Remedial and mitigation measures

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

Construction phase

9.77 With regard to construction activities, reference will be made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities.

9.78 Various mitigation measures will be considered and applied during the construction of the Proposed Development. Specific examples of such measures are:

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

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

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

9.80 It is recommended that vibration from construction activities to off-site residences be limited to the values set out in Table 9.6. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Operational phase

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

9.82 *Additional vehicular traffic on public roads* – The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.83 *Noise and Human Health – Guidelines for construction and operational phase*: Noise criteria are provided by relevant bodies with consideration of the likely impact of noise on human health. The construction phase is short-term and therefore any elevated levels of noise will be of limited duration and, as a result, are not expected to pose any risk to human health. In terms of the noise exposure of construction workers and potential hearing damage that may be caused due to exposure to high levels of noise, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The appointed contractor will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary. No significant noise impacts are expected from the operational phase of the Proposed Development. As such, there is no anticipated risk of long-term exposure to noise on human health resulting from the Proposed Development.

Predicted impact of the Proposed Development

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

Construction phase

9.85 During the construction phase of the project there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. It is reiterated that any construction noise impacts will be short term in nature. Also, it is considered that as the project progresses from initial ground works that construction noise and vibration impacts will be greatly reduced.

9.86 A summary description of the expected construction phase effects is summarised in Table 9.19 for the nearest noise sensitive locations.

Table 9.20 Description of expected construction phase effects

Quality	Significance	Duration
Negative	***Moderate Effects***	***Short-term***

Operational phase

9.87 *Building services noise / emergency site operation* – Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise impact is not significant.

9.88 *Additional vehicular traffic on public roads* – Any change in noise levels associated with vehicles at road junctions in the vicinity of the Proposed Development is expected to be imperceptible. The resultant noise impact is not significant.

9.89 A summary description of the expected operational phase effects is summarised in Table 9.20 for the nearest noise sensitive locations.

Table 9.21 Description of expected operational phase effects

Quality	Significance	Duration
Negative	***Slight Effects***	***Long-term***

Cumulative impacts

9.90 The environmental noise survey takes account of noise emissions from existing and permitted developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network.

9.91 The noise criteria proposed for new building services plant items has been derived with consideration of existing site noise emissions levels to ensure that cumulative noise emissions do not exceed the relevant noise criteria.

9.92 The potential cumulative noise emissions from the Proposed Development and neighbouring permitted developments, including the Microsoft and Interxion Data Centres have been considered. As the full extent of permitted data centres were not operational at the time the baseline noise survey was conducted, reference is made to the various noise predictions for both sites which present noise predictions to nearby shared residential receptors. The closest shared receptors to the two neighbouring sites are the receivers NP01, NP21, NP23 and NP24. Table 9.21 presents the predicted cumulative noise levels to these receivers and compares to the proposed noise criteria.

Table 9.22 Assessment of predicted cumulative noise levels at receptors for typical site operation

Receiver Reference (Ref. Figure 9.1)	Predicted Plant Noise Level, typical operation (dB $L_{Aeq,T}$)				Noise Criteria	Complies?
	Edgeconnex	Microsoft	Interxion	Cumulative		
NP01 (Receiver noise levels not presented Microsoft & Interxion EIS assessments. Plant noise levels extracted from EIS noise contour maps)	39	39.4	29	**42**	Day: 55 dB $L_{Ar,T}$ Eve: 50 dB $L_{Ar,T}$ Night: 45 dB $L_{Aeq,T}$	✓
NP21 (Microsoft EIS NP04). (Interexion EIS NP15)	37	41.4	29	**43**		✓
NP23 (Receiver noise levels not presented Microsoft & Interexion EIS assessments. Plant noise levels extracted from EIS noise contour maps)	39	40	25	**43**		✓
NP24 (Microsoft EIS NP01 value corrected to estimate the noise level at the front façade of the dwelling i.e. facing Proposed Development) (Interexion EIS NP11)	38	39.8	27	**42**		✓

9.93 Predicted cumulative plant noise emissions are therefore within the daytime, evening and night-time limit values.

'Worst case' scenario

9.94 In terms of noise, the worst-case scenario would result in a loss of amenity due to excessively high noise levels i.e. noise nuisance. In terms of vibration, the worst-case scenario would be structural damage to buildings as a result of excessive vibration from activity on site.

'Do nothing' scenario

9.95 In a 'Do nothing' scenario the existing noise environment would remain. Levels of ambient and background noise may increase slightly over time due to growth in traffic volumes on local and distant road networks.

Monitoring

9.96 It is considered appropriate that a commissioning noise survey be undertaken once the site becomes operational in order to ensure that the relevant noise criteria put forward in this document are complied with.

Reinstatement

9.97 Not applicable in respect of noise and vibration.

10. AIR QUALITY AND CLIMATE

Introduction

10.1 This chapter evaluates the impacts which the Proposed Development may have on Air Quality & Climate during the construction and operational stages as defined in the Environmental Protection Agency (EPA) documents Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2017) and Advice Notes for Preparing Environmental Impact Statements (EPA, 2015). An assessment of the likely dust related impacts as a result of construction activities was undertaken and used to inform a series of mitigation measures. Air dispersion modelling of operational stage emissions from the gas generators was carried out using the United States Environmental Protection Agency's regulated model AERMOD as recommended by the EPA (EPA, 2020a). The modelling of air emissions from the site was carried out to assess concentrations of nitrogen dioxide (NO_2) at a variety of locations beyond the site boundary. The modelling was undertaken to assess the impact to ambient air quality from the continuous operation of the gas generators of the Power Plant and the scheduled testing of the standby diesel generators and the infrequent emergency operation of the standby diesel generators.

10.2 The proposed Data Centre development is adjacent to the R120 and the Grange Castle Business Park. The Proposed Development site is bounded to the north by the Grand Canal; the eastern boundary of the site is formed by the R120 with the current EdgeConnex facility on the eastern side of the R120. Agricultural lads bound to the west and south. The site is currently accessed only via an agricultural access point from the east off the R120 and from the north off the access road to the abandoned agricultural building.

10.3 Most of the land to the east adjacent to the proposed site is occupied by industrial campuses including pharmaceutical, data centre and food manufacturing uses. The neighbouring EdgeConnex facility is located directly to the east on the opposite side of the R120. Grange Back-Up Power, Pfizer and Takeda are located further to the east; Microsoft's data centre campuses are located to the east and south-east. In terms of sensitive residential receptors, one-off dwellings are located to the east with a large residential estate, Grange View, located further east, there are additional residential receptors located further north and south.

Methodology

10.4 Air dispersion modelling was carried out by AWN Consulting Ltd using the United States Environmental Protection Agency's regulated model AERMOD. The modelling of air emissions from the site was carried out to assess concentrations of Nitrogen Dioxide (NO_2) and the consequent impact on human health. The assessment of the emergency operations scenario was undertaken in order to quantify the impact of the proposed standby generator development as well as the associated gas generation compound. A cumulative assessment was also undertaken to assess the impact of the Proposed Development with the permitted development on the site as well as the neighbouring EdgeConnex site to the east and neighbouring EPA licenced sites Takeda, Grange Back-Up Power and Pfizer. Grange Back-Up Power, Takeda and Pfizer have main air emission points which are licensed by the EPA to emit air pollutants. These emission points emit air pollutants on an essentially continuous basis over the course of a year. Other nearby facilities, such as Microsoft, have emission points which are classified as potential emission points as these will only operate under exceptional circumstances (except for testing purposes) and thus will not be in operation on a day-to-day basis. For this reason, the Microsoft emission points were not considered for the purpose of this assessment.

10.5 To obtain all the meteorological information required for use in the model, data collected during 2014 - 2018 from Casement Aerodrome has been incorporated into the modelling. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site and a full year of meteorological data. Using this input data, the model predicted ambient concentrations at various receptors for each hour of the meteorological year. This study adopted a worst-case approach which will lead to an over-estimation of the actual levels that will arise. The dispersion modelling study consisted of the following components:

- Review of emissions data and other relevant information needed for the modelling study;
- Review of background ambient air quality in the vicinity of the development;
- Air dispersion modelling of significant substances released from the site;

- Identification of predicted concentrations of released substances beyond the site boundary; and
- Evaluation of the environmental significance of these predicted concentrations, including consideration of whether these concentrations are likely to exceed relevant ambient air quality standards and guidelines.

Criteria for rating of impacts

Ambient Air Quality Standards

10.6 In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC. The ambient air quality standards applicable for NO_2 are outlined in this Directive (see Table 10.1).

10.7 These standards have been used in the current assessment to determine the potential impact of NO_2 emissions from the proposed facility on air quality.

Table 10.1 EU Air Quality Standards 2011

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

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

Climate agreements

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

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

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

10.11 The Act makes provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

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

10.13 Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland, 2020a). The General Scheme was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP. It is expected that the new Climate Action (Amendment) Bill (the Bill) will be published in early 2021.

10.14 In October 2020, the Climate Action and Low Carbon Development (Amendment) Bill 2020 (Government of Ireland, 2020b) was published in draft format (draft 2020 Climate Act) which amends and enhances the 2015 Climate Act. Once approved, the purpose of the 2020 Climate Act is to provide for the approval of plans 'for the purpose of pursuing the transition to a climate resilient and climate neutral economy by the end of the year 2050'. The 2020 Climate Act will also 'provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'. The 2020 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

Gothenburg Protocol

10.15 In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_x (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% below 2005 levels), 65 kt for NO_x (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH_3 (1% reduction) and 10 kt for $PM_{2.5}$ (18% reduction).

10.16 European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National EPA Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005. The data available from the EPA in 2020 (EPA, 2020b) indicated that Ireland complied with the emissions ceiling for SO_2 in recent years but failed to comply with the ceilings for NH_3, NO_x and NMVOCs. Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_x, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_x (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005

levels) for SO_2, 40.7 kt (69% reduction) for NO_x, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

Construction phase

Air Quality

10.17 The current assessment focused firstly on identifying the existing baseline levels of NO_2 in the region of the Proposed Development (as defined in Chapter 4 of this EIAR) by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the Proposed Development.

Climate

10.18 The impact of the construction phase of the Proposed Development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the Proposed Development.

Operational phase

Air Quality

10.19 Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulated model AERMOD (Version 19191). AERMOD is recommended as an appropriate model for assessing the impact of air emissions from industrial facilities in the EPA Guidance document *"Air Dispersion Modelling from Industrial Installations Guidance Note (AG4) (2020b)*".

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

10.21 The assessment was undertaken in order to quantify the impact of the Proposed Development on ambient air quality concentrations. To obtain all the meteorological information required for use in the model, data collected during 2014 - 2018 from Casement Aerodrome has been incorporated into the modelling. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site and five full years of meteorological data. Using this input data, the model predicted ambient concentrations beyond the site boundary for each hour of the modelled meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with ambient air quality standards to assess the significance of the releases from the site. This study adopted a conservative approach which will lead to an over-estimation of the actual levels that will arise.

10.22 AERMOD is a "new-generation" steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement of the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. Details of the model are given in Appendix 10.1. Fundamentally, the model has made significant advances in simulating the dispersion process in the boundary layer. This will lead to a more accurate reflection of real world processes and thus considerably enhance the reliability and accuracy of the model particularly under those scenarios which give rise to the highest ambient concentrations.

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

- Discrete receptors were identified at which concentrations would be modelled. The impact of the emergency generators was assessed at the following discrete receptor locations at nearby residential receptors.

- A receptor grid was identified at which concentrations would be modelled. The receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. Modelling was carried out covering an area of 64 km^2 with the site at the centre. The outer grid was 8km x 8km in size with receptors every 200m and the inner grid consisted of receptors every 100m over a 2.5 x 2.5km area giving 2,357 gridded receptors in total. The total calculation points for the gridded modelling including boundary receptors are 2,650.

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

- Hourly-sequenced meteorological information has been used in the model covering the years 2014 – 2018 from Casement Aerodrome as shown in Figure 10.1. AERMOD incorporates a meteorological pre-processor AERMET 7 which allows AERMOD to account for changes in the plume behaviour with height using information on the surface characteristics of the site. AERMET 7 calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convective boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux (see Appendix 10.2).

- Terrain has been mapped out in the model as using SRTM (Shuttle Radar Topography Mission) data with 30m resolution. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP.

