Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard.
15 Guidance Specified generators: dispersion modelling assessment. Available at: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment [Accessed on 04/08/2021]
16 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 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[12].
- 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 377 daily trips, of which 108 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, neutral, and imperceptible with relation to human health. Accordingly, demolition and construction traffic emissions have not been considered further within this chapter.

8.12 The operation 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, neutral, and not significant with relation to human health. Accordingly, operation 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)[17], or National Heritage Areas (NHAs), designated under the Wildlife Acts[18], 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, neutral, and imperceptible and have not been considered further within this chapter.

8.14 The assessment includes a quantitative assessment of emissions of the temporary gas power plant, the data center emergency generators and the permanent gas power plant. 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 gas power plant). 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' emissions 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 to 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[11].

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[13]. 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 (1-7 years) in nature and from the operation stage which would be expected to be long-term to permanent in nature (i.e. more than 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 demolition and construction programme of the proposed development would be sequenced over a two-to-six-year period with a phased delivery of the storage facilities, power supply connections and power plant. The development phasing details relevant for the air quality assessment are as follow:

- Phase 1A: Construction of Data Center DUB 11.1 with emergency diesel generators and temporary gas-powered plant, hereafter referred to as temporary gas plant, to support DUB 11.1. The temporary gas plant, will be used whilst a EirGrid GIS substation to the south of Falcon Avenue is proposed, permitted, and built.
- Phase 1B: removal of the temporary gas plant with main power supply to be provided from a connection to EirGrid GIS substation to the south of Falcon Avenue. Construction of half a permanent gas plant and switch room;
- Phase 2A: Data Centers DUB 11.1 and DUB 11.2 operational with emergency generators. The permanent gas plant would be operational to half its capacity; and
- Phase 2B: DUB 11.1, 11.2 and DUB 12 operational with emergency generators. Permanent gas plant would be operational to full capacity. The permanent power generation unit would not provide power

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

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

directly to the data centers. Power to the data centers would be available via the EirGrid ESB substation that is proposed South of Falcon Avenue in the permanent state.

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. Phase 1A has been identified as a worst-case scenario due to the type of the combustion engine of the temporary gas plant and Phase 2B due to the number of air combustion engines operating simultaneously. Phases 1B and 2A intermediary phases do not represent worst-case scenarios as the data center emergency generators and the permanent power plant would not be at full capacity and these phases have therefore been scoped out of the assessment.

8.22 As part of the air quality assessment following operation phases/scenarios of the proposed development have been considered:

- Phase 1A: temporary gas plant operational and data center DUB 11.1 with diesel emergency generators; and
- Phase 2B: when the proposed development is built out and operational in its entirety with DUB 11.1, 11.2 and DUB 12 operational with emergency generators and permanent gas plant operational to full capacity.

Baseline Characterisation Method

Desk Study

8.23 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[19] and from cumulative schemes EIAR[20].

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

8.25 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

8.26 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

8.27 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.

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

Methodology

Demolition and Construction Stage

8.29 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.

8.30 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[11].

8.31 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

8.32 Air dispersion modelling was carried out using Atmospheric Dispersion Modelling System (ADMS 5)[21] 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.

8.33 ADMS is recommended as an appropriate model to assess the impact of air emissions from industrial facilities in the EPA Guidance AG4[13]. 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.

8.34 The proposed development Phase 1A will consist of:

- Temporary gas plant will consist of twenty-two gas generators (with 18 running and 4 redundancy/maintenance) with associated 25 metres flues. The temporary gas plant would be expected to operate 24 hours 7 days a week only during Phase 1A for a period of up to 2 years between 2023-2024 until a permanent power plant is built.
- Building DUB 11.1 with diesel emergency back-up generators with associated 22.3 metres flues. These generators would provide emergency back-up power in event of loss of power supply from the temporary gas plant. The emergency plant would therefore be non-operational for the vast majority and would not operate at the same time as temporary gas plant.

8.35 The proposed development Phase 2B will consist of:

- 3 data storage facilities (Building DUB 11.1, DUB 11.2 and DU B12) with MW diesel emergency back-up generators with associated 22.3 metres flues. These generators would provide emergency back-up power in event of loss of the utility supply and therefore will be non-operational for the vast majority of time.
- Permanent gas fired power generation facility with associated 25 metres flues for peaking unit when EirGrid network fails. The permanent power plant would be expected to be start operations by Q4 2024 and operate 24 hours 7 days a week.

8.36 For dispersion modelling purposes it is assumed that for Phase 1A the temporary gas plant and DUB 11.1 emergency generators would to be operating continuously all year round for the assessment of NO_2 annual average and hourly impacts. For Phase 2B it is assumed that the permanent power plant and DUB

19 EPA, 2021, EPA Website: http://www.epa.ie/whatwedo/monitoring/air/ [Accessed on 30/06/2021]
20 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]

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

11.1, DUB 11.2 and DUB 12 emergency generators would to be operating continuously all year round for the assessment of 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 the 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[15,16]. 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[14] 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 Phase 1A temporary gas plant and for Phase 2B permanent power plant, guidance on air emissions risk assessments produced by the UK Environment Agency[22] 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, each generator of the temporary gas plant was allocated its own flue. The emergency generators and permanent plant engines were allocated their own flues and the flues combined in ADMS in pairs or triples when adjacent, according to the plan's configuration. The location and flues parameters used in the model are shown 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 permanent power plant, 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 permanent power plant model input data used in the detailed modelling is provided in Table 8.1.

8.47 For the temporary gas plant, emission rates, volumetric flowrates and stack parameters for the temporary gas plant have been provided by proposed supplier. The input data used in the detailed modelling is provided in Table 8.1.

Table 8.1: Stack Emissions Modelling Input Parameters

Plant	Equipment	Number Generators Modelled	Tempera-ture (°C)	Volume Flux (Am^3/s)	Height (m)	Diameter (m)	NO_2 Emission Rate at discharge conditions (g/s)
Temporary gas Plant	J420C, 1.4MW (MCPD Compliant)	18	409	4.2	25	0.3	0.4

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

Table 8.1: Stack Emissions Modelling Input Parameters							
Permanent power plant	WÄRTSILÄ 34SG 9.8 MW, SCR	10	360	28.4	25	1.2	0.2
Emergency Generators	CAT 3516E, EM4789	33	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 temporary gas power plant and emergency generators comply with the requirements of the Medium Combustion Plant Directive (MCPD). The permanent power plant 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
	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year
Particulate Matter (as PM_{10})	24 hours mean	50 µg/m^3 not to be exceeded more than 35 times per year
	Annual mean	40 µg/m^3
$PM_{2.5}$	Annual mean	25 µg/m^3

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

- where members of the public do not have access and there is no fixed habitation;
- on factory premises or at industrial installations; and

- on the carriageway/central reservation of roads except where there is normally pedestrian access.

Impact Magnitude Criteria

Demolition and Construction Stage

8.57 The criteria provided in the guidance produced by the IAQM[11] 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 [15,16] 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 temporary gas plant and the permanent power plant, 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[13]. 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 $\mu g/m^3$ and the 1-hour average PC should not exceed the value of 137.3 $\mu g/m^3$.

Scale of Effect Criteria

Demolition and Construction Stage

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

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

Operation Stage

8.65 The potential impact to air quality from the permanent plant of the proposed development 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, and by Aggreko. 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[23]. 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.