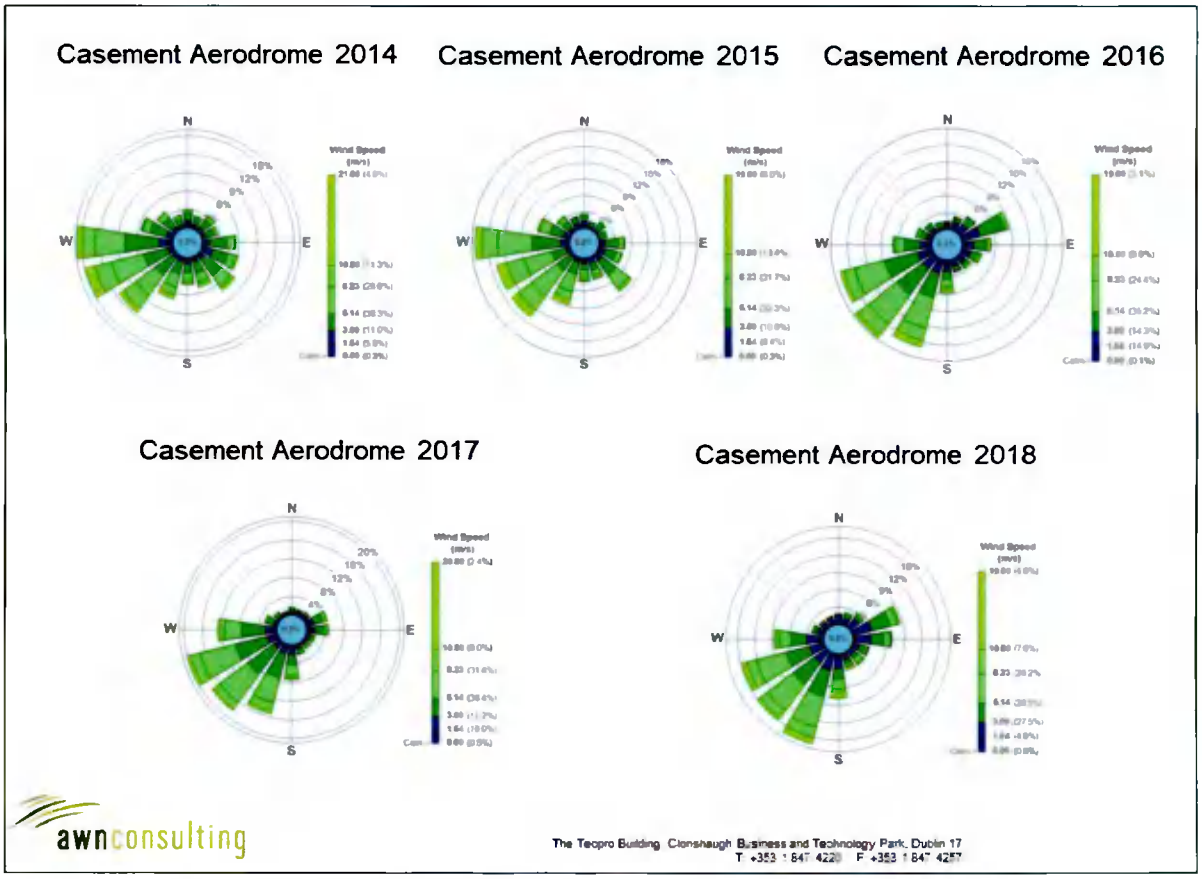

Figure 10.1 Casement Aerodrome Windrose 2014 - 2018

Process emissions

10.24 There will be three phases to the gas generator compound. Phase 1 will have 20 gas generators with 18 operational and 2 catchers. Likewise, Phase 2 will have 20 gas generators with 18 operational and 2 catchers. Phase 3 will have 21 gas generators with 19 operational and 2 catchers. All gas generator flues will have a height of 25m. DUB 5 will have 24 standby diesel generators with 20 operational and 4 catchers. DUB5 diesel generators will only be used in the event of interruption to the supply of natural gas to the gas generator compound and for testing purposes.

10.25 The modelled maintenance plan for the Proposed Development comprises the following:

- Testing once per week of all 24 no. standby generators on site at 80% load for a maximum of 1 hour each, 1 generator at a time, sequentially; and
- All testing is assumed to occur between 8am and 5pm, Monday to Friday only.

10.26 The model has included testing of the generators on a weekly basis, in reality it is more likely that the generators will be tested on a monthly basis rather than a weekly basis. The modelling has taken a conservative approach and therefore emissions may be over-estimated. Continuous operation was assumed for the running of the gas generation compound.

10.27 Modelling for NO_2 was undertaken in detail. In relation to CO, PM_{10}, $PM_{2.5}$ and benzene no detailed modelling was undertaken. Emissions of these pollutants are significantly lower than the NO_X emissions from the generators relative to their ambient air quality standards and thus ensuring compliance with the NO_2 ambient limit value will ensure compliance for all other pollutants. For example, the emission of CO from the generators is eight times lower than NO_X whilst the CO ambient air quality standard is 10,000 $\mu g/m^3$ compared to the 1-hour NO_2 standard of 200 $\mu g/m^3$. Similarly, levels of $PM_{10}/PM_{2.5}$ emitted from the generators will be eighty times lower whilst the ambient air quality standards are comparable.

10.28 The scenarios modelled for this assessment include emergency operation of the generators for 100 hours per year calculated according to USEPA protocol. A testing regime has also been included in the model, this involved testing of each generator on an individual basis once per week for 15 minutes at 80% load. This is an over-estimation of actual operating conditions as the generators are likely to be only tested once per month. In reality, it is unlikely that the generators would be used for emergency operations for more than 24 - 48 hours per year.

10.29 USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA 2011). As a result, the maximum hourly emission rates from the emergency generators were reduced by $\frac{100}{8760}$ and the generators were modelled over a period of one full year. As stated above, the emergency generators are likely to run for only 24 - 48 hours per year; however it is not advisable to assume less than 100 hours per year using the USEPA method as this would not be a sufficiently conservative approach.

10.30 A second methodology has recently been published by the UK Environment Agency. The consultation document is entitled "*Diesel Generator Short-Term NO_2 Impact Assessment*" (UK EA, 2016). The methodology is based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value (18 exceedances are allowable per year before the air standard is deemed to have been exceeded). The assessment assumes a hypergeometric distribution to assess the likelihood of exceedance hours coinciding with the emergency operational hours of the standby generators. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined. The guidance suggests that the 95th percentile confidence level should be used to indicate if an exceedance is likely. More recent guidance (UK EA, 2019) has recommended this probability should be multiplied by a factor of 2.5 and thus the 98th percentile should be used. The guidance suggests that the assessment should be conducted at the nearest residential receptor or at locations where people are likely to be exposed and that there should be no running time restrictions on these generators when providing power on site during an emergency.

10.31 Both the methodology advised in the USEPA guidance as well as the approach described in the UK EA guidance have been applied for the scenarios modelled in this study to ensure a robust assessment of predicted air quality impacts from the standby generators.

10.32 Modelling was undertaken for two separate scenarios to account for emissions from the gas generation compound in isolation and secondly a full cumulative assessment to take into account all existing and proposed phases for EdgeConnex and taking into allow all IED licenced facilities in the region. Both scenarios were modelled using the methodologies described above and are detailed below:

Scenario 1: This scenario involves emissions from 18 no. gas generators in Phase 1, 18 gas generators in Phase 2 and 19 operational gas generators in Phase 3. All gas generator flues will have a height of 25m. DUB05 will have 24 standby diesel generators with 20 operational and 4 catchers. DUB05 diesel generators will only be used in the event of interruption to the supply of natural gas to the gas generator compound and for testing purposes.

Scenario 2: This scenario is based on a full cumulative assessment taking into account all existing and proposed phases for EdgeConnex and taking into account all IED licenced facilities in the region.

10.33 The cumulative assessment of both scenarios with the neighbouring EdgeConnex, Takeda, Grange Back-Up Power and Pfizer sites has been modelled for Scenario 2. The source information for the modelled emission points has been summarised in Table 10.2.

10.34 Modelling of NO_x emissions from the facility was based on the ozone-limiting method (OLM) based on the "OLMGROUP ALL" option. It is preferred to the Plume Volume Molar Ratio Method (PVMRM) method (Hanrahan, 1999a, 1999b). The approach has taken into account the following considerations which are outlined in the USEPA memos "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program" (2010) and "Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (2011):

- Firstly, the PVMRM algorithm may have a tendency to overestimate the conversion of NO to NO_2 for low-level plumes by overstating the amount of ozone available for the conversion as it does not account for the possibility that the vertical extent of the plume may extend below ground-level.
- Secondly, area sources may be overestimated using the PVMRM method as the lateral extent of the plume used in calculating the plume volume depends on the projected width of the area source even if only a portion of the area source actually impacts a nearby receptor.
- Thirdly, although the PVMRM method may be likely to give better results for an isolated source the current assessment will be based on emissions from numerous sources and thus the OLMGROUP ALL method is likely to be of similar or better accuracy as the PVMRM method.

10.35 For the OLM method, it has been assumed that 10% of the NOx in the stack gas is already in the form of NO_2 before the gas leaves the stack (in reality the levels are usually closer to 5% based on the USEPA database of NO_2/NO_x ratios. Actual hourly ozone concentrations from Rathmines was used in the OLM model runs for each relevant year (EPA, 2018b).

Table 10.2 Process emissions used in modelling assessment

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_2	
							Concentration (mg/Nm^3)	Mass Emission (g/s)
Proposed DUB5 Standby Diesel Generators (Emergency Operations)	25	0.65	0.33	773.15	6,164	21.4	1,800	3.22 Note 1 / 0.037 Note 2
Proposed Standby Diesel Generators (Testing)	25	0.65	0.33	773.15	6,164	21.4	1,800	0.805 Note 3
Proposed Gas Generators	25	0.70	0.385	663.15	5,211	14.7	250	0.362 Note 4
EdgeConneX Phase 4 Standby Generators (Emergency Operations)	15.0	0.5	0.20	743	5,996	39.3	2,572	5.7 Note 1 / 0.13 Note 2
EdgeConneX Phase 4 Standby Generators (Testing)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	1.43 Note 3
EdgeConneX Phase 1, 2 & 3 Standby Generators (Emergency Operations)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	5.7 Note 1 / 0.13 Note 2
EdgeConneX Phase 1, 2 & 3 Standby Generators (Testing)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	5.7 Note 3
Neighbouring EdgeConneX Gas Generators	15.0	0.5	0.20	754.2	3,017	25.4	489	0.58 Note 4
Takeda Stack	15.0	0.56	0.25	533.15	5,850	12.9	140	0.23 Note 4
Pfizer A1-1	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A1-2	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A1-3	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A2-1	45.0	2.0	3.14	441.15	64,065	9.2	75	1.33 Note 4
Pfizer A2-2	45.0	2.0	3.14	441.15	64,065	9.2	75	1.33 Note 4
Grange A2-1	25.0	2.8	6.0	663.15	288,000	27.6	75	6.72 Note 4
Grange A2-1	25.0	3.2	8.0	663.15	216,000	27.6	75	8.96 Note 4

Note 1 Maximum emission rates used to model the hypergeometric distribution at the 98th%ile confidence level.

Note 2 Reduced emission rates based on USEPA protocol used to model emissions during emergency operation of generators based on 100 hours of operation.

Note 3 Maximum emission rates used to model scheduled emissions including batch testing

Note 4 Continuous operation assumed 24 hours per day, 365 days per year

Receiving environment

Air Quality

10.36 Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality Monitoring Annual Report 2019*" (EPA, 2020c) details the range and scope of monitoring undertaken throughout Ireland.

10.37 As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2019). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, Grange Castle is categorised as Zone A (EPA, 2020c).

10.38 With regard to NO_2, continuous monitoring data from the EPA (EPA 2020c), at suburban Zone A background locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 13 - 22 $\mu g/m^3$ over the period 2015 - 2019 (see Table 10.3). Sufficient data is available for the station in Ballyfermot to observe long-term trends since 2014 (EPA 2020c), with annual average results ranging

from 16 – 20 µg/m^3. Based on these results, an estimate of the current background NO_2 concentration in the region of the Proposed Development is 15 µg/m^3 based on the results for Ballyfermot and acknowledging the more rural nature of the current location relative to Ballyfermot.

10.39 In relation to the annual averages, the ambient background concentration is added directly to the process concentration. With regard to short-term peak concentrations of NO_2 a value of twice the annual mean background concentration was added to the process concentration.

Table 10.3 Trends In Zone A Air Quality - Nitrogen Dioxide (µg/m^3)

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year					
			2014	2015	2016	2017	2018	2019
Rathmines	Urban Background	Annual Mean NO_2 (µg/m^3)	17	18	20	17	20	22
		99.8th%ile 1-hr NO_2 (µg/m^3)	105	105	88	86	87	102
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	16	17	17	17	20
		99.8th%ile 1-hr NO_2 (µg/m^3)	93	127	90	112	101	104
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	15	16	19	17	19	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	86	91	105	101	91	90
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	14	13	16	14	16	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	37	93	96	79	85	80

Climate

10.40 Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional estimates of emissions up to 2019 (EPA, 2020d). The data published in 2020 states that Ireland has exceeded its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by 6.98 Mt. For 2019, total national greenhouse gas emissions are estimated to be 59.9 million tonnes carbon dioxide equivalent (Mt CO_2eq). This is 4.5% lower than emissions in 2019. Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO_2.

10.41 The EPA 2019 GHG Emissions Projections Report for 2018 – 2040 (EPA 2019) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 – 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 10 Mt CO_2eq under the "*With Existing Measures*" scenario and 9 Mt CO_2eq under the "*With Additional Measures*" scenario (EPA, 2019).

10.42 Greenhouse gases have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different greenhouse gases, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The GWP100 for CO_2 is the basic unit (GWP = 1) whereas CH_4 has a global warming potential equivalent to 28 units of CO_2 and N_2O has a GWP100 of 265.

Characteristics of the Proposed Development

10.43 When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

10.44 The construction phase will involve excavation over the development site and the erection of new buildings over a phased construction period. The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the emergency operation and testing of the generators.

10.45 These issues are discussed in detailed in the following sections. A full description of the Proposed Development is set out in Chapter 2 of this EIA Report.

Potential Impacts of the Proposed Development

Construction phase

Air Quality & Climate

10.46 The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

10.47 Construction traffic would be expected to be the dominant source of greenhouse gas emissions as a result of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development.

10.48 The potential impacts associated with the construction phase of the Proposed Development are short-term in nature. When the dust minimisation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will not be significant and will pose no nuisance at nearby receptors. Due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a short-term and imperceptible impact on climate.

Operational phase

Air Quality

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

Climate

10.50 The standby diesel generators modelled for the purpose of this assessment will only be used in the event of a power failure at the site. During normal operations at the facility, the gas generators will be used to produce electricity.

10.51 Importantly, electricity providers form part of the EU-wide Emission Trading Scheme (ETS) and thus greenhouse gas emission from electricity generation are not included when determining compliance with the targeted 30% reduction in the non-ETS sector. Thus, emissions from these gas generators

will not affect the EU target of a 30% reduction in non-Emission Trading Scheme (non-ETS) greenhouse gas emissions by 2030. Consequently, the Proposed Development will have no impact on whether Ireland meets the targets set for 2030. The EU policy of operating the ETS (on a EU-wide basis) for large industrial emitters including electricity generators will continue up to 2030 as a minimum and thus electricity generation will have no impact on the non-ETS targets up to 2030 as a minimum.

Do-nothing scenario

10.52 The Do-Nothing scenario includes retention of the site with no development in place. In this scenario ambient air quality at the site will remain as per the baseline and will also change in accordance with trends within the wider area (including influences from new developments in the surrounding industrial estates, changes in road traffic, etc).

Remedial and Mitigation Measures

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

Construction phase

Climate

10.54 Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to ***short-term*** and ***temporary*** nature of these works the impact on climate will ***not be significant***.

Air Quality

10.55 The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland and the UK (IAQM (2014), The Scottish Office (1996), UK Office of Deputy Prime Minister (2002) and BRE (2003)) and the USA (USEPA (1997)).

Site management

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

10.57 At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 10.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles downwind (to the north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

10.58 Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2 mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures should be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are

minimised;

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein; and
- At all times, the procedures put in place will be strictly monitored and assessed.

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

Site roads / haulage routes

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

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

Land clearing / earth moving

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

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

Storage piles

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

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;

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

Site traffic on public roads

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

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust; and
- In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of dust mitigation measures

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

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

Operational phase

Air Quality

10.65 The stack heights of the gas generators have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the plume. Provided each gas generator flue stack is built to a height of 25m above local ground level and based on the site layout modelled, the air impact assessment has demonstrated that mitigation measures are not required. Similarly, the standby diesel generators have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the plume. Provided each standby diesel generator flue stack is built to a height of 25m above local ground level and based on the site layout modelled and hours of operation, the air impact assessment has demonstrated that mitigation measures are not required.

Climate

10.66 On-site emissions of greenhouse gases will mainly derive from the gas generators with infrequent standby emissions due to the diesel generators. However, the emissions from the gas generators will form part of the EU-wide Emission Trading Scheme (ETS) and thus greenhouse gas emission from onsite electricity generation are not included when determining compliance with the targeted 30% reduction in the non-ETS sector. In addition, gas generators have the lowest greenhouse gas emission rate of any fossil fuel. Thus, no mitigation measures for the gas generators will be required.

Predicted Impacts of the Proposed Development

Construction phase

Air Quality

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

Climate

10.68 Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the potential impact on climate change and transboundary pollution from the Proposed Development is deemed to be ***short-term*** and ***not significant*** in relation to Ireland's obligations under the EU 2030 target.

Human Health

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

Operational phase

Air Quality

Scenario 1 (USEPA Methodology)

10.70 This assessment involved modelling the continuous operation of the 18 no. gas generators associated with Phase 1, the 18 no. gas generators associated with Phase 2; and the 19 no. gas generators associated with Phase 3 as well and also considering scheduled testing of the DUB05 diesel generators. The NO_2 modelling results at the worst-case off-site receptor are detailed in Table 10.4. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the site lead to an ambient NO_2 concentration (including background) which is 83% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 89% of the annual limit value at the worst-case off-site receptor. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations are illustrated as concentration contours in Figure 10.2 and Figure 10.3.

Table 10.4 Dispersion modelling results – Scenario 1

Pollutant / Meteorological Year	Background (µg/m^3)	Averaging period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/m^3)	Standard (µg/m^3) Note 1
NO_2 / 2014	15	Annual mean	18.2	33.2	40
	30	99.8th%ile of 1-hr means	117.2	147.2	200
NO_2 / 2015	15	Annual Mean	18.8	33.8	40
	30	99.8th%ile of 1-hr means	116.0	146.0	200
NO_2 / 2016	15	Annual mean	15.8	30.8	40
	30	99.8th%ile of 1-hr means	124.5	154.5	200
NO_2 / 2017	15	Annual mean	18.3	33.3	40
	30	99.8th%ile of 1-hr means	124.5	154.5	200
NO_2 / 2018	15	Annual mean	20.6	35.6	40
	30	99.8th%ile of 1-hr means	135.0	165.0	200

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

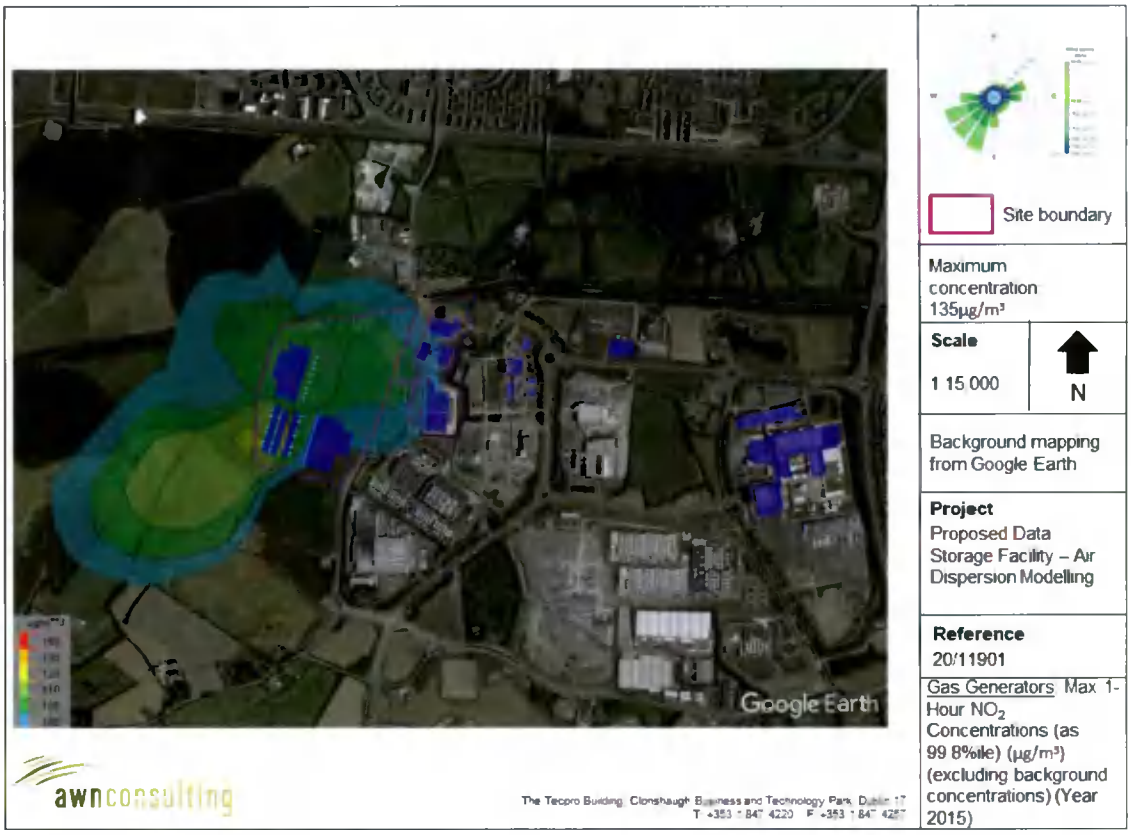

Figure 10.2 Scenario 1 Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile) (Year 2018)

Figure 10.3 Scenario 1 Annual Mean NO_2 Concentrations (Year 2018)

Scenario 2 - Cumulative Assessment (USEPA Methodology)

10.71 The cumulative assessment involved modelling the continuous operation of the 18 no. gas generators associated with Phase 1, the Phase 2 18 no. gas generators and the Phase 3 19 no. gas generators

and also considering scheduled testing of the DUB 5 diesel generators. In addition, emissions from the IED Licenced sites Takeda, Grange Back-Up Power and Pfizer were also included in the model as well as the emissions associated with Phases 1, 2, 3 and 4 of the neighbouring EdgeConneX site. The NO_2 modelling results at the worst-case off-site receptor are detailed in Table 10.5. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the site lead to an ambient NO_2 concentration (including background) which is 85% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 94% of the annual limit value at the worst-case off-site receptor. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations are illustrated as concentration contours in Figure 10.4 and Figure 10.5.

Table 10.5 Dispersion modelling results – Scenario 2, cumulative assessment

Pollutant / Meteorological Year	Background (µg/m^3)	Averaging period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/m^3)	Standard (µg/m^3) Note 1
NO_2 / 2014	15	Annual mean	21.7	36.7	40
	30	99.8th%ile of 1-hr means	121.7	151.7	200
NO_2 / 2015	15	Annual Mean	22.0	37.0	40
	30	99.8th%ile of 1-hr means	120.9	150.9	200
NO_2 / 2016	15	Annual mean	21.0	36.0	40
	30	99.8th%ile of 1-hr means	128.3	158.3	200
NO_2 / 2017	15	Annual mean	22.4	37.4	40
	30	99.8th%ile of 1-hr means	129.0	159.0	200
NO_2 / 2018	15	Annual mean	22.3	37.3	40
	30	99.8th%ile of 1-hr means	139.1	169.1	200

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

Figure 10.4 Scenario 2 Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile) (Year 2018)

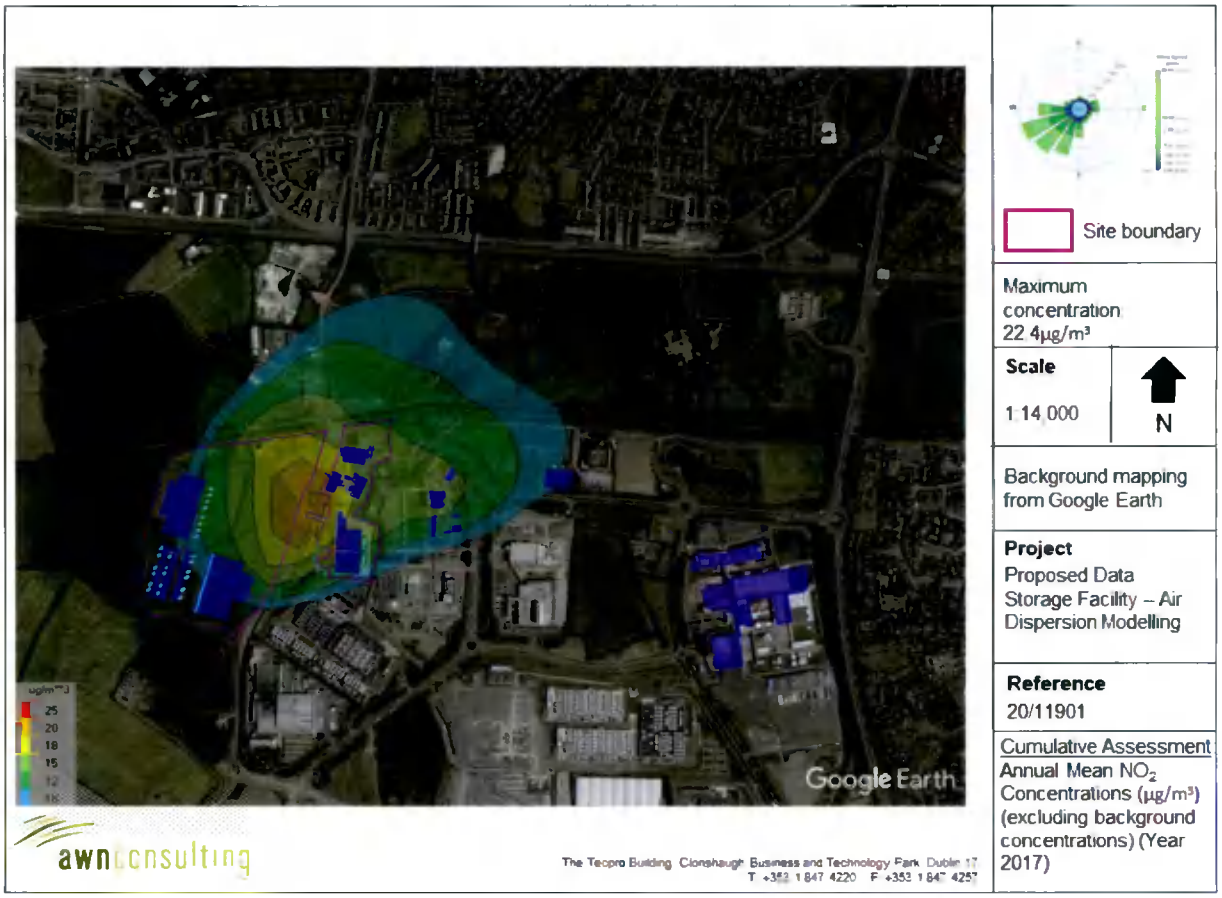

Figure 10.5 Scenario 2 Annual Mean NO_2 Concentrations (Year 2017)

DUB05 Only (UK EA Methodology)

10.72 The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the worst-case residential receptor for DUB05 diesel generators and assuming continuous operation of the gas generators. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 10.6. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the standby diesel generators and assuming continuous operation of the gas generators. The results indicate that in the worst-case year, both the 24 no. standby DUB05 diesel generators and Phase 1, 2 & 3 Gas Generators can operate for up to 4,720 hours before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level).