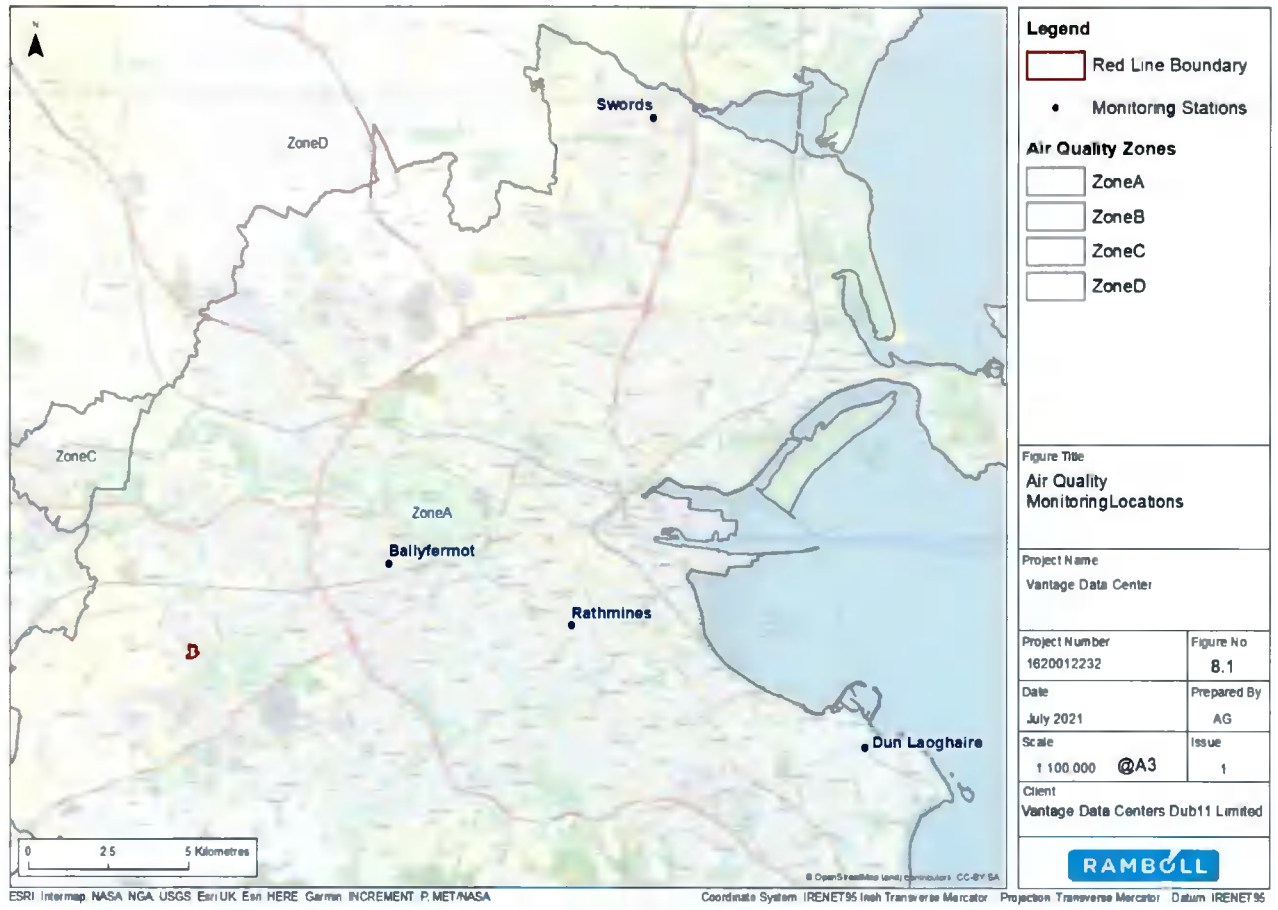


Figure 8.1: Air Quality Monitoring Locations

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

23 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

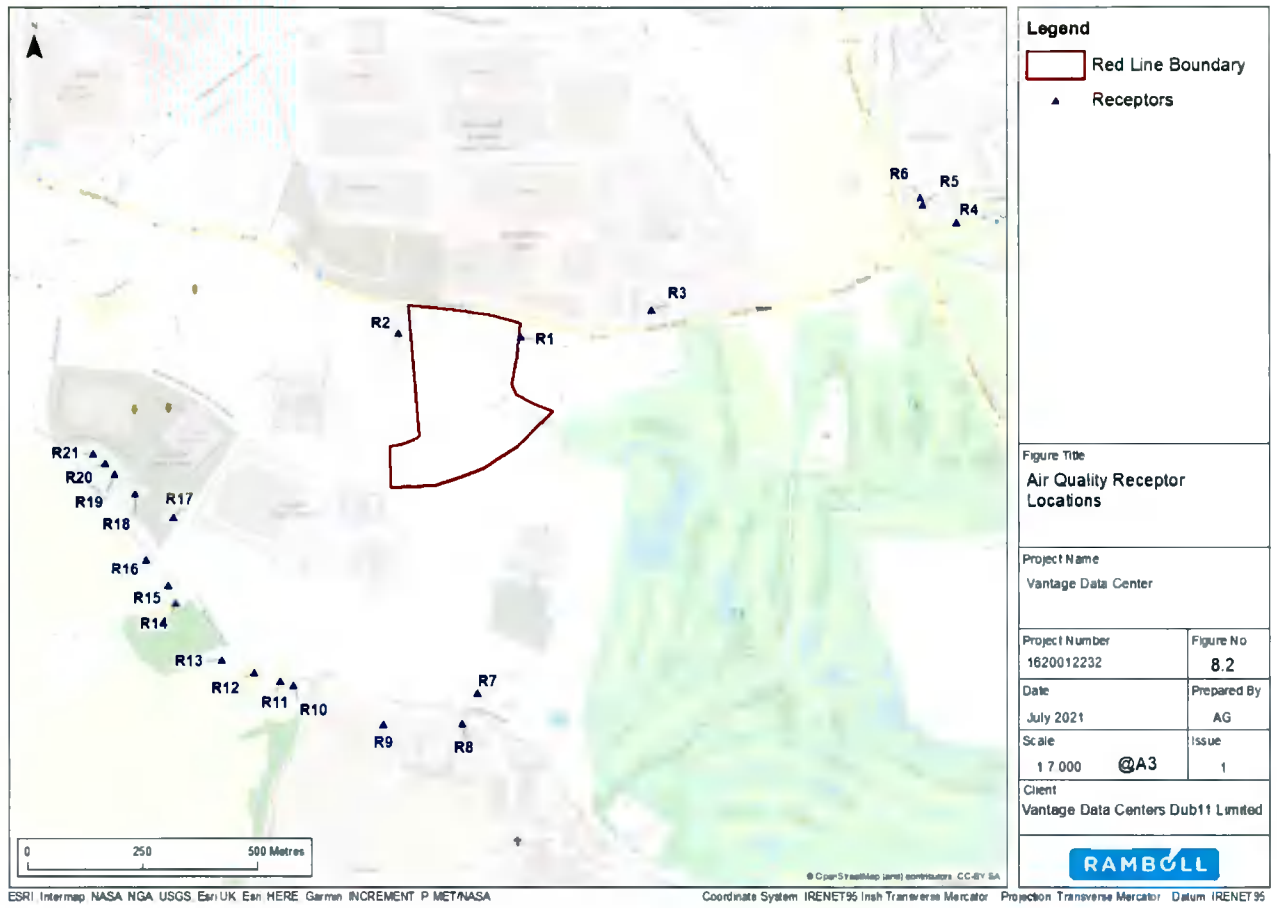


Figure 8.2: Air Quality Receptor Locations

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 realignment;
- 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. • 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.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• Remove dusty materials from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below • Minimise emissions from stockpiles by covering, seeding, fencing, or damping down.
Operating Vehicle/ Machinery and Sustainable Travel	• Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. • Ensure vehicles switch off engines when stationary. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	• Only undertake cutting, grinding, or sawing equipment with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression. • Use enclosed chutes, conveyors, and covered skips. • Minimise drop heights of materials. • Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	• Avoid bonfires. • Avoid explosive blasting using appropriate manual or mechanical techniques. • Bag and remove any biological debris.
Measures Specific to Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression during demolition. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. • Avoid concrete scabbling where possible. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures Specific to Trackout	• Use water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving the site are appropriately covered. • Record inspections of haul roads in site log, including any remedial action taken. • Implement a wheel washing system. • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit. • Access gates to be located at least 10 m from the receptors where possible.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• 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 neutral, temporary to short-term and imperceptible (i.e. not significant).

Operation Effects

Phase 1A

Temporary Gas Power Plant

8.96 The full 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.

8.97 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Phase 1A temporary gas power plant is provided in Table 8.12.

Table 8.12: Temporary Gas Plant 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	14.7	37	17	32.1	80
R2	2.1	5	17	19.5	49
R3	7.5	19	17	24.9	62
R4	2.2	5	17	19.6	49
R5	2.4	6	17	19.8	50
R6	2.4	6	17	19.8	50
R7	0.5	1	17	17.9	45
R8	0.5	1	17	17.9	45
R9	0.4	1	17	17.8	44
R10	0.4	1	17	17.8	44
R11	0.4	1	17	17.8	44
R12	0.5	1	17	17.9	45
R13	0.6	1	17	18.0	45
R14	1.0	2	17	18.4	46
R15	1.1	3	17	18.5	46
R16	1.4	3	17	18.8	47
R17	2.1	5	17	19.5	49
R18	2.2	6	17	19.6	49
R19	2.2	5	17	19.6	49

Table 8.12: Temporary Gas Plant 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
R20	2.1	5	17	19.5	49
R21	2.0	5	17	19.4	49
AQS	**40**				

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

8.98 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.

8.99 The maximum results indicate that the ambient level concentrations due to emissions arising from the temporary power plant would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be below 62% of the ambient NO_2 annual AQS at all assessed receptors, except for receptor R1 where concentrations where the predicted PEC would be 80% of the NO_2 annual AQS.

8.100 The geographical variation in annual mean NO_2 PC concentrations (without background) of the temporary gas power plant emissions are shown in Figures 8.3.

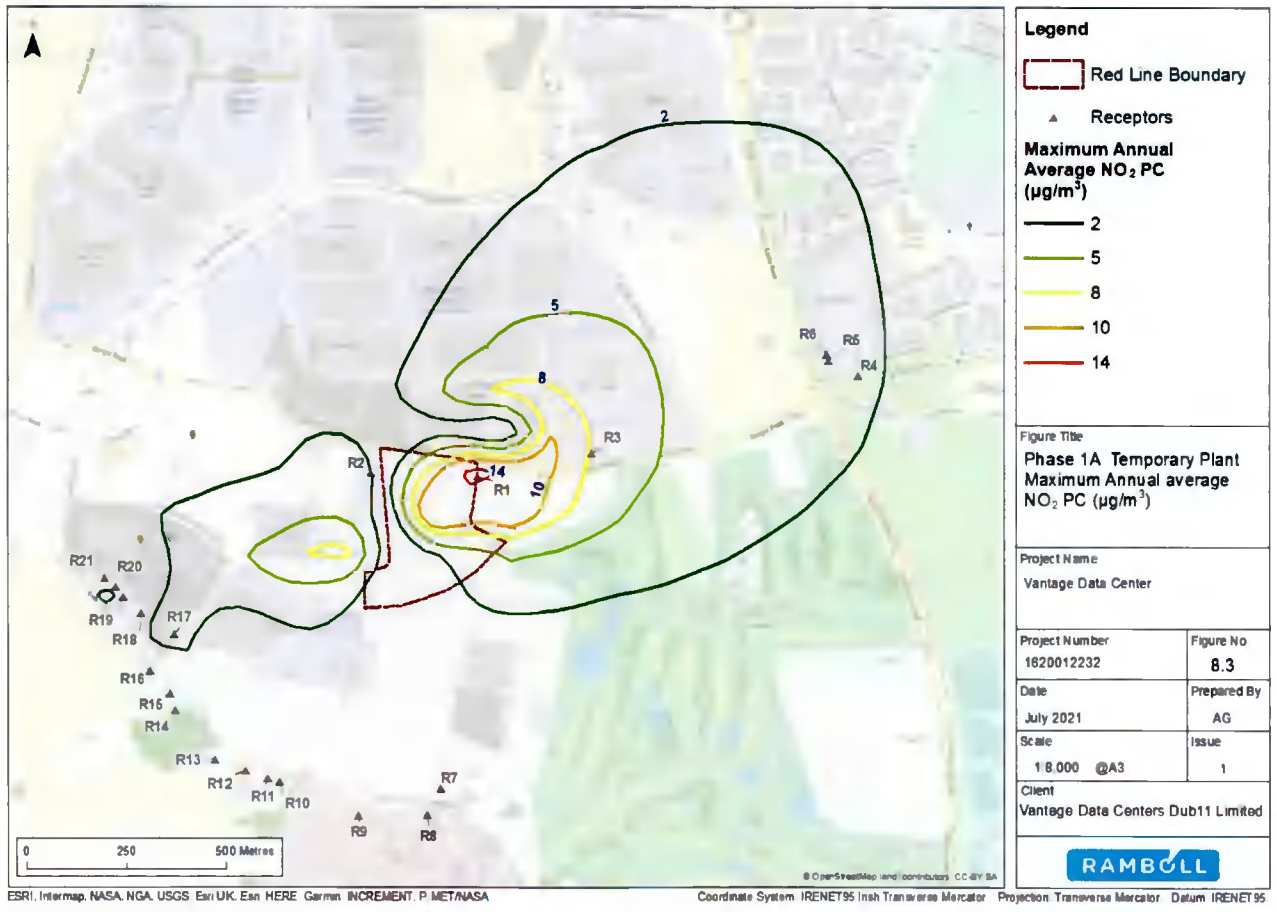


Figure 8.3: Phase 1A Temporary Gas Plant Maximum Annual Average NO_2 PC (µg/m³).

8.101 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Phase 1A temporary gas power plant is provided in Table 8.13.

Table 8.13: Temporary Gas Plant 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	34.7	17	35	69.5	35
R2	32.8	16	35	67.6	34
R3	24.9	12	35	59.7	30
R4	11.4	6	35	46.2	23
R5	11.7	6	35	46.5	23
R6	11.5	6	35	46.3	23
R7	16.6	8	35	51.4	26
R8	15.0	8	35	49.8	25
R9	13.9	7	35	48.7	24
R10	14.0	7	35	48.8	24
R11	13.7	7	35	48.5	24
R12	14.1	7	35	48.9	24
R13	14.9	7	35	49.7	25
R14	15.4	8	35	50.2	25
R15	15.9	8	35	50.7	25
R16	16.5	8	35	51.3	26
R17	21.0	10	35	55.8	28
R18	19.6	10	35	54.4	27
R19	18.8	9	35	53.6	27
R20	18.9	9	35	53.7	27
R21	18.5	9	35	53.3	27
AQS	**200**				

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

8.102 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.

8.103 The maximum results indicate that the ambient level concentrations due to emissions arising from the temporary power plant would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be below 35% of the ambient NO_2 1-hour AQS at all assessed receptors.

8.104 The geographical variation in the 1-hour mean (99.8th percentile) concentrations (without background) of the temporary gas power plant emissions are shown in Figures 8.4.

8.105 Given the temporary operation of the temporary gas plant for up to approximately 2 years, the air quality localised effects are temporary to short term, negative and slight (not significant).