Table 10.6 Hypergeometric statistical results at worst-case residential receptor – DUB5 Only

Pollutant / Meteorological Year	Hours of operation (Hours) (98th%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98th%ile) Note 1
NO_2 / 2014	7,130	**0.02**
NO_2 / 2015	8,760	
NO_2 / 2016	6,500	
NO_2 / 2017	8,760	
NO_2 / 2018	4,720	

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

Cumulative Impacts (UK EA Methodology)

10.73 The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the worst-case residential receptor. The cumulative hypergeometric distribution of 19 and more hours per year is computed and

the probability of an exceedance determined as outlined in Table 10.7. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the cumulative standby diesel generators for Phases 1 - 5 and assuming continuous operation of the Phase 1, 2 & 3 gas generators. The results indicate that in the worst-case year, based on the cumulative assessment involving the continuous operation of the nearby IED licenced sites, the 18 no. gas generators associated with Phase 1, the Phase 2 - 18 no. gas generators and the Phase 3 - 19 no. gas generators, the backup generators associated with Phases 1, 2, 3, 4 and 5 of EdgeConneX sites can operate for 80 hours before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). Figure 10.6 shows the statistical distribution predicted for the 98th percentile (based on 80 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on standby generators which provide power on site only during an emergency power outage.

Table 10.7 Hypergeometric statistical results at worst-case residential receptor – Cumulative Assessment

Pollutant / Meteorological Year	Hours of operation (Hours) (98thO%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98thO%ile) Note 1
NO_2 / 2014	115	0.02
NO_2 / 2015	162	
NO_2 / 2016	107	
NO_2 / 2017	153	
NO_2 / 2018	80	

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

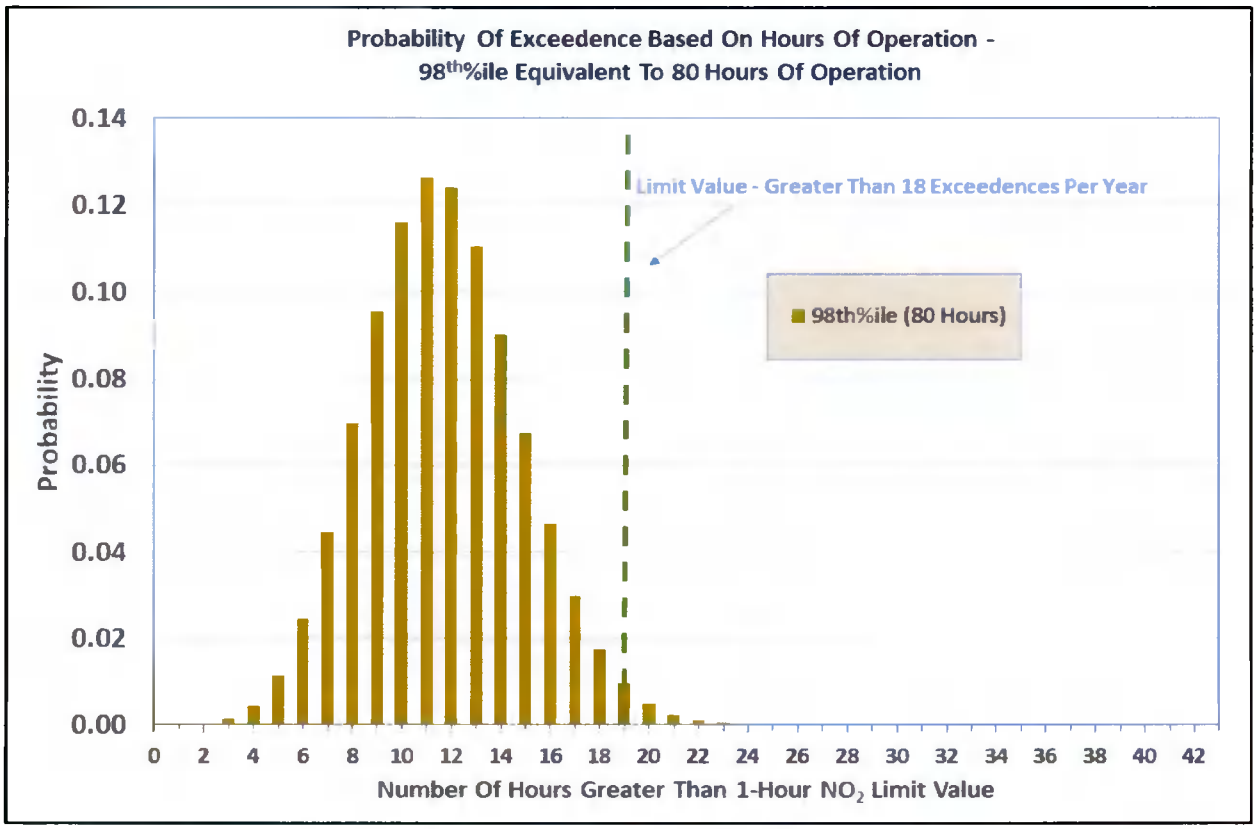

Figure 10.6 Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Proposed Development – Cumulative Assessment

Summary of modelling assessment

10.74 The results of the modelling assessment based on the Proposed Development have found that ambient concentrations of NO_2, due to emissions from the gas generators, scheduled testing of diesel generators on site and standby operation of the diesel generators, are below the air quality limit values.

Thus, it is predicted that the impact of the Proposed Development on air quality will be long-term, negative and not significant.

10.75 The cumulative assessment results are also within the relevant air quality limit values for NO_2 and as such the impact to air quality as result of emissions from both the Proposed Development and Phases 1, 2, 3 and 4 of the neighbouring EdgeConneX site and Licenced IED sites at Grange Back-Up Power, Takeda and Pfizer is predicted to be long-term, negative and insignificant.

Climatic Impact

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

10.77 As the Proposed Development is over 20 MW, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading Scheme (ETS). Electricity providers form part of the ETS and thus greenhouse gas emissions from these electricity generators are not included when determining compliance with the targeted 30% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing Decision target. Thus, any necessary increase in electricity generation due to data centre demand will have no impact on Ireland's obligation to meet the EU Effort Sharing Decision.

Human health

10.78 The air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, emissions from the site assuming scheduled testing as well as emergency operation of the standby generators are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. Conservative assumptions were made when determining the input data for the air modelling assessment and the approach used in the study leads to an over-estimation of the actual levels that will arise. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

Monitoring

10.79 No monitoring is required.

Residual impacts

10.80 The results of the air dispersion modelling study show that the residual impacts of the Proposed Development on air quality and climate will not be significant.

11. LANDSCAPE AND VISUAL IMPACT

Introduction

11.1 Character, for the purposes of this assessment refers to the interaction of elements in the landscape that combine to give the area its particular identity. In this context, impacts on character include the effect on existing land uses and responses that are felt towards the combined effects of the new development.

11.2 The criteria as set out in the EPA Guidelines on Information to be contained in Environmental Impact Statements are used in the assessment of the likely impacts.

11.3 The ratings may have negative, neutral or positive application where:

- Positive impact - a change that improves the quality of the environment;
- Neutral impact - a change that does not affect the quality of the environment; and
- Negative impact - a change that reduces the quality of the environment.

11.4 Terms relating to the duration of impacts are as described in the EPA Guidelines as:

- Momentary impact – a few seconds or minutes;
- Brief impact – less than a day;
- Temporary impact - lasting one year or less;
- Short-term impact - lasting one to seven years;
- Medium-term impact - lasting seven to fifteen years;
- Long-term impact - lasting fifteen to sixty years; and
- Permanent impact - lasting over sixty years.

11.5 The significance of impacts on the perceived landscape will depend partly on the number of people affected, but also on judgments about how much the changes will matter and in relation to other senses i.e. sound, feeling, etc., experienced by those concerned.

Methodology

11.6 The assessment was carried out by visiting the site and its surroundings in December 2018, by analysis of the proposals through photomontages, plans, aerial photographs, the tree survey by The Tree File Ltd. (Appendix 11.3), historic maps and by reference to the South Dublin County Dublin Development Plan 2016-2022 and the Landscape Character Assessment of South Dublin County Council (June 2016 updated)

11.7 A study of the environmental impact on the biodiversity of the site will be covered in other sections of the EIAR.

Receiving environment

11.8 The proposed built development is located 100m south of the Grand Canal tow path at its closest point. The site is situated to the west of the Grange Castle Business Park, separated by the R120 road. It is an irregular shaped area measuring 670m on its longest north-south axis and 465m on its longest east west axis. The total land area of the site measures 22.1ha..

11.9 The ground levels within the site area are generally flat with a slow and gradual fall from the western edge of the site towards the north eastern corner. From the lowest level in the north east (63.40, near the residence at the 12th lock) the lands rise by 6m towards the north-west of the site (69.43m). There is a localised high ridge line on a berm created by spoil in the north of the site. The berm is approximately 80m long on the east west axis and stands at between 2-3m higher than the surrounding ground levels.

Figure 11.1 Site context

11.10 The land use of the subject lands is primarily arable agricultural fields with traditional hedgerow field boundaries. The hedgerows are low and sparsely vegetated in sections. The land in the most northern section of the site contains several buildings, primarily agricultural barns and sheds but also a number of residences. The field pattern is also smaller in the northern section of the lands. Two large electricity pylons are situated in the northern section of the lands with the power cables running across the site on an east west axis.

11.11 The lands are bounded on the north by the Grand Canal public amenity and proposed Natural Heritage Area. The site is separated from the canal and towpath by a local access road and trees and vegetation along the edge of the canal. To the south and west, the site is bounded by a field boundary hedgerow beyond which are agricultural fields like those on the subject lands. The eastern section of the site is bounded by the recently upgraded R120 public road. There are several residences and quasi-residential properties on the opposite side of the R120 road and abutting the site in the north eastern corner.

11.12 In the wider landscape the site is in a generally flat landscape on the edge of two landscape types. The landscape to the east and south east is characterised by large built developments and new tree lined roads. Between these built developments are large flat green areas that were used for agriculture and the landscape is still of a traditional field and hedgerow boundary typology. To the west and south the landscape is that of a traditional agricultural landscape with medium to large field patterns. The landscape to the north beyond the canal is that of the urban fringe characterised by the transition from rural landscape to a built urban environment.

11.13 According to the Tree Survey and Report, by the Tree File Ltd. (refer to Appendix 11.3) the historic tree cover on the site is primarily contained within the agricultural hedgerows on the northern boundary of the site. Throughout the rest of the site there are no trees worthy of including in the report. The arrangement of the trees and hedgerows are remnants of the agricultural stock proof field boundaries. The report finds that due to the lack of management and subsequent deterioration the original

Hawthorn is now overrun by Bramble, Blackthorn and Ivy in several places. The site is described as supporting 'little material of Arboricultural interest' and having very few trees that would be considered valuable.

11.14 Within the application lands there is an extant permission for a Data Centre facility (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948. The Proposed Development is Phase 2 of the development of the site and the permitted development will be subject to some minor amendments as a result of this application. The details of the permitted development can be summarised as:

- construction of 4 single storey buildings with a total floor area of 13,900sqm at 12.72m above ground level;
- construction of a single storey building with a total floor area of 1,522sqm at 9.15m above ground level;
- construction of a two storey ESB substation (494sqm) with associated transformer yard and single storey transformer building (247sqm);
- external plant consisting of 32 no. standby generators with the flues extending 15m above ground level;
- temporary gas-powered generation plant with 8 generators within a walled compound
- access road, service yard, footpaths, perimeter fencing, water tank and external lighting; and
- creation of native woodlands, native woodland scrub corridors, native wetlands, native grassland meadow and earth modelling.

Characteristics of the Proposed Development site

11.15 The character of the site and its environs has largely been determined by the following:

- flat topography in the site and its surrounding environs;
- landscape history of agricultural use with a traditional hedgerow field boundary;
- built structures and hardstanding in the northern section of the site;
- recently upgraded road along the eastern boundary with no vegetation buffer;
- electricity pylons and power cables;
- the canal and its towpaths and lock; and
- number of very large buildings in the local landscape.

11.16 In the wider context the subject site lies on the boundary between two landscape types. The environment to the east with its contrast of new built structures and historic field patterns would be considered a 'transitional landscape'. The environment to the west would be considered a traditional agricultural landscape.

11.17 A comparison of the historical Ordnance Survey maps with the current site and through analysis by site visits, it is evident that there has been little change to the study area in recent times. The perimeter hedgerows reflect historic field patterns as recorded in the historic '6 inch' maps, however, several of the internal hedgerows in the southern section of the lands no longer exist. The hedgerow along the western and southern boundary is also a historic townland boundary marking the boundary of the Ballymakaily townland.

11.18 The landscape of the subject lands has no inherent aesthetic qualities of note. In the context of the surrounding landscape, landscape sensitivities and views across the southern section of the lands would be considered of little aesthetic value. The northern section of the lands does hold some more aesthetic value in the context of the canal and its local environment. The aesthetic qualities provided are limited to the hedgerows and trees around the canal and partial views of the fields.

Existing views and visibility

11.19 The location from which the site is most visually prominent is from the R120 to the east of the lands. Due to the recent road works the boundary roadside hedgerows have been removed and the site is open to views from the east. From this section of the R120 the site forms part of the foreground of the view. The site is visually prominent due to the sites proximity to the viewpoint, the local topography and the recent removal of the boundary hedgerow vegetation to facilitate the R120 upgrade works. The views from the R120 are expansive including a wide sweep of the local landscape in which the

pylons on the site are prominent features. Due to the very flat nature of the topography the subject lands form a small section of the wider view. However, the expansive nature of this view is temporary as the tree planting associated with the R120 upgrade, once planted, will start to form a visual screen. The Dublin Mountains are partially visible from this location and form part of the ridgeline of the views to the south.

11.20 The site is also visible from the Green Route of the Grand Canal Way at the lock gate and the towpath directly to the north of the lands on both sides of the canal. The hedgerows, trees and buildings on the most northern section of the lands form part of this view. In parts where the hedgerow vegetation is thinner, partial glimpsed views further into the site are possible.

11.21 The subject lands and vegetation are visible from the residences along the R120 on the eastern side of the road. Due to the recent removal of the roadside vegetation the view from these residences is quite extensive over the site and landscape. However, this is a temporary view as the tree planting associated with the R120 works, once planted will start to form a visual screen.

11.22 The site is not visible from locations in the wider landscape due to the flat nature of the topography, the scale of the local built development and the significant number of trees in the area.

Landscape planning

11.23 Within the South Dublin County Development Plan 2016-2022 there are no specific landscape objectives that apply to the subject lands. There are a number of objectives that apply to the general environs of the site most notably to the Grand Canal (Proposed Natural Heritage Area).

Green infrastructure objectives

- G2 Objective 1 states: *'To reduce fragmentation of the Green Infrastructure network and strengthen ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional Green Infrastructure network.'*

- G2 Objective 2 states: *'To protect and enhance the biodiversity value and ecological function of the Green Infrastructure network.'*

- G2 Objective 6 states: *'To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries, and increase hedgerow coverage using locally native species.'*

- G2 Objective 9 states: *'To preserve, protect and augment trees, groups of trees, woodlands and hedgerows within the County by increasing tree canopy coverage using locally native species and by incorporating them within design proposals and supporting their integration into the Green Infrastructure network.'*

- G3 Objective 1 states: *'To promote the natural, historical and amenity value of the County's watercourses and address the long term management and protection of these corridors in the South Dublin Green Infrastructure Strategy.'*

- G3 Objective 2 states: *'To maintain a biodiversity protection zone of not less than 10 metres from the top of the bank of all watercourses in the County, with the full extent of the protection zone to be determined on a case by case basis by the Planning Authority, based on site specific characteristics and sensitivities. Strategic Green Routes and Trails identified in the South Dublin Tourism Strategy, 2015; the Greater Dublin Area Strategic Cycle Network; and other government plans or programmes will be open for consideration within the biodiversity protection zone, subject to appropriate safeguards and assessments, as these routes increase the accessibility of the Green Infrastructure network.'*

- G3 Objective 3 states: *'To ensure the protection, improvement or restoration of riverine floodplains and to promote strategic measures to accommodate flooding at appropriate locations, to protect ground and surface water quality and build resilience to climate change.'*

Heritage Conservation & Landscape Objectives

- HCL11 Objective 1 states: *'To protect and enhance the important biodiversity resource offered by the Grand Canal.'*

- HCL11 Objective 3 states: *'To ensure that development along or adjacent to the Grand Canal contributes to the creation of an open and integrated network of walking and cycling routes that integrate with the Grand Canal Way Green Route.'*

- HCL11 Objective 5 states: *'To ensure that development along and adjacent to the Grand Canal protects and incorporates high value natural heritage features including watercourses, wetlands, grasslands, woodlands, mature trees, hedgerows and ditches and includes for an appropriate set-back distance or buffer area from the pNHA boundary to facilitate protected species, biodiversity, and a fully functioning Green Infrastructure network.'*

- HCL13 Objective 1 states: *'To ensure that any proposal for development within or adjacent to a proposed Natural Heritage Area (pNHA) is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the pNHA particularly plant and animal species listed under the Wildlife Acts and the Habitats and Birds Directive including their habitats.'*

- HCL15 Objective 3 states: *'To protect existing trees, hedgerows, and woodlands which are of amenity or biodiversity value and/ or contribute to landscape character and ensure that proper provision is made for their protection and management in accordance with Living with Trees: South Dublin County Council's Tree Management Policy 2015-2020.'*

11.24 There are no protected trees or tree groups within the subject lands listed in the South Dublin County Development Plan 2016-2022. There are no views or prospects that include the subject lands listed in the South Dublin County Development Plan 2016-2022.

11.25 In the Landscape Character Assessment of South Dublin County Council (June 2016 updated), the subject lands are designated as being in the 'Newcastle Lowlands Character Area'. This area is listed as having a medium landscape sensitivity, due to the vulnerability of the agricultural landscape to urban pressures. The subject lands are located in the east of the 'Limestone Farmland' character type separated from the 'Urban Fringe' character type by the R120

Characteristics of the Proposed Development

11.26 The development will consist of a phased development that will include 2 no. single storey data centres all with associated plant at roof level; 24 no. standby generators with associated flues (each 25m high); associated office and service areas; service road infrastructure and car parking; as well as an associated water tower and sprinkler tank.

11.27 The development will also include 3 no. 2-storey gas powered generation plant within 3 buildings containing 61 no. generator units with associated flues (each 25m high).

11.28 The development will also include new ancillary site works and amendments to the permitted development (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948), connections to existing infrastructural services as well as fencing, signage, and will include vehicular access off the realigned R120, internal service roads and 39 car parking spaces.

11.29 The permitted landscape scheme including earth berms, woodland, a native wetland and wildflower meadows (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948) will be modified to increase the extent of habitat creation.

11.30 The detailed design of the data centres incorporates green walls, consisting of vegetation for the full height of sections of the building façade, on the northern elevation.

11.31 The completed development involves the following works that have the potential to impact on the landscape. The details of the Proposed Development listed below are in accordance with the proposed plans outlined as part of the drawings submitted as part of the planning application and can be summarised as:

- construction of 2 single storey buildings with a total floor area of 12,797sqm at 12.72m above ground level;
- construction of an additional 2,404sqm of single storey buildings for office and delivery space.
- external plant consisting of 24 no. standby generators with the flues extending 25m above ground level;
- 3 no 2-storey gas powered generation plant within 3 buildings totalling 9,286sqm containing 61 no. generator units with associated flues (each 25m high).
- access road, service yard, footpaths, perimeter fencing, water tank and external lighting; and
- creation of native woodlands, native woodland scrub corridors, native wetlands, native grassland meadow and earth modelling.

Potential impact of the Proposed Development

Construction phase

11.32 The change of use of part of the site from its current state to that of a construction site has the potential to result in the following impacts:

- visual impacts due to the introduction of new structures, access roads, machinery, materials storage, associated earthworks, car parking, lighting and hoarding;
- change of character due to the change in use; and
- visual impacts due change in ground levels and earthworks.

Operational phase

11.33 The proposed works as described in the 'Characteristics of the Proposed Development' and as set out in more detail within Chapter 2 of this EIA Report has the potential to result in the following impacts:

- visual impacts due to the introduction of new buildings and built structures;
- visual impacts due to the introduction of new roads, mechanical plant and lighting;
- change of character due to the change in use;
- visual impact of landscape proposals – earth modelling, hard surfaces etc; and
- landscape and visual impacts due to the installation of trees and vegetation.

Remedial and mitigation measures

11.34 The mitigation of potential negative landscape and visual impacts has influenced the design and layout of the scheme from the beginning of the design process (refer to Landscape Mitigation Drawing). As a result, the following landscape design mitigation measures have been made:

- earth modelling and large tree planting reinforced with woodland whip planting in belts is proposed to provide a high level of visual screening of the most sensitive views of the development; and
- the creation of a large wetland and woodland habitat in a buffer zone between the canal and the built development
- the colour palette chosen for the building aims to further reduce any visual impact of the building.

Predicted impact of the Proposed Development

Impact on Landscape Character

Construction phase

11.35 As described under potential impact of the Proposed Development above, the initial construction operations created by the clearance of the greenfield sections of the site and the construction of the buildings and plant will give rise to temporary or short-term impacts on the landscape character, through the introduction of new structures, machinery etc. and the removal of vegetation. The conversion of part of the site from an agricultural field landscape type to a building site, to build the data centres and associated development, is likely to be perceived in the short term as a negative 'loss' of landscape character, particularly by sections of the local community closest to it.

11.36 The introduction of the elements described under potential impact of the Proposed Development will have an impact on the amenity value of the adjacent surrounding areas. The construction compounds, temporary car parking and storage facilities etc. will be located sensitively to avoid any visually sensitive areas. The activities that will cause the most significant visual impact are confined to the south western section of the lands, furthest from the sensitive views along the canal and north-west, set back some 100m from the canal. Furthermore, as the site is located adjacent to an existing business park with recent built developments and developments currently under construction, and the recent R120 upgrade works on the east perimeter of the lands, the visual elements associated with construction would be considered part of the existing urban landscape.

11.37 With the above considered the negative visual impact on the landscape character during construction would be considered ***moderate*** in magnitude and ***short-term*** in its duration.

Operational phase

11.38 As described under potential impact of the proposal above, the operational phase of this development will give rise to a noticeable change in the landscape character particularly in the western section of the site. The development will not have a negative impact on any of the more sensitive aspects of the landscape character, the hedgerows, trees and field boundaries near the canal.

11.39 The initial removal of a section of the agricultural field landscape to be replaced with built development would be considered a negative impact on the landscape character. However, the landscape measures proposed with this development and the previously permitted scheme will significantly improve the quality of the landscape character in this area. The significant amount of native woodland, scrub, wetland and grassland habitats to be created, including the creation of a new wildlife habitat that extends from east to west across the site, would have a very positive impact on the landscape character of this area and the wider environment of the canal and canal walks. The initial impact of the built development on the landscape character could be perceived as negative in the short term due to the change in type from a field to a built structure. In the long term as the habitats establish, and the impact of the change in the landscape is reduced, the impact on the landscape character of this area would be considered positive in nature.

11.40 The site is specifically zoned for this type of development and there have been recent built developments of a larger scale in the local vicinity. Many of these built developments are dominant in views from the site. In this context the Proposed Development would be considered a continuation of existing trends in the local area.

11.41 The overall impact on the landscape character would therefore be considered positive due to the level of landscape and ecological enhancement proposed and restricting the built development to an area set back a distance from the canal and its immediate environs.

Impact on landscape planning

11.42 The Green Infrastructure objectives that apply to the site and its environs, described under section 11.23 above, are mostly general objectives aimed at the protection of the existing green infrastructure network and strengthening ecological links in the wider landscape. The proposed landscape combined with that permitted under the extant planning permission will create significant belts of native woodland linking the existing hedgerows and trees into a much larger ecological habitat. In the north eastern corner of the site an additional large wetland habitat will be established, adjacent to that currently permitted. This combined wetland habitat will be an incredibly positive contribution to the local biodiversity. Most of the existing trees and hedgerows will be retained and improved and strengthened by the additional native planting proposed and invasive species management. The level of tree cover and woodlands proposed will significantly increase the ecological value of the lands and create strong ecological corridors through the site and connecting to the canal environs. The proposal would be considered in accordance with these policy objectives.

11.43 The Heritage, Conservation and Landscape objectives that apply to the site and its environs, described under section 11.23 above, are mostly aimed at the protection of the character, heritage value, visual amenity value and the biodiversity of the Grand Canal and its surrounding landscape corridor. The proposed landscape, combined with that permitted under the extant planning permission, includes

native wetland, woodlands, hedgerow scrub and meadows that will contribute positively to the landscape corridor of the canal and the biodiversity of the wider environs. The Proposed Development will therefore be in accordance with these policy objectives.

Visual impact assessment

11.44 The photomontages assessed in this chapter are included in a separate document by Digital Dimension Ltd. within Appendix 11.2 of this EIA Report. In this document two scenarios are shown from each viewpoint.