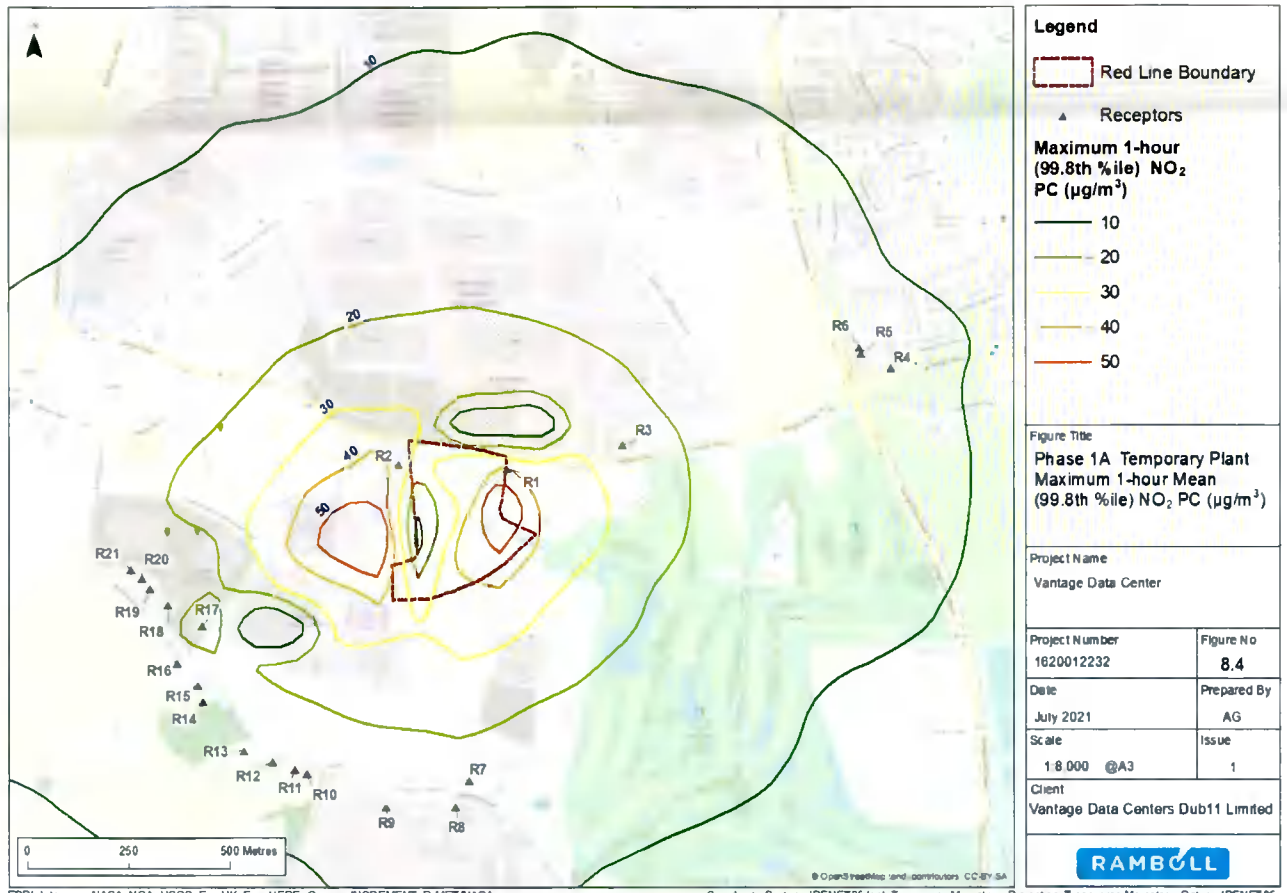


Figure 8.4: Phase 1A Temporary Gas Plant Maximum 1-hour mean (99.8th percentile) NO_2 PC (µg/m³).

DUB 11.1 Emergency Generators

8.106 The modelling has been undertaken to determine the DUB 11.1 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.

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

Table 8.14: DUB11.1 Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability
DUB 11.1 Emergency Generator	106

8.108 The DUB s11.1 Emergency Generator would operate for 106 hrsto reach a 1% probability of exceeding the objective.

8.109 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 11.1 Emergency Generator maximum of 106 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: DUB 11.1 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	106	1.1	3	17	18.5	46

8.110 The maximum predicted 1-hour mean PC concentrations for 106 hours operation of the DUB 11.1 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.

8.111 The maximum results indicate that the ambient level concentrations due to emissions arising from the DUB11.1 emergency generator would be below the relevant NO_2 AQS. For the worst-case year modelled and receptor, predicted PEC (including background) would be 46% of the ambient NO_2 annual AQS.

8.112 The localised air quality effects of the DUB11.1 emergency are long term, neutral and imperceptible (i.e. not significant).

Phase 2B

Permanent Power Plant

8.113 The full 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.

8.114 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Phase 2B Permanent power plant are provided in Table 8.16.

Table 8.16: Permanent Power Plant 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	0.9	2.2	17	18.3	46
R2	0.1	0.2	17	17.5	44
R3	0.6	1.4	17	18.0	45
R4	0.2	0.5	17	17.6	44
R5	0.2	0.6	17	17.6	44
R6	0.2	0.6	17	17.6	44
R7	0.0	0.1	17	17.4	44
R8	0.0	0.1	17	17.4	44
R9	0.0	0.1	17	17.4	44
R10	0.0	0.1	17	17.4	44
R11	0.0	0.1	17	17.4	44
R12	0.0	0.1	17	17.4	44
R13	0.0	0.1	17	17.4	44
R14	0.1	0.2	17	17.5	44
R15	0.1	0.2	17	17.5	44
R16	0.1	0.3	17	17.5	44
R17	0.2	0.4	17	17.6	44

Table 8.16: Permanent Power Plant 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
R18	0.2	0.4	17	17.6	44
R19	0.2	0.4	17	17.6	44
R20	0.2	0.4	17	17.6	44
R21	0.2	0.4	17	17.6	44
AQS	**40**				

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

8.115 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.

8.116 The maximum results indicate that the ambient level concentrations due to emissions arising from the permanent power plant would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would range between 44% to 46% of the ambient NO_2 annual AQS.

8.117 The geographical variation in annual mean NO_2 PC concentrations (without background) of the permanent power plant emissions are shown in Figures 8.4.

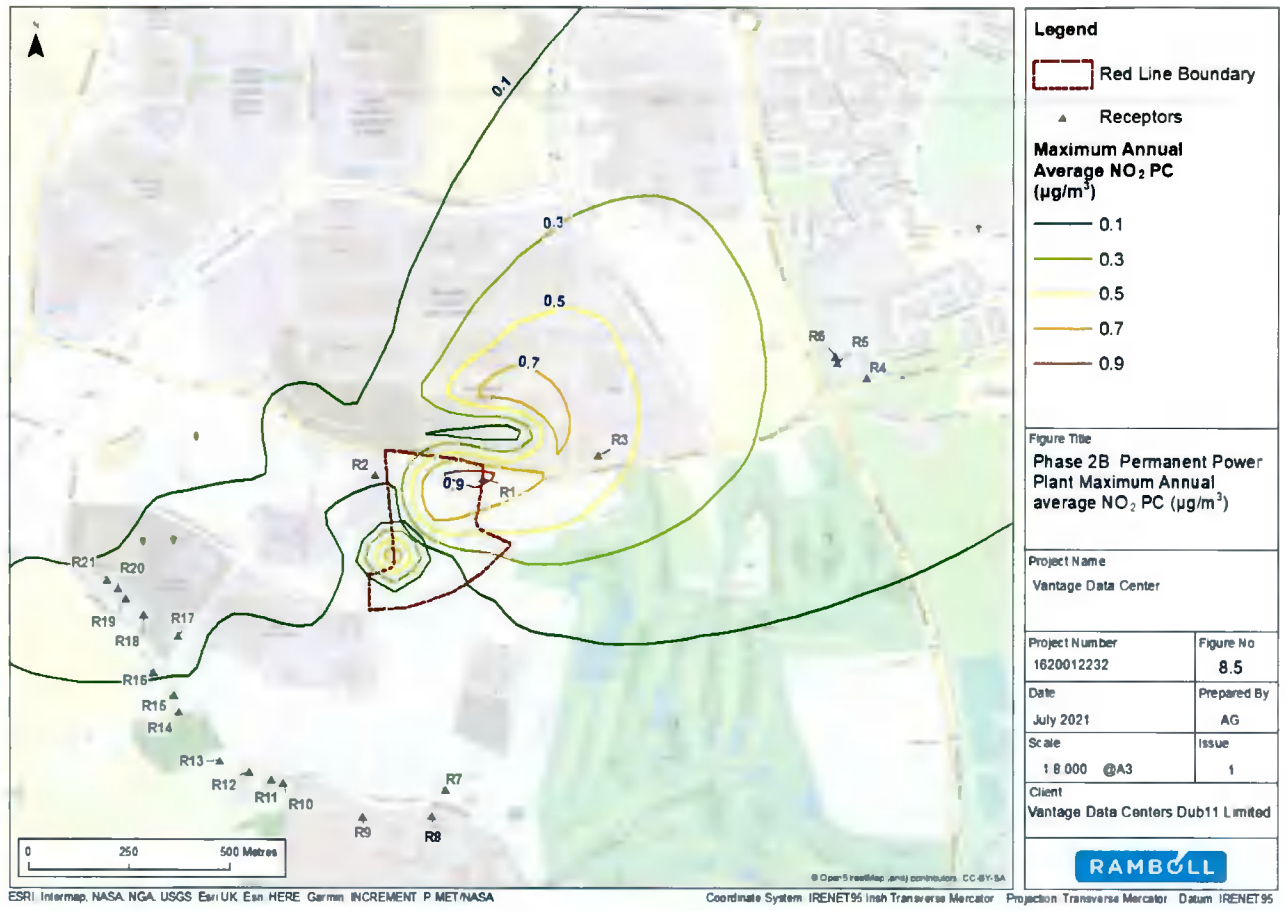


Figure 8.5: Phase 2B Permanent Power Plant Maximum Annual Average NO_2 PC (µg/m³).

8.118 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Phase 2B Permanent power plant are provided in Table 8.17.

Table 8.17: Permanent Power Plant 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	2.8	1	35	37.6	19
R2	4.5	2	35	39.3	20
R3	1.9	1	35	36.7	18
R4	0.8	0	35	35.6	18
R5	0.8	0	35	35.6	18
R6	0.8	0	35	35.6	18
R7	1.4	1	35	36.2	18
R8	1.3	1	35	36.1	18
R9	1.2	1	35	36.0	18
R10	1.2	1	35	36.0	18
R11	1.3	1	35	36.1	18
R12	1.3	1	35	36.1	18

Table 8.17: Permanent Power Plant 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	1.3	1	35	36.1	18
R14	1.4	1	35	36.2	18
R15	1.4	1	35	36.2	18
R16	1.5	1	35	36.3	18
R17	1.8	1	35	36.6	18
R18	1.7	1	35	36.5	18
R19	1.6	1	35	36.4	18
R20	1.5	1	35	36.3	18
R21	1.5	1	35	36.3	18
AQS	**200**				

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

8.119 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.

8.120 The maximum results indicate that the ambient level concentrations due to emissions arising from the temporary power plant would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would range between 18% to 20% of the ambient NO_2 1-hour AQS.

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

8.122 The localised air quality effects of the of the permanent power plant are considered long term to permanent, negative, and not significant.