Photomontage 1 - The existing scenario.
Photomontage 2 - The Proposed Development on day one of operations. Where the proposed built elements are not visible a red line indicates the outline of the Proposed Development.

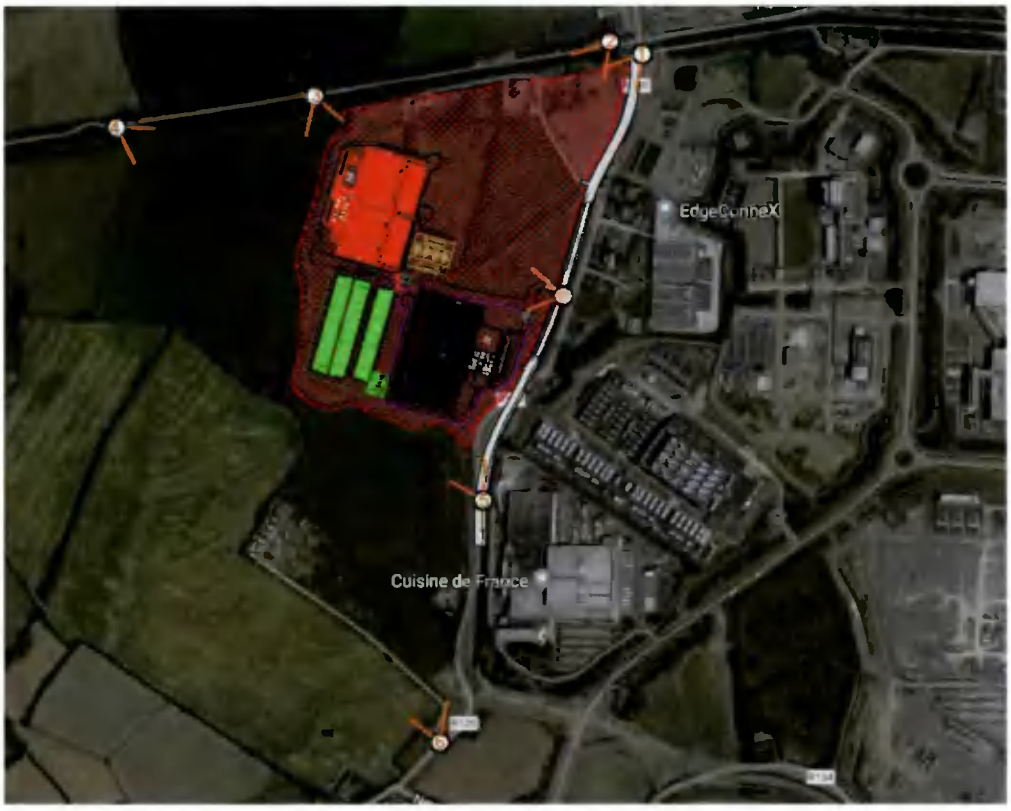

Figure 11.2 Visual impact assessment locations

View 1 – From the bridge at the 12th Lock, Grand Canal and the R120 public road

Existing view

11.45 The northern edge of the subject lands is 33m from this view location and the closest point of the proposed buildings is 392m from this view location on the canal bridge crossing. Views of value in this vicinity are the long vista offered along the canal towards the west within the visual frame created by the vegetation on each side. A view is also offered to the south towards the Wicklow Mountains however, there are many visual elements intruding into this view. In this view the subject lands are partially visible in the centre of the view, however, the house and vegetation in the foreground do provide some screening. The buildings under construction on the opposite side of the R120 are also visible on the left side of the view.

Visual impact of Proposed Development during construction

11.46 The Proposed Development will not result in any significant impact on this view during construction. The construction process, machinery, storage of materials and built structures will be visible in the distance until the earthworks are created. Some of the visual elements associated with the building

process will result in some minor visual intrusion into this view. However, the distance from the viewpoint will limit the level of visual impact. No sensitive aspects of the view would be obstructed and the level of impact reduced due to the distance and small scale of the visual intrusion in the context of a wide expansive view. The impact of the proposals during construction on the view from this location would be considered negative but of ***not significant*** magnitude, and ***temporary*** in duration.

Visual impact of Proposed Development during operation

11.47 The nature of the Proposed Development will result in a minor alteration to the existing view that would be considered positive in nature. The photomontage (View 1 Proposed in the Photomontage document by Digital Dimension Ltd.) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed buildings are screened from view by the proposed earth berms and tree planting proposed as part of the scheme. The visual screening provided by the permitted and proposed trees and berms will screen the buildings from view. The residence in the foreground of the view will also screen the Proposed Development from view. The introduction of woodlands, meadow and wetlands into this view would be considered a positive impact. The level of this positive visual impact will increase as the trees mature and form a larger section of the view. The magnitude of the positive visual impact on this view would be considered ***moderate*** and ***long-term*** in duration.

View 2 – From the proximity of the protected structure at the 12th Lock to the south-west

Existing view

11.48 The northern edge of the subject lands is 41m from this view location and the closest point of the proposed buildings is 338m from this view location adjacent to the Mill buildings that are a protected structure. Views of value in this vicinity are the long vistas offered along the canal towards the west and east, within the visual frame created by the vegetation on each side. A view is also offered to the south towards the Wicklow Mountains, however, there are many visual elements intruding into this view. The northern edge of the subject lands are visible in the foreground of the view most notable the buildings and associated garden trees and hedgerows. The large electricity pylon and lines are also prominent in this view.

Visual impact of Proposed Development during construction

11.49 The Proposed Development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials and built structures will be visible in the background of the view. Some of the visual elements associated with the building process will result in a visual intrusion into this view. The level of this impact will also be limited due to the construction works being located close to recently constructed large buildings and the recent road upgrade where similar construction activities were recently part of the visual landscape. No sensitive aspects of the view would be obstructed, and the level of impact reduced due to the distance and small scale of the visual intrusion in the context of a wide expansive view. The impact of the proposals during construction on the view from this location would be considered ***negative, slight*** in magnitude, and ***temporary*** in duration.

Visual impact of Proposed Development during operation

11.50 The nature of the Proposed Development will result in a slight alteration to the existing view. The photomontage (View 2 Proposed in the Photomontage document by Digital Dimension Ltd. in Appendix 11.2) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data hall building is screened from view by the earth berms and tree planting within the site, as permitted in the previous application and as proposed in this application. Any views of the building would be of the flues in the northern section of the development. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. The visual impact would reduce over time as the trees mature. With this considered the impact of the proposals on the view from this location would be considered negative, not significant and long-term in duration.

View 3 – From the Grand Canal Way, Green Route to the south

Existing view

11.51 The north eastern edge of the subject lands is 98m from this view location and the closest point of the proposed buildings is 170m from this view location. Views of value in this vicinity are the long vista

offered along the canal towards the east and west within the visual frame created by the vegetation. In this view the electricity pylon and the top of the western boundary hedgerow are the only parts of the of the subject lands that are visible. The canal the vegetation along the banks are the prominent visual elements in this view.

Visual impact of Proposed Development during construction

11.52 The Proposed Development will not result in a noticeable visual impact on this view during construction. The construction process, machinery, storage of materials, built structures will be screened from view by the existing vegetation, and local topography.

Visual impact of Proposed Development during operation

11.53 The buildings proposed in this development will have no impact on the view from this location. The photomontage (View 3 Proposed in the Photomontage document by Digital Dimension Ltd. in Appendix 11.2) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The top of the woodland belt is the only element that will be visible, and it will be mostly indistinguishable from the existing vegetation until the woodland matures. When the above in considered the overall visual impact on views form this location would be considered ***positive*** in nature and ***imperceptible*** in magnitude.

View 4 – From the Grand Canal Way, Green Route to the south east

Existing view

11.54 The north eastern edge of the subject lands is 380m from this view location and the closest point of the proposed buildings is 420m from this view location. Views of value in this vicinity are the long vista offered along the canal towards the east and west within the visual frame created by the vegetation. Some restricted views to the south towards the mountains are possible between the blocks of vegetation. In this view the electricity pylon and the top of the western boundary hedgerow are the only parts of the of the subject lands that are visible. The canal the vegetation along the banks are the prominent visual elements in this view.

Visual impact of Proposed Development during construction

11.55 The Proposed Development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible from this location. Some of the visual elements associated with the building process will result in a visual intrusion into this view and will alter the visual ridgeline. However, the magnitude of this impact will be greatly reduced due to the significant screening provided by existing and proposed earthworks and vegetation. The impact will be further mitigated by the distance to the contraction activities from this location. The impact of the proposals during construction on the view from this location would be considered ***negative***, however ***not significant*** in magnitude, and ***temporary*** in duration.

Visual impact of Proposed Development during operation

11.56 The nature of the Proposed Development will result in a slight alteration to the existing view. The photomontage ((View 1 Proposed in the Photomontage document by Digital Dimension Ltd. in Appendix 11.2) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data hall building is screened from view by the earth berms and tree planting within the site, as permitted under the previous application and maintained to be implemented under this application. The impact will be further mitigated by the distance to the development from this location. Any views of the building would be of the flues and upper section of the building in the southern section of the development. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. This visual impact would reduce over time as the trees on the berms mature. With this considered the impact of the proposals on the view from this location would be considered ***negative, not significant*** and ***long-term*** in duration.

View 5 – From the R120 public road in the proximity of a cluster of residences to the north-west

Existing view

11.57 The eastern edge of the subject lands is 17m from this view location and the closest point of the proposed buildings is 245m from this view location. This view is an expansive view over the mainly flat agricultural landscape to the east of the R120. There are no prominent features other than the small hedgerows and trees crisscrossing the landscape. The expansive nature of this view is temporary, and the roadside vegetation has been cleared as part of the R120 upgrade works. This will be re-established over the next few seasons.

Visual impact of Proposed Development during construction

11.58 The Proposed Development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible from this location. Some of the visual elements associated with the building process will result in a visual intrusion into this view and will alter the visual ridgeline. However, the magnitude of this impact will also be mitigated due to the construction works being located close to recently constructed large buildings and public road works where similar construction activities were recently part of the visual landscape. The construction process will be mostly screened from view by the earth berms and woodland tree planting installed as part of the permitted development on these lands. The impact of the proposals during construction on the view from this location would be considered ***negative***, ***slight*** in magnitude, and ***temporary*** in duration.

Visual impact of Proposed Development during operation

11.59 The Proposed Development will not result in any visual impact on this view during its operational phase. The building and associated development will be completely screened from view by the permitted development and vegetation, and proposed earth berms and woodland planting.

View 6 – From the R120 to the north across fields adjoining the southern boundary of the application site.

Existing view

11.60 The southern edge of the subject lands is 482m from this view location and the closest point of the proposed buildings is 555m from this view location. There are no views of value in this vicinity. The recently upgraded R120, boundary walls and large buildings in the Grange Castle Business Park are prominent features of the view. The subject lands are not visible form this location.

Visual impact of Proposed Development during construction

11.61 The Proposed Development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible from this location. Some of the visual elements associated with the building process will result in a visual intrusion into this view and will alter the visual ridgeline. However, the magnitude of this impact will be greatly reduced due to the significant screening provided by existing and proposed earthworks and vegetation. The impact will be further mitigated by the distance to the contraction activities from this location. The impact of the proposals during construction on the view from this location would be considered negative, however not significant in magnitude, and temporary in duration.

Visual impact of Proposed Development during operation

11.62 The nature of the Proposed Development will result in a slight alteration to the existing view. The photomontage (View 6 Proposed in the Photomontage document by Digital Dimension Ltd. in Appendix 11.2) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed buildings are screened from view by the earth berms and tree planting within the site, as permitted in the previous application and as proposed in this application. The impact will be further mitigated by the distance to the development from this location. Any views of the building would be of the flues in the southern section of the development. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. This visual impact would reduce over time as the trees on the berms mature. With this considered the impact of the proposals on the view from this location would be considered negative, not significant and long-term in duration.

View 7 – From the R120 public road towards the west

Existing view

11.63 The eastern edge of the subject lands is 10m from this view location and the closest point of the proposed buildings is 270m from this view location. This view is an expansive view over the mainly flat agricultural landscape to the east of the R120. There are no prominent features other than a group of hedgerow trees in the foreground. The expansive nature of this view is temporary, and the roadside vegetation has been cleared as part of the R120 upgrade works. This will be re-established over the next few seasons.

Visual impact of Proposed Development during construction

11.64 The Proposed Development will not result in a noticeable visual impact on this view during construction. The construction process, machinery, storage of materials, built structures will be screened from view by the previously permitted development and associated earth berms and trees.

Visual impact of Proposed Development during operation

11.65 The nature of the Proposed Development will not result in a noticeable visual impact on this view during the operational phase. The development will be screened from view by the previously permitted development and associated earth berms and trees.

'Do nothing' scenario

11.66 In the event of this scenario the lands would continue to be left in the 'transition state' as it is currently, for a period. Without proper management of the landscape it would go into decline as the field reverts to scrub areas. As the area has a specific zoning for development it is likely that the site would be developed in the future in a similar scale and type as is currently proposed.

Monitoring

11.67 Contracts will ensure good working practices to reduce any negative impacts arising from construction to the lowest possible level and to ensure that all machinery operates within clearly defined construction areas. Storage areas will be located to avoid impacting on sensitive views, trees, hedgerows, drainage patterns etc. and such areas will be fully re-instated prior to, and at the end of the construction contract. The works will also have continuous monitoring so as to ensure adequate protection of areas outside of the construction works.

Reinstatement

11.68 On completion of sections of the proposed scheme, side slopes including cuttings and embankments, verges and other soft areas will be prepared for soil, top-soiled and planted using appropriate native tree and hedgerow species.

12. TRAFFIC AND TRANSPORTION

12.1 This chapter of the EIAR assesses the likely effects of the Proposed Development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the Proposed Development. This Chapter of the EIAR has been prepared by Ronan Kearns, BA, BAI, MSc, MBA, CEng MIEI, Chartered Engineer of Pinnacle Consulting.

12.2 The chapter describes: the methodology; the receiving environment at the application site and surroundings; the characteristics of the proposal in terms of physical infrastructure; the potential impact that proposals of this kind would be likely to produce; the predicted impact of the proposal examining the effects of the Proposed Development on the local road network; and the remedial or reductive measures required to prevent, reduce or offset any significant adverse effects.

12.3 The rationale for the car parking strategy refer to the Traffic and Transport Assessment and as set out under Chapter 2 of this EIA Report.

Methodology

12.4 The approach to this assessment accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. The following methodology has been adopted for this assessment:

- Environmental Protection Agency (EPA) Guidelines on the information to be contained in the EIAR;
- Transport Infrastructure Ireland (TII) (Formerly National Roads Authority) Traffic and Transportation Assessment Guidelines.
- Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority;
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003);
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation;
- The Traffic Management Guidelines;
- Guidance on Transport Assessment;
- Design Manual for Urban Road and Streets;
- South Dublin County Development Plan 2016 - 2022;
- GDA Cycle Network Plan - National Transport Authority;
- Review of relevant available information including where available Development Plans, existing traffic information and other relevant studies;
- Site visit to gain an understanding of the site access and observe the existing traffic situation;
- Consultations with South Dublin County Council (SDCC) Roads Department to agree the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application;
- Detailed estimation of the transport demand that will be generated by the development. The morning and evening peak times will be addressed as well as an estimation of the construction stage traffic; and
- Assessment of the percentage impact of traffic on local junctions, car parking requirements and accessibility of the site by sustainable modes including walking, cycling and public transport.

Receiving environment

12.5 This section considers the baseline conditions, providing background information for the site in order to determine the significance of any traffic implications. This section also considers the existing accessibility of the site by sustainable modes of transport.

Site location

12.6 The application site is located within South Dublin County Council approximately 13km west of Dublin City Centre, and around 4km west of Clondalkin Village, immediately south of the Grand Canal. The site is adjacent and to the west of the Grange Castle Business Park and is bounded to the north by planting and the Grand Canal; the R120 to the east; agricultural land to the south and west. The location of the site is shown on the map extract at Figure 12.1 below. The site is 22.1ha. in area.

Figure 12.1 Site Location (Source: Google Maps)

Local road network

12.7 The application site is accessed via the recently realigned R120 to the west of the Grange Castle Business Park. The R120 links with Adamstown to the north; and with the internal Grange Castle road network, and Newcastle, to the south. The realigned R120 contains a shared 3m wide footpath and cycle path on either side of the single lane carriageway. There are two closed off agricultural entrances from the R120 into the site. A local access also serves the dwelling outside and to the north-east of the site adjacent to the canal.

12.8 The recently aligned new lighted junction between the R120 and the realigned R134 that connects to the R136 along the southern boundary of the original Business Park is located c.370m south of the south-east corner of the site. Both the R134 and R136 are also bounded either side by cycle and footpaths.

12.9 The existing Edgeconnex site to the east of the application site is accessed through the Grange Castle Business Park via a roundabout junction on the R136 Grange Castle Road; and from the R134 (Nangor Road). There was previously access to the site off R120 but this has now been closed with the exception of facilitating local access to the property to the immediate south of this former access. The site location and local road network are shown on Figure 13.1 below.

12.10 The R136 forms a grade separated junction with the N4 approximately 3km north of its roundabout junction with Grange Castle Business Park, as well as the N7 approximately 3km to the south. The site is also well served by the R120 and R134 regional roads, forming the primary routes from Grange Castle to Adamstown and Clondalkin respectively.

12.11 The M50 is located approximately 5km to the east of the site, and forms an orbital motorway ring road around Dublin. The M50 is intersected by the principal radial routes, including the N4 at Junction 7, and the N7 at Junction 9, also known as the Red Cow Interchange. It is concluded that the site is strategically situated to facilitate trips by vehicle, with road infrastructure in place and built to a high standard.

Figure 12.2 Site location and local road network (Source: Google Earth)

Baseline traffic data

12.12 The Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is complete. The Adamstown Road (R120) and Nangor Road (R134) Improvement was designed to take into account the predicted level of traffic based on local land use zoning. It is, therefore, reasonable to conclude that the Proposed Development, as permitted under the site-specific zoning, would be accommodated on the Adamstown Road (R120) and Nangor Road (R134) with acceptable levels of delay and congestion. Covid 19 restrictions have affected local traffic flows as school and non-essential business are shut and people work from home. Therefore, no new traffic surveys have been carried out as part of this assessment.

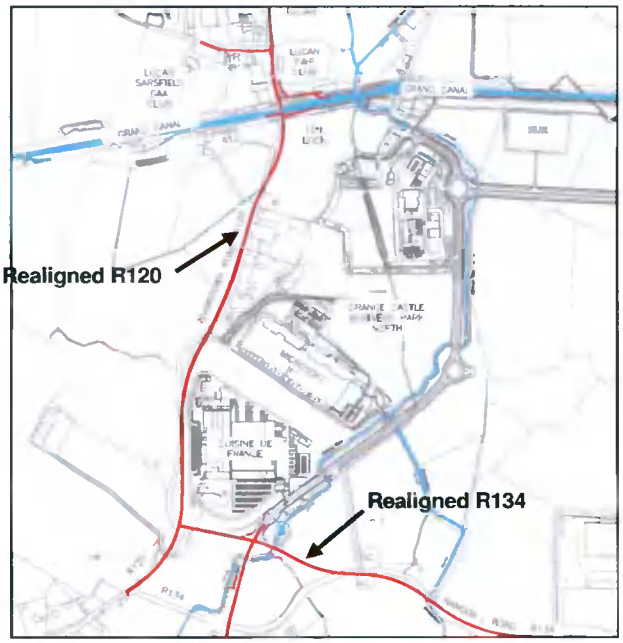

Figure 12.3 Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme (Source: SDCC)

Pedestrian and cycling facilities

12.13 The realignment of the R120 created cycle paths on either side of the road that will connect into other cycle paths along the realigned R134. A planning application was recently approved in 2019 to the north of the canal to the immediate north of the site by South Dublin County Council that will enable the extension of the greenway to the west of the lock and bridge to Hazelhatch (Ref.SD188/0011).

12.14 This pedestrian and cycle route provides an 8.5km off-road route from 12th Lock, Newcastle Road to Davitt Road, Inchicore. The route also links north to Adamstown and Lucan, via a walking and cycling bridge over the Grand Canal. The route can be accessed from the R136, approximately 1km from the site. In addition, pedestrian and cycleways are available on all internal roads within Grange Castle Business Park, and along the R136.

Proposed cycle improvements

12.15 Under the National Transport Authority's Cycle Network Plan for the Greater Dublin, the Dublin South West Sector extends outward from the twin corridors of Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham. There is considerable overlap between the West and South West sectors, with interconnecting routes between the two.

12.16 In accordance with the National Transport Authority's Cycle Network Plan for the Greater Dublin area the following improvements to the local cycle networks are proposed:

- Route 7C: Camac River Greenway branch from the Grand Canal through Clondalkin Village to Corkagh Park and City West;
- Route 8A follows Crumlin Road past the Children's Hospital, Bunting Road to Walkinstown, through Ballymount to cross the M50 at Junction 10 and out to Citywest / Fortunestown via Belgard;
- Route 9C is an alternative to the Harold's Cross route from Route 8C at Clogher Road via Stannaway Road west of Kimmage and then along Wellington Lane to join Route 9A at Spawell to connect to Tallaght. It also provides a continuation from Route 9A west of Tallaght via Fortunestown and Citywest to Saggart;
- Route 9D would provide a traffic-free option branching off Route 9A at Kimmage Cross Roads and following the River Poddle Greenway to Tymon Park where a new bridge is required over the M50 in the centre of the park to connect with Castletymon Road and rejoin Route 9A. West of Tallaght it provides a loop through Jobstown along the N81 and then northward into Citywest;
- The Dublin South West Sector extends outward from the twin corridors of Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham. There is considerable overlap between the West and South West sectors, with interconnecting routes between the two. Some radial cycle routes originate in one sector at the city centre but end up in the neighbouring sector.
- Orbital Route SO6 (Dun Laoghaire to Tallaght via Ballycullen and Old Bawn) is part of the Orbital Routes in the Dublin South West Central Sector. There are six orbital routes proposed under the National Transport Authority's Cycle Network Plan for the Greater Dublin area in the Dublin West South Central Sector providing cross-links between the radial routes and give access to destinations such as Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham within this sector.

12.17 The proposed cycle routes are illustrated in Figure 12.4 below.

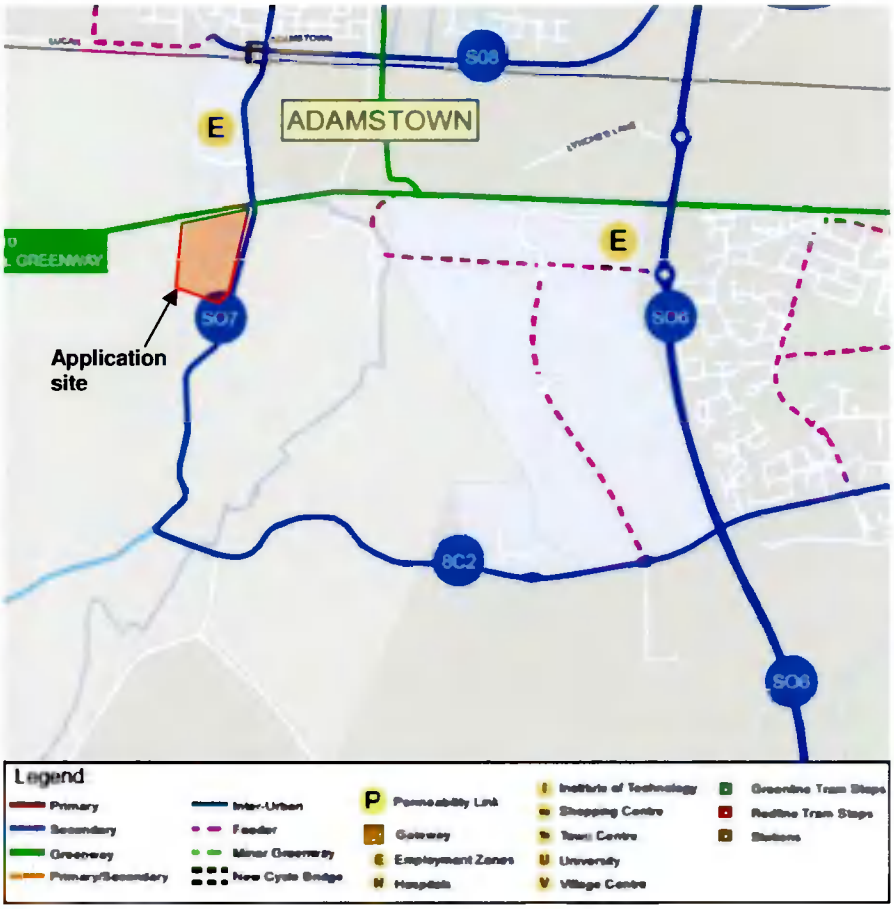

Figure 12.4 Proposed cycle routes (Source: NTA)

Public transport accessibility

Bus

12.18 The application site is not currently well served by buses. The nearest stop along the New Nangor Road (R134 are on route no. 68 that connects Newcastle with the city centre. These stops are some 700m to the south of the application site. The bus stops within the Grange Castle Business Park, such as those serving the no. 13 and 151 buses also have the ability to serve the site and contain stops within Grange Castle Business Park. The following table illustrates that there are regular services on all days which route to the existing bus stops on routes 13, 151 and 68. Table 12.4 illustrates local bus routes serving the area.