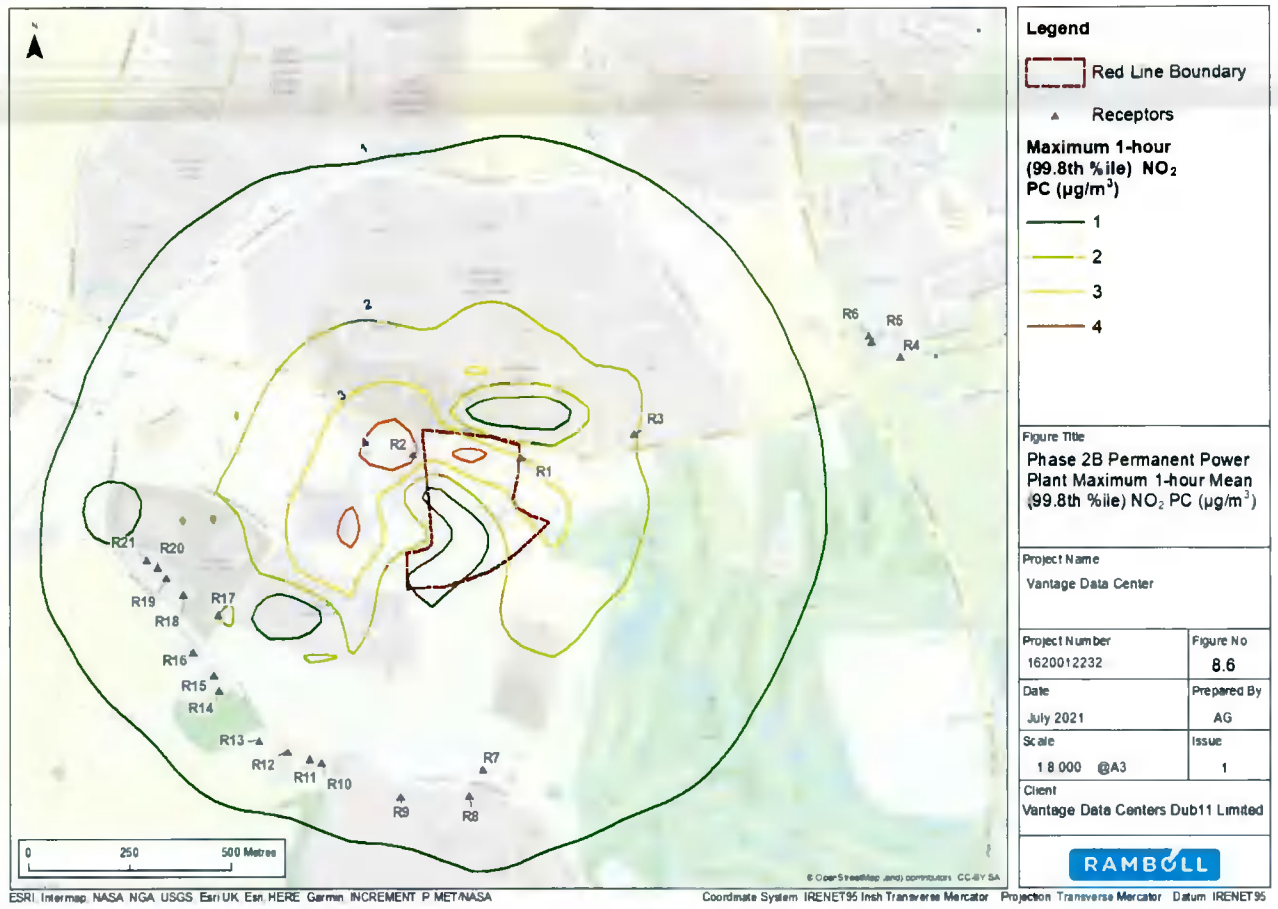


Figure 8.6: Phase 2B Permanent Power Plant Maximum 1-hour mean (99.8th percentile) NO_2 PC (µg/m³).

Emergency Generators

8.123 The modelling has been undertaken to determine the DUB 11.1, DUB 11.2 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.

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

Table 8.18: DUB11.1, DUB11.2 and DUB12 Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability
DUB 11.1, DUB 11.2 and DUB 12 Emergency Generator	53

8.125 The DUB 11.1, DUB 11.2 and DUB 12 Emergency Generators would operate for 53hrs to reach a 1% probability of exceeding the objective.

8.126 Table 8.19 shows the maximum predicted annual mean NO_2 concentrations at the worst-case receptor with the highest predicted concentration for the DUB11.1 Emergency Generator maximum of 53 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: DUB11.1 Emergency Generators Maximum Annual Mean Concentrations for 106 hours Operation

Receptor	Operating hours for 1% probability	NO_2 PC ($\mu g/m^3$)	PC % AQS	NO_2 Average Background ($\mu g/m^3$)	Annual Mean PEC ($\mu g/m^3$)	PEC % AQS
R1	53	0.9	2.2	17	18.3	46

8.127 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 46% of the ambient NO_2 annual AQS.

8.128 The localised air quality effects of the emergency generators are considered long term to permanent, neutral, and imperceptible (i.e. not significant)

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

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

Operation Stage

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

Enhancement Measures

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

Demolition and Construction Residual Effects

8.132 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

- Neutral;
- Temporary to short term; and
- Imperceptible.

Operation Residual Effects

8.133 As no additional mitigation would be required, the residual operation effects of the Phase 1A Temporary Gas Power plant remain as reported in the assessment of effects section:

- Temporary to short term;
- Negative; and
- Slight.

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

- Long term to permanent;
- Negative; and
- Not significant.

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

- Long term to permanent;
- Neutral; and
- Imperceptible.

Summary of Residual Effects

8.136 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	IR	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	IR	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 1A temporary gas plant	None required	Slight	-	L	D	R	T to St
Existing Off-site Human Health	Change in NO_2 levels due to Phase 2B permanent power plant	None required	Not significant	-	L	D	IR	Lt to P
Existing Off-site Human Health	Change in NO_2 levels due to Phase 1A and Phase 2B emergency generators	None required	Imperceptible	-	L	D	IR	Lt to P

Notes:

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

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

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

Cumulative Effects

Intra-Project Effects

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

Inter-Project Effects

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

8.139 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.

8.140 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 [SD20A/0283]	No	Development constructed.	No	Development located to the north of the site. Cumulative effects assessed and considered unlikely and not significant.
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	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.
UBC Properties - Grange Castle South Business Park, Baldonnel, 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.
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.
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	No	Development located immediately to the south of the site.	No	No significant air emissions expected.

Table 8.21: Inter-Project Cumulative Effects				
Cumulative Development	**Demolition and Construction**		**Operation**	
	Cumulative Effects Likely?	**Reason**	**Cumulative Effects Likely?**	**Reason**
substation to EirGrid to the south		There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.		
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	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.	Yes	Gas fired power plant emission likely to overlap with proposed development.

Demolition and Construction Cumulative Effects

8.141 Demolition and construction significant cumulative effects are unlikely to occur as the 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

8.142 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[24], hereafter referred to as Microsoft; and
- Centrica Business Solutions Profile Park, Baldonnel, Dublin 22 planning application reference SD21A/0167[25], hereafter referred to as Centrica.

8.143 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.

8.144 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.

8.145 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.

8.146 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.

Table 8.22: Centrica Application Maximum Predicted Cumulative 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	

8.147 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.

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

24 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]

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

Table 8.23: Temporary Power Plant Maximum Annual Mean Concentrations

Averaging period	Receptor	Proposed Development NO_2 PC (µg/m³)	Centrica NO_2 PC (µg/m³)	Cumulative NO_2 PC (µg/m³)	AQS (µg/m³)	PC % AQS	Annual Mean PEC (µg/m³)	PEC % AQS
Phase 1A –Temporary Power PLANT								
Annual Mean	R1	14.7	2	16.7	40	37	34.1	85
1-hour (99.8th %ile)	R1	34.7	70	104.7	200	17	139.5	70
Phase 2B – Permanent Power Plant								
Annual Mean	R1	0.9	2	2.9	40	2	20.3	51
1-hour (99.8th %ile)	R1*	2.8	70	72.8	200	1	107.6	54

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

8.149 The maximum cumulative annual average results indicate that the ambient level concentrations due to emissions arising from Phase 1Atemporary gas power plant 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 85% of the ambient NO_2 annual AQS at the worst-case receptor.

8.150 The maximum 1-hour average results indicate that the ambient level concentrations due to emissions arising from Phase 1Atemporary gas power plant 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 70% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.151 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 1A temporary gas plant to be removed by end of 2024, there is potential for both power plant operation to overlap for a short period of less than a year. Given the temporary operation of the plant for approximately up to 2 years, the cumulative air quality effects of Phase 1A temporary gas power plant is considered short term, negative and slight.

8.152 The maximum cumulative results indicate that the ambient level concentrations due to emissions arising from Phase 2B permanent power plant and Centrica power plant are below the relevant NO_2 AQS. For the worst-case year modelled, emissions (including background) were predicted to be 51% of the ambient NO_2 annual AQS at the worst-case receptor.

8.153 The maximum results indicate that the ambient level concentrations due to emissions arising from Phase 2B permanent power plant 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 51% of the ambient NO_2 AQS and the 1-hour predicted PEC (including background) would be 54% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.154 The cumulative air quality effects of 2B permanent power plant are considered long term, negative and not significant.

Summary of Assessment

Background

8.155 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.

8.156 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.

8.157 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.

8.158 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

8.159 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.

8.160 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.

8.161 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.

8.162 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.

Operation Effects

8.163 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 completed development stage related traffic emissions would be long-term and not of a scale that would give rise to significant effects.

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

8.165 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 power plant engines. Predicted concentrations are below the relevant objectives at all the existing receptor locations for the operation stages.

8.166 It is considered that the operation of the proposed development Phase 1A with the temporary gas plant, expected to be operational for no more than 2 years, would result in a temporary to short term slight effect on air quality and identified receptors. The operation of Phase 2A with the permanent power plant, would result in a not significant effect 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.

Cumulative Effects

8.167 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.

8.168 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 Phase 1A with the temporary gas plant, expected to be operational for no more than 2 years, would result in a temporary to short term slight negative effect on air quality and identified receptors. The operation of the permanent power plant would result in a not significant effect on air quality and identified receptor.

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

9 NOISE AND VIBRATION

Introduction

9.1 This chapter of the EIAR reports on the likely significant noise and vibration effects to arise from the demolition and construction stage and the operation stage of the proposed development.

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

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

- Appendix 9.1: Acoustic Terminology; and
- Appendix 9.2: Construction Noise Calculations.

Methodology

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

- International Legislation:
  - EU Directive 2002/49/EC[1]
- National Legislation and Policy:
  - Environmental Noise Regulations, SI number 140 of 2006[2]
  - Environmental Protection Agency Act 1992[3]
- Regional Policy:
  - Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023[4]
- Local Policy:
  - As Regional Policy, Volume 1 – Dublin City Council
- National guidance and industry standards:
  - EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)[5], which refers to the following British Standards:
  - BS5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites6;
  - BS6472-1:2008 for vibration effects on humans7; and
  - BS4142:2014+A1 2019 for industrial and commercial noise8.

Assessment Scope

Technical Scope

Effects Assessed in Full

9.5 The technical scope of the assessment has considered the following:

- Demolition and construction noise from works being undertaken;
- Demolition and construction road traffic noise;
- Demolition and construction vibration; and
- Operational noise from plant and servicing.

9.6 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as construction activities, road traffic, and building services plant. Vibration is defined as perceptible oscillations or ground and building structure transmitted from sources such as construction plant.

Effects Scoped Out

9.7 There are no predicted significant road traffic noise, or operational vibration effects associated with the operational phase of the proposed development, therefore these elements have been scoped out of the noise and vibration assessment.

Spatial Scope

9.8 The study area incorporates the application site, existing noise-sensitive receptors (NSR) situated along the application site boundaries; as well as NSRs located at further distances from the application site boundary.

9.9 For the purposes of construction and operational noise and construction vibration impact assessments, a number of NSRs have been identified from site investigations, satellite imagery and the proposed development plans. These NSRs are considered to represent a worst case, such that other receptors located at greater distances from the application site should not experience greater noise and vibration impacts.

9.10 The existing NSRs which have been considered in the assessment are provided in Table 9.1 and indicated on Figure 9.1.

Table 9.1: NSR and approximate distance from the proposed development phases

Receptor reference	Receptor	Type of Receptor	Approximate Distance from nearest proposed development phase
1	Detached house on north east application site boundary on New Nangor Road	Residential	75 m
2	Detached house off Baldonnel Rd to south west of application site	Residential	500 m
3	Detached house off Baldonnel Rd to south of application site, outside the department of defence.	Residential	445 m
4	Houses located south of Baldonnel Rd	Residential	480 m

[1] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise
[2] Irish Statutory Instrument (S.I.) No. 140/2006 - Environmental Noise Regulations 2006
[3] Irish Environmental Protection Agency Act, 1992.
[4] Dublin Agglomeration Noise Action Plan 2018-2023(NAP) Relating to The Assessment and Management of Environmental Noise
[5] Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016). EPA.
[6] British Standards Institute, 2009 + A1 2014. British Standard BS 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites. BSI
[7] British Standards Institute, 2008. British Standard BS 6472: Part 1 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting. BSI
[8] British Standards Institute, 2014 + A1 2019. British Standard BS 4142: Methods for rating and assessing industrial and commercial sound. BSI

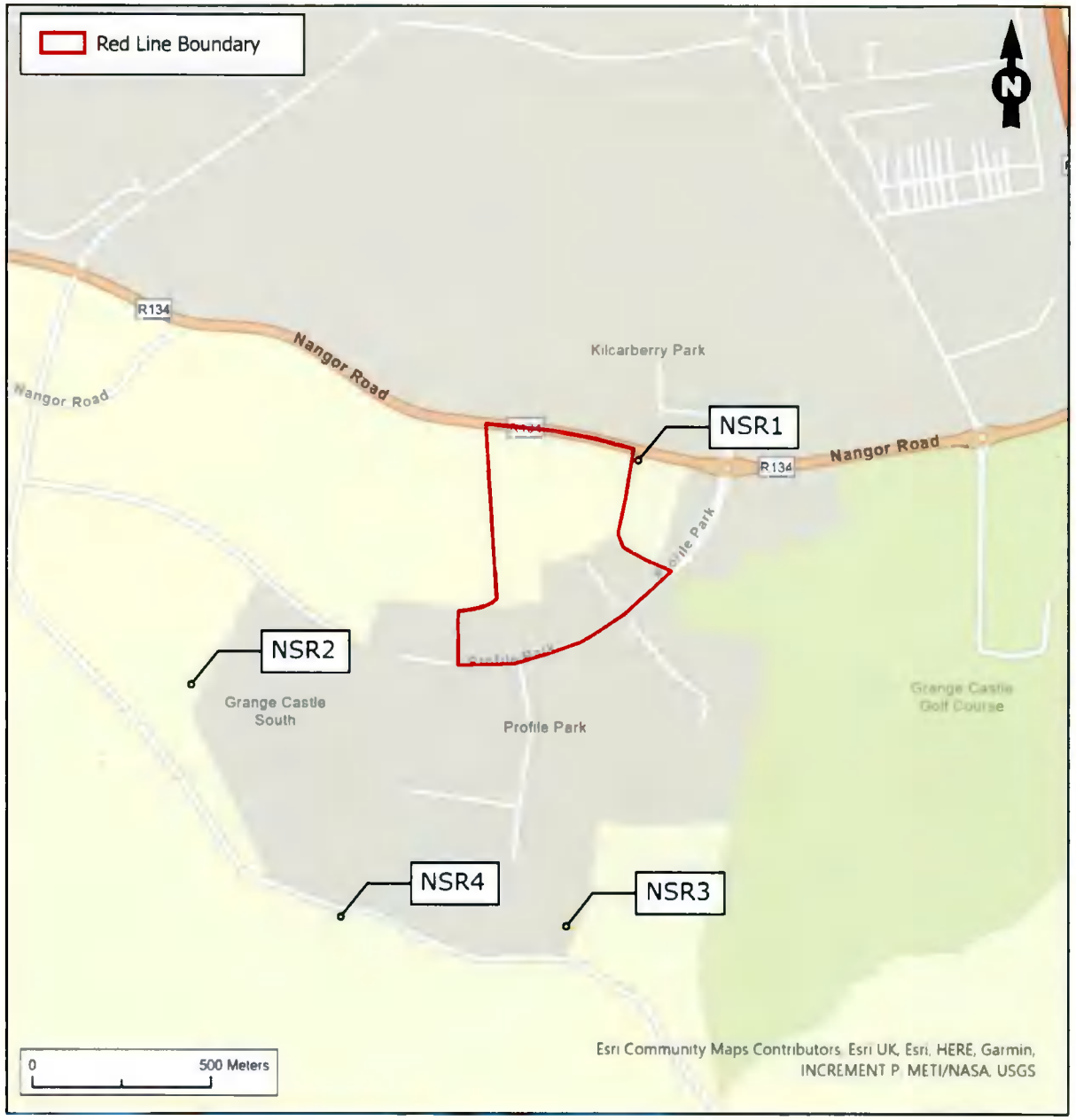


Figure 9.1: Nearest Noise Sensitive Receptors 1-4 (NSR)

Temporal Scope

9.11 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary and short term (2 years) in nature and from the operation stage which would be expected to be permanent in nature.

9.12 For the operation stage, consideration has been given to the following development phasing:

Table 9.2: Development Phasing

Phase	Detail	Indicative Construction Completion and Start of Operation
Phase 1A	• Stream realigned with associated landscaping • DUB 11.1 constructed and operational with 11 emergency generators • Temporary 24 MW gas powered power source	Q1 2023
	• No permanent gas plant or other buildings • Construction of the 20kV switch rooms	
Phase 1B	• Construction of half the permanent gas plant. • Removal of the temporary 24 MW gas powered power source • Connection to EirGrid made to the south of Falcon Avenue for main power supply	Q2 2023-Q4 2024
Phase 2A	• DUB 11.1 and 11.2 constructed and operational with 22 total emergency generators • Main power supply from the EirGrid site to the south of Falcon avenue. • Permanent gas plant will be operational to half capacity	Q4 2024
Phase 2B	• DUB 11.1 and 11.2 operational with 22 total emergency generators • DUB 12 constructed and operational with 11 emergency generators • Main power supply from the EirGrid site to the south of Falcon avenue. • Permanent gas plant will be operational to full capacity	Q4 2026

9.13 The noise and vibration assessment considers two specific operational scenarios, Phase 1A and Phase 2B. These have been chosen as the power supply method is different between the two (i.e. temporary gas power source vs a permanent gas plant) and Phase 2B provides a reasonable worst-case for the development as a whole, such that mitigation measures included for this phase would provide sufficient control for intermediary phases including Phase 2A when DUB 11.2 will be constructed and operation.

9.14 For Phase 1A and 2B, the assessment also considers noise from emergency plant which would operate only in the event of power failure and for testing.

Baseline Characterisation Method

Desk Study

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

- Other previous planning applications in the public domain (planning portal);
- Satellite imagery;
- Architectural GAs, Sections, Elevations; and
- Manufacturer supplied noise data for proposed plant installations.

Field Study

9.16 The existing noise environment was characterised by baseline noise surveys. These were taken in and around the application site to quantify the prevailing ambient and background noise levels during the daytime and night-time periods. The ambient and background noise levels have been used to inform the

assessment criteria for plant noise emissions, building envelope and ventilation strategies and construction noise effects.

9.17 The surveys were taken outside of Covid-19 lockdown measures. However, the noise levels measured on site may have been lower due to reduced traffic levels. This is not considered to affect the assessments because the use of lower background levels would form a worst-case in terms of settling plant noise emission limits.

9.18 Attended and unattended measurements have identified the major noise sources around the application site. The locations of noise measurements are detailed in Figure 9.2. LT positions were unattended monitoring positions. ST positions were attended monitoring positions.

9.19 At each measurement location, a comprehensive suite of noise level metrics was recorded. The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period;
- $L_{A90,T}$ The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.

9.20 Vibration surveys were not undertaken as there are no active rail links or considerable vibration generating sources within 100m.

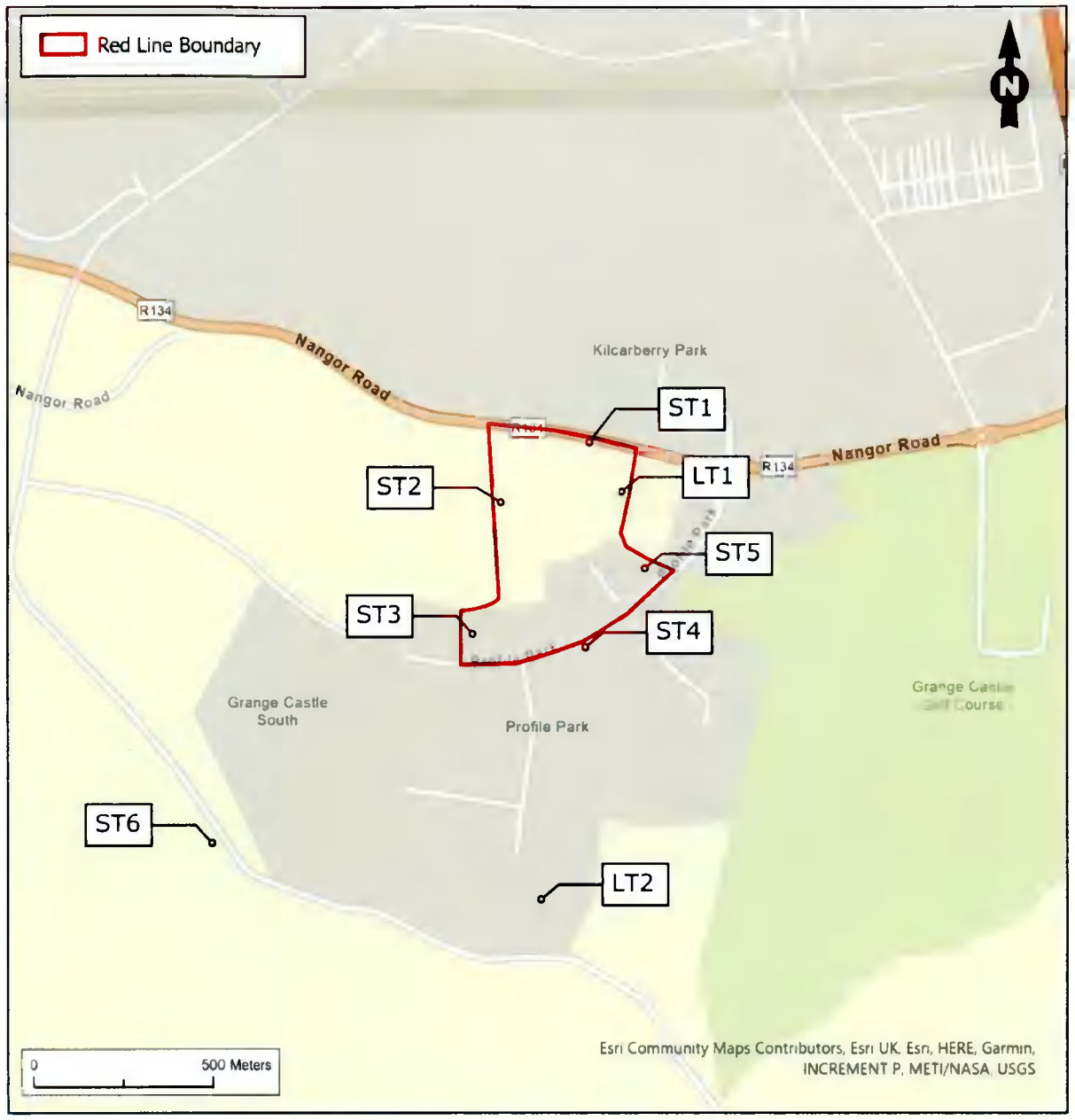


Figure 9.2: Noise Measurement Locations (LT positions were unattended monitoring positions and ST positions were attended monitoring positions)

Assessment Method

Methodology

Demolition and Construction Stage

9.21 Published Guidance: BS5228:2009+A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

9.22 BS5228:2009+A1 2014 gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

9.23 The approach adopted in BS5228:2009+A1 2014, calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction

noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

9.24 BS5228:2009+A1 2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.3 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS5228:2009+A1 2014. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9.3: BS5228:2009+A1 2014 Assessment Categories

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

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

9.25 Noise limits have been set for the purposes of the construction noise effects assuming daytime working (07:00-19:00). It should be noted that this assessment method is only valid for residential properties.

9.26 Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration.

9.27 The legislative background to vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. The standard also provides guidance on measuring vibration and assessing its effects on the environment.

Demolition and Construction Noise Assessment

9.28 Proposed demolition and construction works on the site will involve the use of a variety of working methods, and operations will vary across the site throughout the construction period. Therefore, noise levels from the works are likely to vary over time as the distance from the noise sources and the type of construction activity change. Note BS5228-1:2009+A1:2014 states that calculations to receivers over 300m away should be treated with caution.

9.29 The exact working methodology and plant to employed on site for the demolition/construction work have not yet been established. This level of detail will only be available post-planning when specialist contractors are engaged; therefore a realistic worst case has been assessed.

9.30 An estimate of the expected noise levels over a representative period has been prepared using typical types of plant commensurate for works of this nature, and noise emission data for plant obtained from BS5228-1:2009+A1:2014. As a 'worst case', the assessment has assumed that all plant will operate for each phase of work at a given location within the site.

9.31 Construction noise predictions have been based on the methodology contained within BS5228-1:2009+A1:2014. This enables predictions to be made of the noise emissions from the construction activities for given distances from the works.

9.32 The daytime construction noise criteria used for identifying potentially significant impacts has been identified as 65 dB $L_{Aeq,10hr}$, based on the measured noise levels at the site (Category A).

9.33 The following construction stages have been considered:

- Demolition
- Enabling Works and Stream realignment;
- Substructure;
- Superstructure;
- Internal Fit-out; and
- External works.

Demolition and Construction Traffic Noise Assessment

9.34 There is potential for disturbance to occur as a result of heavy goods vehicles (HGVs) travelling on the public highway. Impacts of this nature are typically more likely to occur close to the construction site access, or on sections of road that are subject to low levels of preconstruction traffic.

9.35 The HGV movements on the roads nearest the site have been considered for the purposes of identifying significant impacts. This approach has been taken because they are bounded by noise-sensitive receptors in close proximity; therefore, they provide the worst case for the assessment.

9.36 The number of HGVs attributable to the demolition and construction works will be highest during demolition and earthworks.

9.37 This assessment has been undertaken using the haul route method outlined in BS5228-1:2009+A1:2014. The maximum number of trips will be included within the CEMP.

Demolition and Construction Vibration Assessment

9.38 BS5228-2:2009+A1:2014 states that for the majority of people vibration levels between 0.14 and 0.3 mm/s PPV are just perceptible. A vibration level of 1.0 mm/s is sufficient to cause complaint, but tolerable with prior warning; whereas a level of 10 mm/s is intolerable for anything more than a very brief exposure. Vibration levels exceeding 15 mm/s PPV are sufficient to result in minor cosmetic damage in light/unreinforced buildings. This magnitude of vibration is not considered likely as a result of the proposed construction activities being undertaken, and therefore an assessment of building damage has not been undertaken. No piling is proposed as part of the development.

9.39 Perceptibility of vibration is considered in the assessment.

Operation Stage

9.40 Published Guidance: BS4142:2014+A1 2019 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

9.41 BS4142:2014+A1 2019 provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

9.42 The basis of BS4142:2014+A1 2019 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
- Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;

9.66 The existing noise climate across the application site varies with location. The northern portion of the site generally experiences higher levels of noise due to the influence of the surrounding road network and other commercial/industrial uses. Elsewhere, the noise levels in central part and southern portion of the site are influenced more by other industrial uses and aircraft movements from the nearby Casement Aerodrome.

9.67 A summary of the noise measurements at each position is provided below. The typical $L_{A90,T}$ values have been derived from statistical analysis in line with BS4142:2014+A1 2019.

Table 9.10: Summary of Noise Measurements at Monitoring Position LT1

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	53	46
	Evening (19:00-23:00)	50	44
	Night time (23:00-07:00)	47	42

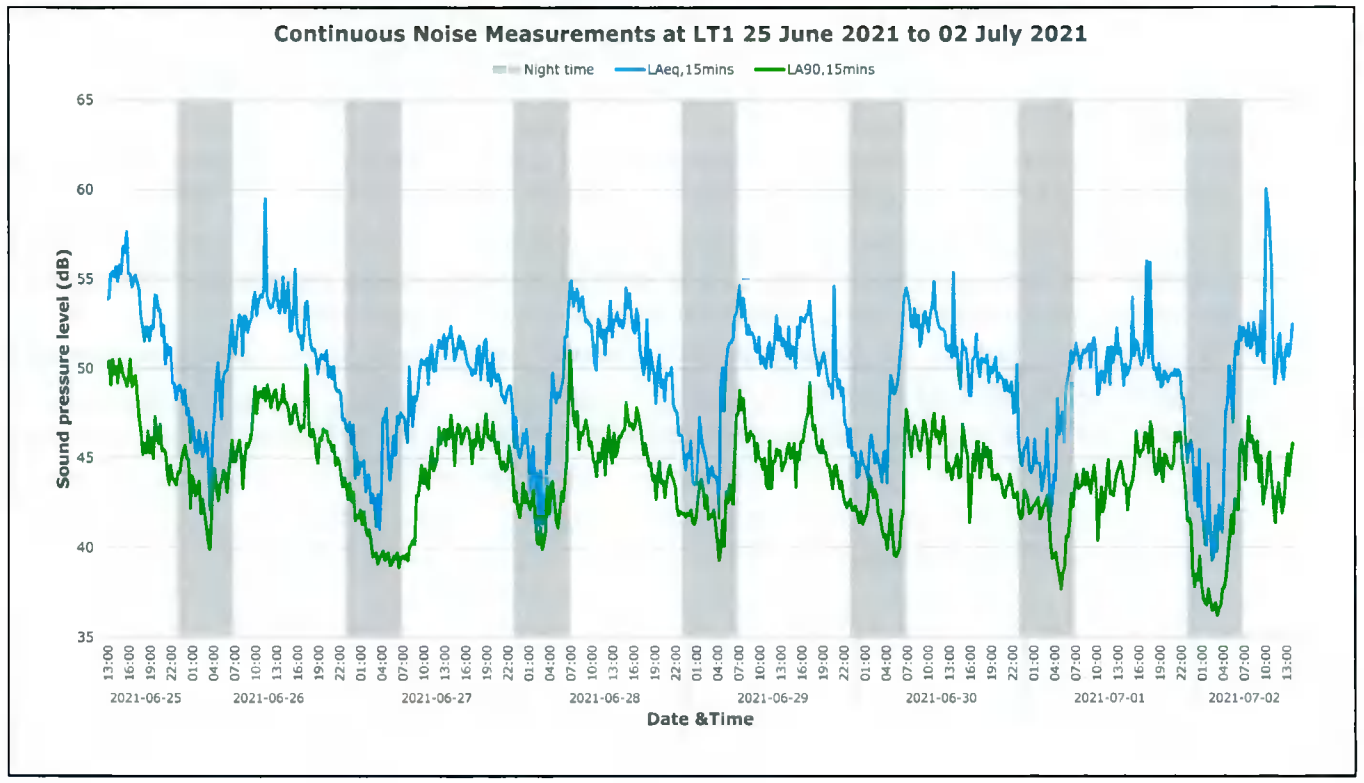


Figure 9.3: Continuous noise measurements at LT1

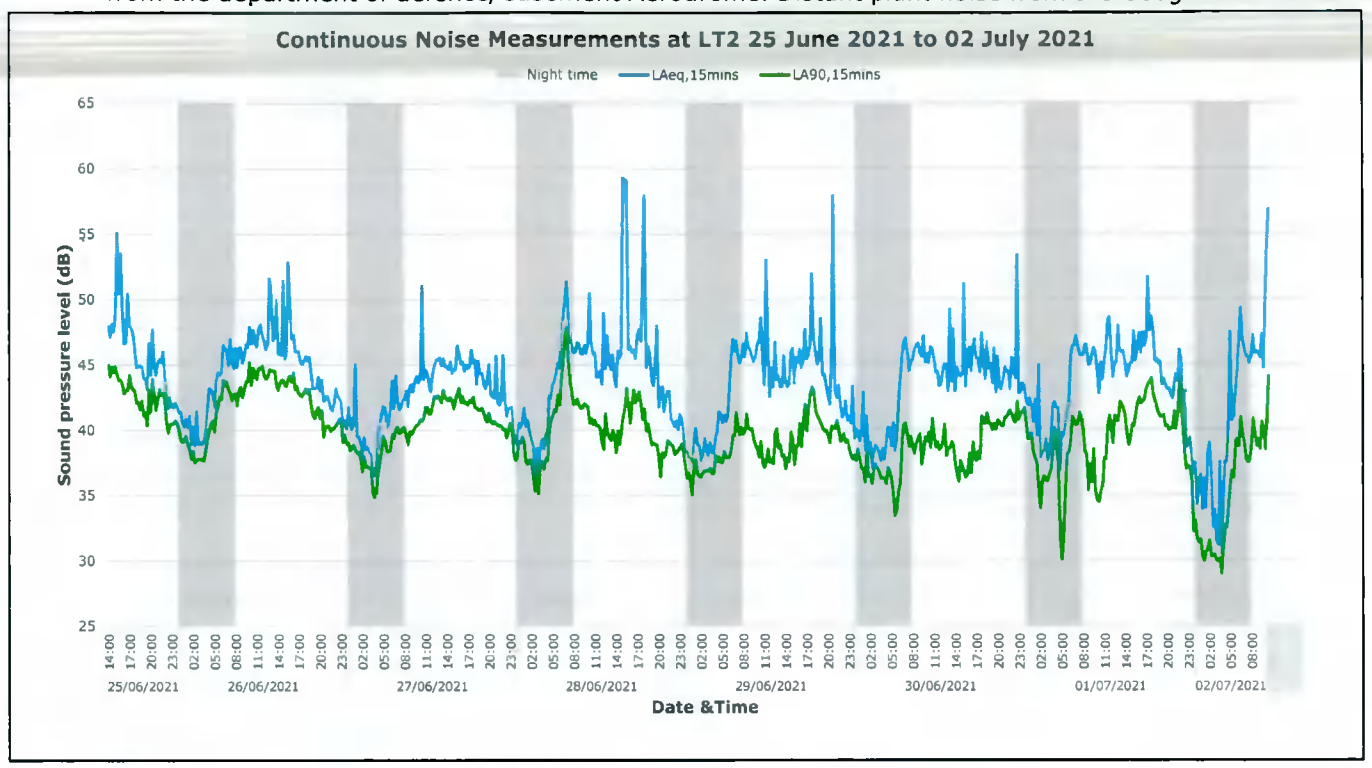
9.68 It is evident from the survey data recorded at LT1 that the noise levels did not vary significantly throughout the duration of the survey. The dominant noise sources were road traffic noise, aeroplanes and helicopters and more distant noise from other industrial land uses.

Table 9.11: Summary of Noise Measurements at Monitoring Position LT2

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	47	42
	Evening (19:00-23:00)	45	40
	Night time (23:00-07:00)	42	38

Figure 9.4: Continuous noise measurements at LT2

9.69 The noise climate at LT2 during the survey was dominated by road traffic noise and aircraft movements from the department of defence/Casement Aerodrome. Distant plant noise from the Google Data Center



Campus was also audible at this position.

Table 9.12: Summary of Noise Measurements at Monitoring Position ST1

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:17	54	40
24/06/2021	00:28	48	39
	01:33	45	37
02/07/2021	11:14	67	46
	13:31	69	49
	16:58	69	51

9.70 The noise climate at STI was dominated by road traffic noise during the daytime, with occasional planes and helicopters also contributary. Other sources included cyclists in the cycle lane along New Nagor Road and birdsong. During the night time, road traffic noise was reduced with only one car approximately every 30mins. Humming from nearby industrial units was more clearly audible during the night time measurements.

Table 9.13: Summary of Noise Measurements at Monitoring Position ST2

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:39	38	33
24/06/2021	00:48	38	34
	01:54	36	34
02/07/2021	11:35	45	39
	13:52	49	43

Table 9.13: Summary of Noise Measurements at Monitoring Position ST2			
	17:19	44	40

9.71 During the daytime the noise climate at ST2 was dominated by distant road traffic noise and the nearby car garage workshop (hammering, banging, and cars idling). During the night time, the noise climate was dominated by distant road traffic noise.

Table 9.14: Summary of Noise Measurements at Monitoring Position ST3

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:05	39	35
	01:13	40	37
	02:11	39	36
02/07/2021	13:11	46	44
	15:41	44	41
	16:38	45	40

9.72 During the daytime the noise climate at ST3 was dominated by distant road traffic noise and the occasional aircraft noise as noted for ST1 above. Some nearby construction noise was also noted. During the night time, humming from other data centers was more audible, along with faunal clicks in nearby trees.

Table 9.15: Summary of Noise Measurements at Monitoring Position ST4

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:52	41	39
	23:43	41	38
	01:53	41	39
02/07/2021	12:52	46	43
	15:22	44	42
	16:20	50	42

9.73 During the daytime the noise climate at ST4 was dominated by road traffic noise and overheard aircraft movements. Other distant sources included a lorry reversing, a car alarm and fan exhaust noise from the Google Data Center. During the night time, road traffic noise was more distant with the 'hum' from Google's plant more audible.

Table 9.16: Summary of Noise Measurements at Monitoring Position ST5

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:22	49	39
24/06/2021	00:31	39	37
	01:35	39	36
02/07/2021	12:32	41	39
	15:01	41	37
	16:01	46	41

9.74 The noise climate at ST5 was similar to that at ST4, with the loudest industrial noise contributions coming buildings located to the north of New Nangor Road. During the night time, it was noted that contributions from Digital Realty's Data Center were more audible.

Table 9.17: Summary of Noise Measurements at Monitoring Position ST6

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:06	34	33
	01:13	50	32
	02:15	36	33
02/07/2021	11:59	64	43
	14:38	64	39
	17:44	65	39

9.75 The noise climate at ST6 in the daytime was dominated by road traffic noise, vehicles accessing the 'Junior Genius' creche, and children playing in the nearby gardens. During the night time, no local vehicle movements were noted except for the measurement at 01:13 when an articulated lorry passed the measurement position. Otherwise, plant noise from the Google Data Center dominated the noise climate during the night time.

9.76 A summary of the weather conditions during the survey period is provided below (as measured at monitoring position LT2):

Table 9.18: Summary of Weather Conditions During Monitoring Period

Average Wind Direction	Average Wind Speed (m/s)	Average Ambient Temperature (°C)	Average Pressure (bar)	Average Precipitation (mm)
South-East (SE)	1.3	14.1	1009.6	0.0

Future Baseline

9.77 The future baseline of the site and study area will be the continued construction of phases of the business parks across the area defined by the South Dublin County Council Development Plan 2016-22 under use zoning Objective EE.

9.78 If any new development of a data center (or other) were proposed, an assessment of the potential noise and vibration effects on the surrounding receptors would need to be considered.

9.79 The Existing Baseline has been used to form the basis of the noise and vibration assessment as this provides a reasonable worst-case.

Assessment of Effects

9.80 The assessment of effects has taken account of the following embedded mitigation.

Embedded Mitigation

Demolition and Construction

9.81 Standard best practice controls and measures, as detailed below, will be adopted onsite to ensure that noise management forms an integral part of the contractor's scope of works.

Construction Environmental Management Plan

9.82 A Construction Environmental Management Plan (CEMP) will be prepared that defines construction mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive

receptors. This will be updated as the project progresses to incorporate specific measures for all phases of the construction works where noise and vibration may give rise to disturbance.

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

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

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

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

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

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

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

Operational

9.88 For operational phase processes and locations, reference should be made to the phasing plan details and drawings included in EIAR Chapter 4.

Temporary Gas Generation Plant (Phase 1A)

9.89 The proposed Agrekko GEJ420 gensets will be inclusive of Industrial Marine Silencers (IMS) sound attenuators and side panels to give a maximum of 75 dBA at 1m. The sound power level used in the model is as follows:

Table 9.19: Sound power L_w (dB) as a function of frequency (Hz) per genset

Total (dBA)	Sound power L_w (dB) at Octave Band Centre Frequency (Hz) per chiller							
	63	125	250	500	1k	2k	4k	8k
91.5	102.7	105.5	91.0	85.6	80.6	68.9	67.1	63.9

Proposed Generator Building (Phase 2B)

Exhaust Stacks

9.90 5no. Wartsilla 20V34SG engines are proposed in each of the two generator halls. The sound power per engine exhaust is shown below:

Table 9.20: Wartsilla 20V34SG engine noise								
Total (dBA)	**Sound Power Level L_w (dB) at Octave Band Centre Frequency (Hz)**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
119.8	88.0	103.0	110.0	113.0	114.0	111.0	114.0	-

9.91 Each exhaust stack will include silencers to reduce the engine noise by 45dB.

Internal reverberant noise level

9.92 The following internal reverberant noise level from within the engine halls has been used. This is based on 5no. Wartsilla 20V34SG engines running in each generator hall.

Table 9.21: Internal reverberant noise level in generator halls used in the assessment								
Total (dBA)	**Internal reverberant noise level (dB) at Octave Band Centre Frequency (Hz)**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
105.8	74.5	89.7	96.7	99.8	101.0	97.7	100.0	-

Building Envelope Construction

9.93 The current building design allows for the following building envelope construction:

- 0.7mm standing seam steel outer
- 160mm Rockwool 100kg/m^3 (1 x 60mm + 1 x 100mm)
- 5mm Tecsound (10kg/m^2)
- 1.2mm profiled steel liner

9.94 The estimated performance of this construction is as follows:

Table 9.22: Generator building envelope construction octave band transmission loss used in the assessment									
Transmission loss of building envelope (dB)	**Approx R_w (dB)**	**Octave Band Centre Frequency (Hz)**							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	50	20	28	37	49	55	58	64	-

Noise from Air Inlets/Exhausts

9.95 The noise level from each air inlet/exhaust will be limited to 65 dBA at 1m from the external louvre/duct. This has been calibrated within the model using the spectrum for the internal reverberant noise level, corrected to 65 dBA at 1m.

Remote radiators

9.96 The air-cooled radiators located on the roof of the gas generator building will be selected to be 'ultra-ultra-low noise'. The A-weighted sound power level $L_{w,A}$ for one 3-fan cooling radiator is shown below. We have assumed this data is applied evenly over the radiator per fan for the model.

Table 9.23: Remote radiator fan noise used in the assessment								
Total (dBA)	**A-weighted Sound Power Level $L_{w,A}$ (dB) at Octave Band Centre Frequency (Hz)**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
88	92.2	93.1	88.6	85.2	83.0	77.8	73.0	65.1

Barriers/Screens

Substation compound

9.97 The proposed substation compound will include a min. 3m high brick blast wall to its full perimeter.

External Plant Installations (Phase 1A and 2B)

Rooftop Chillers per data hall

9.98 There are 12no. Airedale TurboChill V chillers proposed per roof of each data hall. The sound power per chiller is as follows:

Table 9.24: Sound power L_w (dB) as a function of frequency (Hz) per chiller								
Total (dBA)	**Sound power L_w (dB) at Octave Band Centre Frequency (Hz) per chiller**							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
99.2	72.0	87.7	98.6	96.5	93.2	90.7	89.4	86.6

9.99 Each chiller will include an acoustic package with attenuated inlet and discharge, providing the following minimum insertion losses:

Table 9.25: Chiller acoustic package octave band insertion loss used in the assessment							
Insertion loss (dB) at Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
4.0	8.0	13.0	22.0	24.0	21.0	18.0	14.0

Step-up Substation

9.100 2no. transformers will be located in the external substation compound. A sound power of 106 dB L_w has been assumed in the model.

Emergency generators

9.101 33no. KD3300-F emergency generators will be included (11no. per hall). These will be housed in containers and include silencers to attenuate noise levels to 85dBA at 1m. The following sound levels have been used in the model:

DATA:
Generator set: KD3300-F
Engine: KD83V16-5BFS @ 1500RPM
Radiator Cooling airflow: 46m³/s @ 300Pa.
Absorbed fan Power: 70kW
Combustion airflow: 3.262m³/s
Overall Noise : 85dB(A)@1m

NOISE DATA FOR PROPOSED GENERATOR SET, CANOPY
designed to achieve 85dB(A)@1m around the perimeter under standard test conditions Free Field .

FREQUENCY (Hz)	Octave band Centres (dB)								OVERALL dB(A)
	63	125	250	500	1000	2000	4000	8000	
UNSILENCED ENGINE NOISE L_W	119.4	126.3	125.6	118.7	117.7	116.9	114.6	114.7	..
UNSILENCED Radiator fan L_W (Calculated)	119	123	124	125	125	125	123	121	130
CANOPY PREDICTED L_P @1m	64.1	74.3	78.2	75.9	69.9	56.9	56.9	52.8	81.6
INLET ATTN PREDICTED L_P @1m	99.3	96.3	80.7	67.3	58.2	55.2	60.2	74	82.2
DISCHARGE PREDICTED L_P @1m	102.6	97.1	80.8	62.8	56.7	56.1	54.0	72.8	83.1
UNSILENCED EXHAUST NOISE Lw SDMO Data	129.9	142.9	135.2	129.3	125.4	123.8	125.6	124.2	..
PREDICTED EXHAUST L_P @1m	99.0	95.0	87.0	69.0	60.0	54.0	56.0	59.0	83.0

NOTES: Grey areas above denote source data stated in L_W Sound Power levels.
White areas above denote calculated data, stated in L_P Sound Pressure levels at 1m from the unit.

Calculations for noise within the unit is carried out using both the engine and radiator fan as noise sources to ensure "Beaming" from fan Pure Tones is prevented in the discharge attenuator.

Figure 9.5: Emergency Generator Sound Levels

Demolition and Construction Effects

Demolition and Construction Noise

9.102 Reference should be made to Appendix 9.2 for details of the demolition and construction noise calculation that has been used to inform this summary.

9.103 Table 9.26 presents the mitigated noise levels (dBA) at various distances from the construction activities taking place at the site. A +3 dB building façade correction factor has been applied in accordance with BS5528:2009+A1 2014.

Table 9.26: Demolition and construction noise assessment results, dB L_{Aeq} (façade levels)

Activity	NSR1 (New Nangor Road)	NSR2 (Baldonnel Rd)	NSR3 (Baldonnel Rd)	NSR4 (Baldonnel Rd)
Min. separating distance	38 or 75m[1]	500m	445m	480m
Enabling Works	65	43	44	44
Demolition	62	46	47	46
Substructure	62	45	46	45
Superstructure	54	38	39	38
Internal Fit-out	52	34	35	35
External Works	64	42	43	42

[1]38m from Enabling/External Works, 75m from other activity at the proposed development.

9.104 The noise levels at the identified noise sensitive receptors are not predicted to exceed the threshold criteria as demonstrated by the above table.

9.105 On the basis of the predicted mitigated noise levels and distances to receptors, the demolition and construction works are predicted to give rise to noise levels that will constitute a direct temporary short term slight negative (not significant) effect.

Demolition and Construction Traffic Noise

9.106 The assessment has calculated a maximum number of trips per hour to not exceed the construction noise limit (65 dB L_{Aeq}).

9.107 Based on a (80 dBA at 10m) 44t lorry travelling at 34 kph, the peak permissible number of HGV vehicle movements passing a receptor at 5m has been assessed as 8 per hour, or 4 return journeys per hour. On this basis the predicted construction traffic noise level would be calculated as 64.7 dB L_{Aeq}. This would constitute a direct temporary short term slight negative (not significant) effect.

9.108 Notwithstanding this, the management of construction vehicle movements will form an integral part of the CEMP.

Construction Vibration

9.109 With reference to Table 9.5 and the distances to surrounding NSRs throughout the various phases of the work, there is potential that construction induced vibration may be perceptible. The activities that are most likely to give rise to just perceptible levels of vibration are certain earthworks activities. This would constitute a medium level of impact, prior to application of the embedded mitigation. With application of BAT within the CEMP, it is expected that the magnitude of impact would be low.

9.110 This constitutes a direct temporary short term slight negative (not significant) effect.

Operation Effects

Building Services Plant

Noise Emission Limits

9.111 The specifications for fixed plant installations serving the proposed development have been based on the following noise limits, which have been set in accordance with BS4142:2014+A 2019 and local requirements.

9.112 Limits are set at 1m from the window of the nearest NSRs and include a façade reflection.

Table 9.27: Noise Emissions Limits for New Building Services Plant

NSR reference	Time Period	Representative Background Noise Level LA90,15min (dB)	Rating Noise Limit LAr,Tr (dB)	Emergency Noise Limit LAeq,1hr (dB)
1	Daytime (07:00-19:00)	46	≤56	55

Table 9.27: Noise Emissions Limits for New Building Services Plant				
	Evening (19:00-23:00)	44	≤44	55
	Night-time (23:00-07:00)	42	≤42	55
2-4	Daytime (07:00-19:00)	42	≤52	55
	Evening (19:00-23:00)	40	≤40	55
	Night-time (23:00-07:00)	38	≤38	55

9.113 The proposed development is expected to run 24 hours a day, 7 days a week, therefore the assessment has taken into account the noise emission limits during night time only (for normal operation).

Modelled Sound Levels – Normal Operations

9.114 In order to quantify the levels of environmental noise affecting the surrounding NSRs, noise levels have been predicted using the computer noise propagation model, the proposed building constructions, proposed screens and barriers and proposed fixed plant installations, inclusive of any embedded mitigation measures as outlined in this assessment.

9.115 Extracts of the noise model are shown in Figure 9.6 and Figure 9.7.

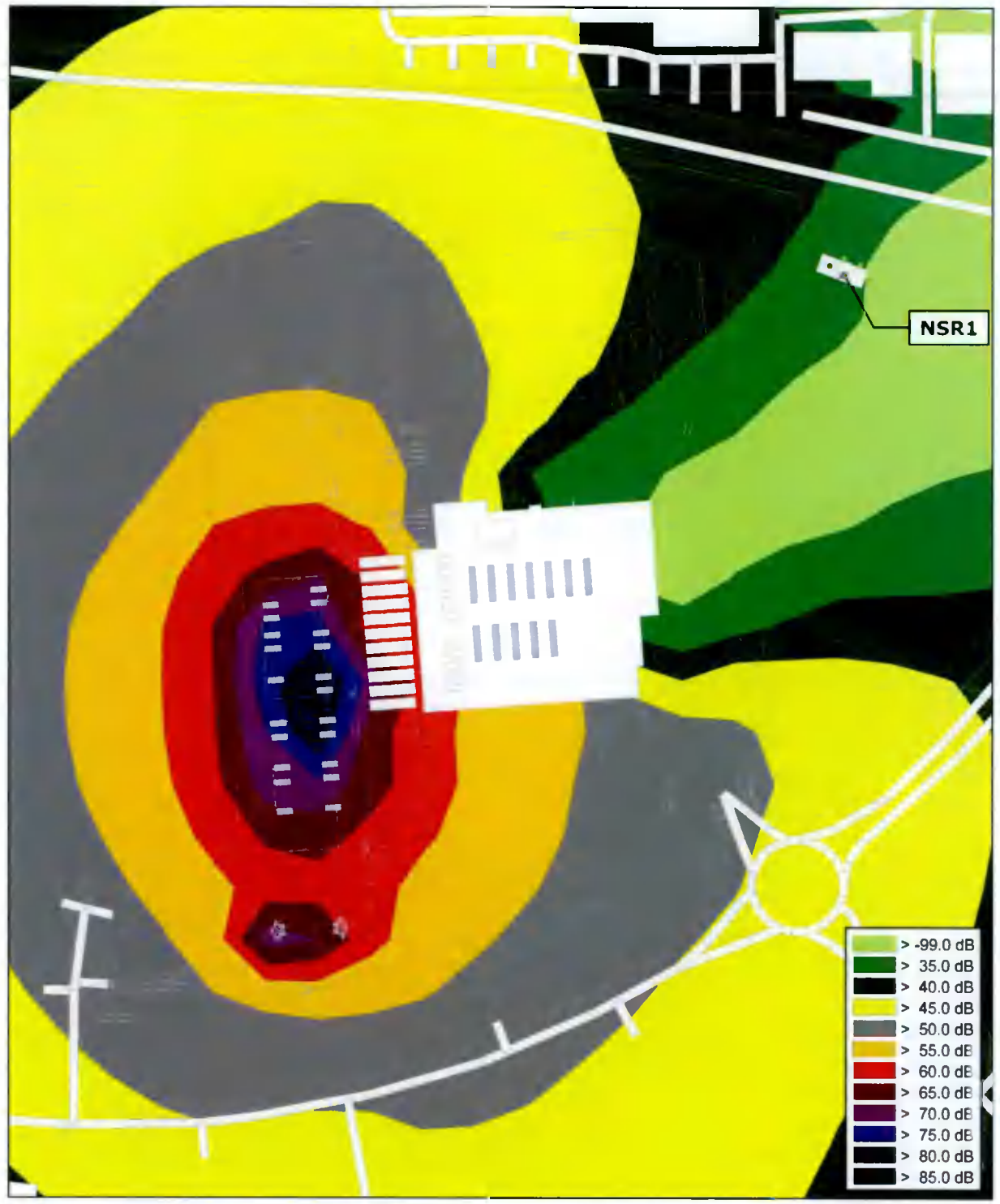


Figure 9.6: Overview of modelled noise emissions (Phase 1A) Grid set at 4.0 AGL

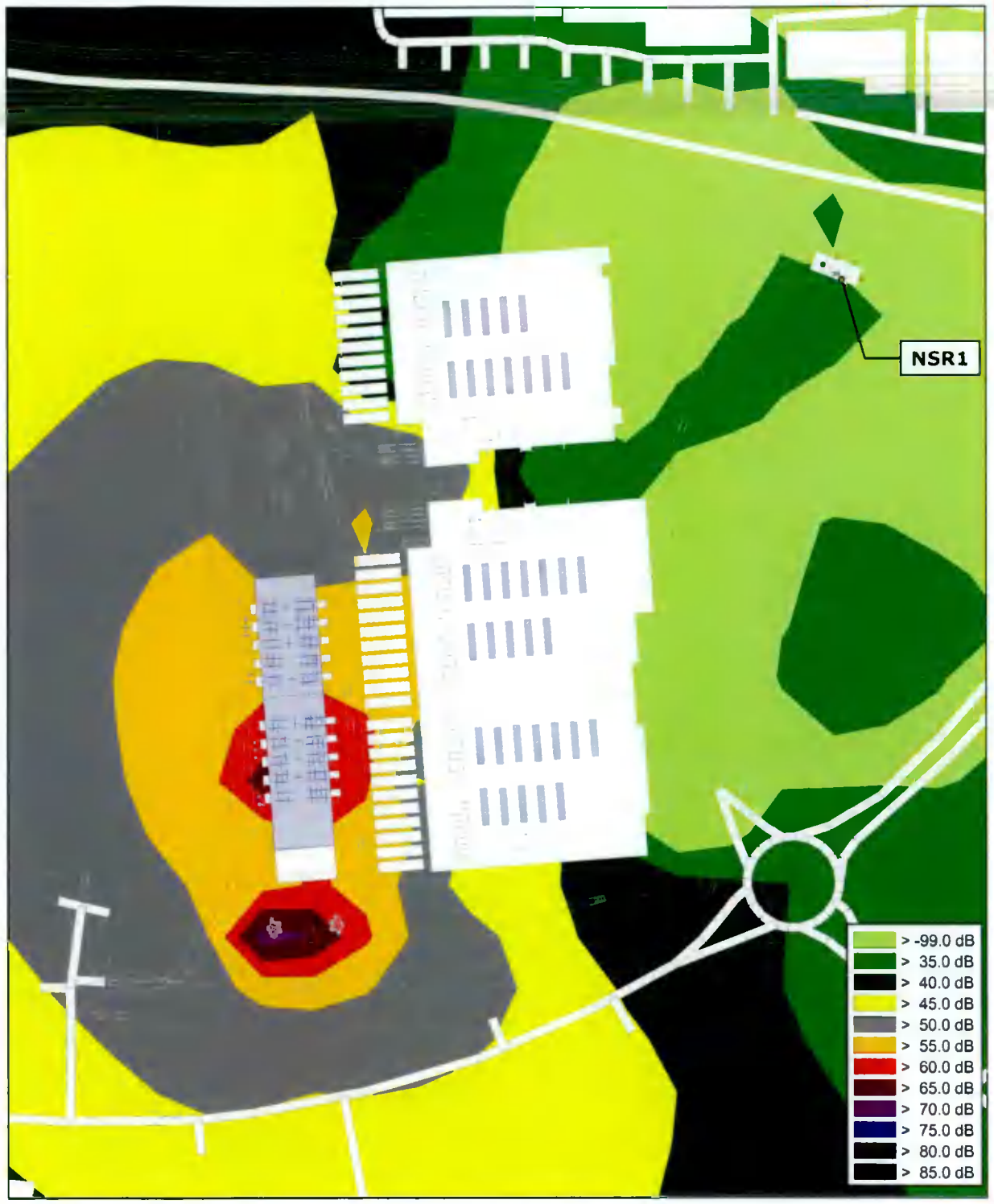


Figure 9.7: Overview of modelled noise emissions (Phase 2B) Grid set at 4.0 AGL

9.116 The worst-case predicted noise levels at each NSR location for the two scenarios (Phase 1A and Phase 2B) are presented below in Table 9.28.

Table 9.28: Predicted normal operational building services noise at NSR

NSR reference	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Predicted Rating Noise Level $L_{Ar,Tr}$ (dB) – Phase 1A	Predicted Rating Noise Level $L_{Ar,Tr}$ (dB) – Phase 2B
1	42	39	39
2	38	37	36
3	38	38	38
4	38	37	36

9.117 The above table shows that for Phase 1A, the predicted noise rating levels at NSRs meet the required limits. This constitutes a direct temporary to short-term slight negative (not significant) effect.

9.118 The above table shows that for the worst-case scenario (i.e. Phase 2B with all non-emergency kit running), the predicted noise rating levels at NSRs meet the required limits. This constitutes a direct permanent long-term slight negative (not significant) effect.

Modelled Sound Levels – Emergency Condition

9.119 Extracts of the noise model showing the calculated noise levels during the emergency condition for Phase 1A and Phase 2B are shown in Figure 9.8, Figure 9.9.