Table 12.1 Local Bus Routes

No.	Route	Service		Mon-Fri	Sat	Sun
13	Harristown – Dublin City Centre – Clondalkin Village – Grange Castle	Harristown	First	05:30	06:05	08:00
			Last	23:15	23:15	23:30
		Grange Castle	First	06:00	06:00	08:00
			Last	23:30	23:30	23:30
		Frequency		15min	15min	15min
151	Docklands – Dublin City Centre – Clondalkin – Grange Castle Business Park – Lucan	Docklands	First	06:30	07:10	08:30
			Last	23:20	23:20	23:20
		Grange Castle	First	06:00	06:30	07:30
			Last	23:30	23:30	23:30
		Frequency		20min	20min	30min
68	Newcastle / Greenogue Business Park - Cherrywood Villas - Clondalkin Village - Bulfin Rd. - Camden St. - Hawkins St.	Newcastle	First	06:25	06:40	09:15
			Last	23:30	23:30	23:30
		Hawkins St	First	06:25	06:40	10:10
			Last	22:30	23:30	00:00
		Frequency		60min	70 min	115m

12.19 Dedicated bus lanes are provided in both directions on the R136 Outer Ring Road and the R134 Nangor Road east of the Grange Castle Business Park roundabout. These routes are part of Dublin's Quality Bus Corridor (QBC) network.

Rail

12.20 The nearest stations are Adamstown, approximately 2.4km to the north-west of the site and Clondalkin-Fonthill approximately 6km to the north-east of the site. These stations are served by around 20 suburban commuter trains in each direction during weekdays.

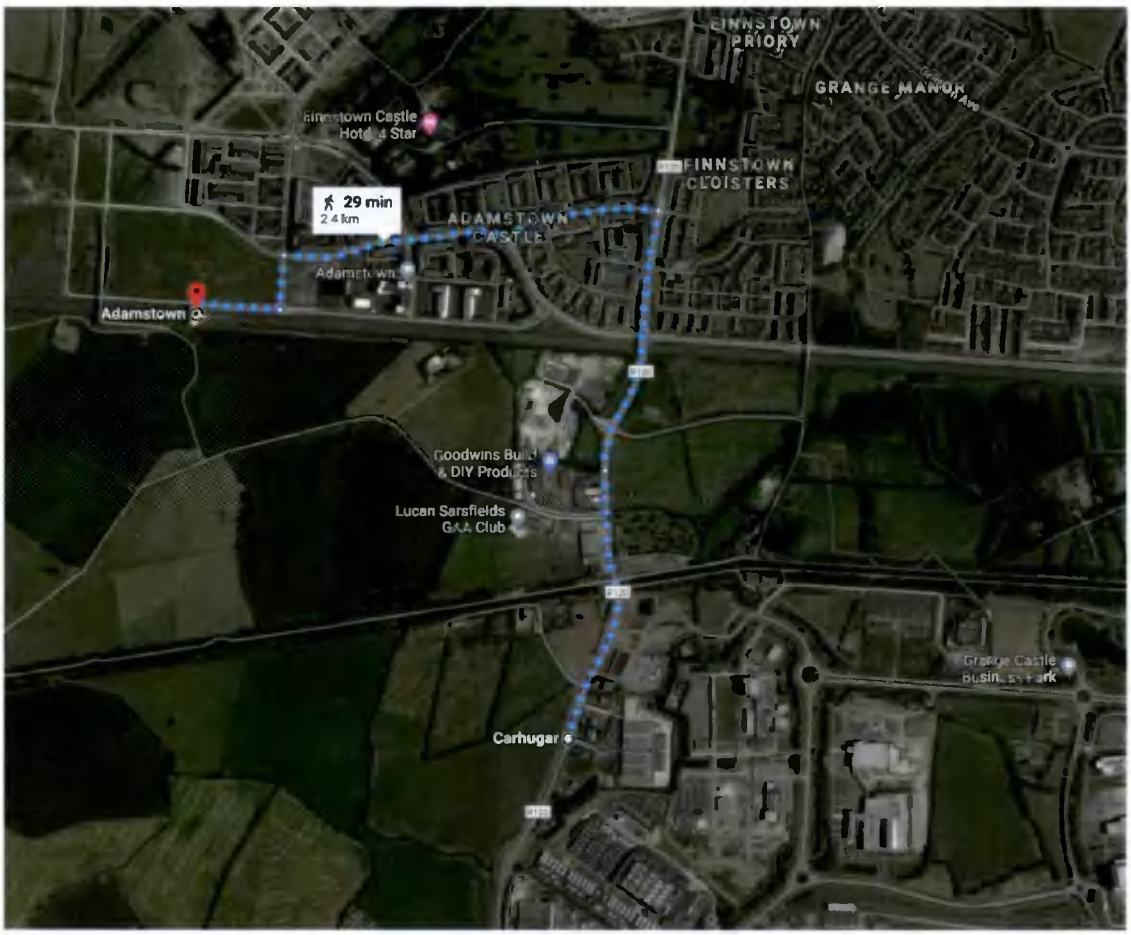

Figure 12.5 Route to Adamstown Rail Station (Source: Google Earth)

Characteristics of the Proposed Development

12.21 The proposal will utilise the permitted access into the site off the R120 to the east of the site and seeks permission for two data centres of 12,797sqm that will also include a goods receiving area and offices of 2,404sqm. The data centres will be served by 39 car parking spaces of which 2 no. spaces will be disabled spaces. It is intended that 4 of these spaces will be provided for electrical charging vehicles. The data centre and associated elements will require a slight adjustment to the landscaping along the western boundary.

12.22 The application will also include the construction of a gas powered generation plant in the form of three single storey buildings with a gross floor area of 9,000sqm that will contain 61 gas generators within all of the buildings with associated flues that will be 25m in height, and grouped in pairs.

12.23 A full description of the Proposed Development is set out within Chapter 2 of the EIA Report.

Physical infrastructure

12.24 The proposed access into the site will be off the eastern side of the site as permitted under South Dublin County Council Reg. Ref SD19A/0042 / An Bord Pleanála Reg. Ref. PL06S.305948. The permitted vehicular access will serve as the sole vehicular access into the site both for this and future applications and will result in the closure of the vehicular access to the abandoned farm buildings that sits some 180m to the north.

12.25 The permitted access will provide access initially for construction traffic and car parking within the construction compound to the immediate north of the permitted entrance off the R120, and in the longer term to facilitate employees accessing the permitted and Proposed Development. Refer to the Outline Construction Traffic Management Plan for the construction related proposals.

12.26 The proposed extension of the already permitted internal access road will create a loop around the data centres and generators and will also provide service access to the three Power Plants. All other internal access roads will remain as permitted with a minor change that will remove the service access to the north of the permitted data centres.

12.27 The application will also include a revision to the security gates from that of the permitted development. The revised security gates will provide independent security gates to both the permitted development, as well as both elements of the Proposed Development. The revised location are set further into the site and therefore offer no potential for queuing onto the public road. It is proposed to provide 39 car parking including four EV charging points and 2 no. disabled car parking spaces on site for all employee and visitor parking requirements under both phases of development. Provision for covered cycle parking will also be made to the immediate north of the proposed car parking spaces.

12.28 Provision will also be made for a HGV turning area in order to allow HGV's to make deliveries to the site in a safe and efficient manner and exit the site in a forward gear.

Servicing

12.29 An AutoTrack analysis has been carried on the internal service access roads to demonstrate its capability to cater for staff, visitors and service vehicles such as delivery vans. The results of this analysis show that the Proposed Development can accommodate the anticipated service vehicles that will serve the Proposed Development.

Trip generation – Including Cumulative Assessment

12.30 In order to understand the expected trip generation of the data centre assumptions have been made on the level of staff associated with the Proposed Development, based on information provided by EdgeConnex. Appropriate estimates have been made, where necessary, in order to provide a robust analysis of the impact of traffic associated with the Proposed Development on the local road network.

12.31 The site will employ 100 people working in 3 shifts as follows:

- 08:00-16:00 - 40 Employees
- 16:00-00:00 - 40 Employees
- 00:00 – 08:00 – 20 Employees

12.32 The proposed peak hour trip rates are shown in Table 12.2 below.

Table 12.2 Predicted staffing requirements for Proposed Development

Weekday Trip Generation	AM Peak (08:00 – 09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Staff	40	20	0	0
Two Way Trips	60		0	

Traffic generation

12.33 Due to the shift patterns of the site, the AM Peak hour will have 40 arrivals and 20 departures resulting in a total of 60 two-way trips. The shift change occurs at 16:00 which would be outside the traditional PM Peak between 17:00 and 18:00. It is therefore assumed that the development will have no impact on the PM Peak. Additionally, it is assumed that all staff will travel by car, with an occupancy rate of 1 per vehicle. Again, this is unlikely in reality, but will provide a robust assessment.

12.34 A small number of deliveries such as post, couriers, IT equipment and general office supplies will be required during the operational phase of the Proposed Development. It is assumed that this will occur throughout the day with negligible impact on the respective peaks as these will be diverted and/or pass by trips. Whilst provision would be made for customer service staff at the proposed data centre, this service will be undertaken via telephone / remote IT support, without the need for regular visitors to the site. It is therefore assumed that no visitors will require access to the site in the AM or PM peak hours.

12.35 Table 12.3 below indicates that the overall EdgeConnex development is forecast to generate 60 two-way vehicular trips in the AM peak hour and 0 in the PM peak hour. This is not a significant level of traffic and equates to just over one vehicle movement approximately every minute or so in each of the peak hours.'

Table 12.3 Predicted trip rates for Proposed Development

	AM Peak Hour (08:00 - 09:00)			PM Peak Hour (17:00 - 18:00)		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
Staff	40	20	60	0	0	0

Potential impact of the Proposed Development

Construction phase

12.36 The likely impact of the construction works will be short-term in nature. The number of staff on site will fluctuate over the implementation of the subject scheme. Nevertheless, based upon the experience of similar projects and estimation has been made on the construction impact. At the peak of construction, it is anticipated that there will be a requirement for approximately c.150 construction workers, which with an allowance for shared journeys could equate to a maximum of around 100 arrivals and departures per day. This will vary over the lifetime of the project.

12.37 Where possible, construction workers will use shared transport. On-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 16:00. A number of the construction traffic movements will be undertaken by heavy goods vehicles.

12.38 The site is excepted to generate c. 16,200m^3 of topsoil that, subject to the suitability for it to be used elsewhere i.e. the construction of berms on site and other landscaping features. In addition to the removal of topsoil, a 3d terrain model has been generated to optimise the site levels. Where possible, the model seeks to balance the amount of cut and fill required on site.

12.39 This is expected to take up to 2 months to complete. This equates to, on average, 5 soil removal related trips per day/10 2 two-way trips or 195 HGV trips over the 2-month period. The actual number of soil related HGV movements is expected to be lower as alternative uses is found for the soil i.e., landscaping, berm formation and used on other phases of the development. It is anticipated that the development will create c. 3,750 tonnes of demolition and construction waste.

12.40 A large builder's skip has an estimated capacity of eight cubic yards/8tonnes. Therefore, over the lifetime of the development there will be c. 470 trips related to the removal of demolition and construction waste.

12.41 Whilst it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the removal of demolition and construction waste, based on experience of similar sites it is considered that the number of construction related heavy goods vehicle movements to and from the application site will be on average 2 arrivals/departures per day over a 2 year construction period.

12.42 For Site Clearance/Proposed Material Deliveries Storage Yard/Site Compound it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the construction activities, based on experience of similar sites it is considered that the number of construction related heavy goods vehicle movements to and from the application site will be approximately 10 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

12.43 The following phasing will apply to the development:

- Application for planning permission – Q1 2021;
- Commence site construction works for the proposed data centres (subject to grant of planning permission) – Q4, 2021;
- Complete construction works of Data Centre – Q2, 2023;
- Commence site construction works for Power Plant 1 (subject to grant of planning permission) – Q4, 2021;
- Complete construction works of Power Plant 1 – Q2, 2022;
- Commence site construction works for Power Plant 2 (subject to grant of planning permission) – Q3, 2022;
- Complete construction works of Power Plant 2 – Q1, 2023;
- Commence site construction works for Power Plant 3 (subject to grant of planning permission) – Q4, 2024; and
- Complete construction works of Power Plant 3 – Q2, 2025.

12.44 Materials such as steel and concrete required in the construction of the Proposed Development are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the Proposed Development. Accordingly, a temporary construction material storage yard will be the source destination from which construction traffic, particularly for steel deliveries, will be generated.

12.45 Vehicles will access the road network to/from the construction site using the R120 via the M50. Return trips will be via the same route. The construction traffic impacts of the Proposed Development are dependent on the capacity of the local road network to facilitate access to the development by HGV's and heavy construction machinery associated with the construction phase. The ability to accommodate temporary parking for contractors and storage of materials on site is another key consideration. The road marshal appointed will be responsible to ensure that there is no disruption to traffic or pedestrians and that roadways and paths are kept clean and free of debris

12.46 The potential impact during the construction phase with all the above considered would have a short-term effect on the surrounding road network, however, with the measures outlined in the Construction Traffic Management Plan, this will have imperceptible effect on the R120 and along the remainder of the haul route. A description of the haulage routes are offered below:

From M50 to Development ~ 9 km, 10 minutes
Take Exit 6 of M50, Redcow -> Continue onto N7 -> Continue straight onto Naas Rd/N7 -> At junction 2, take the R136 exit to Grange Castle/Kingswood -> At the roundabout, take the 3rd exit onto R136 -> At the roundabout, take the 2nd exit and stay on R136 -> At the roundabout, take the 2nd exit and stay on R136 -> Turn left onto New Nangor Road/R134 -> Turn right onto R120 and enter site.

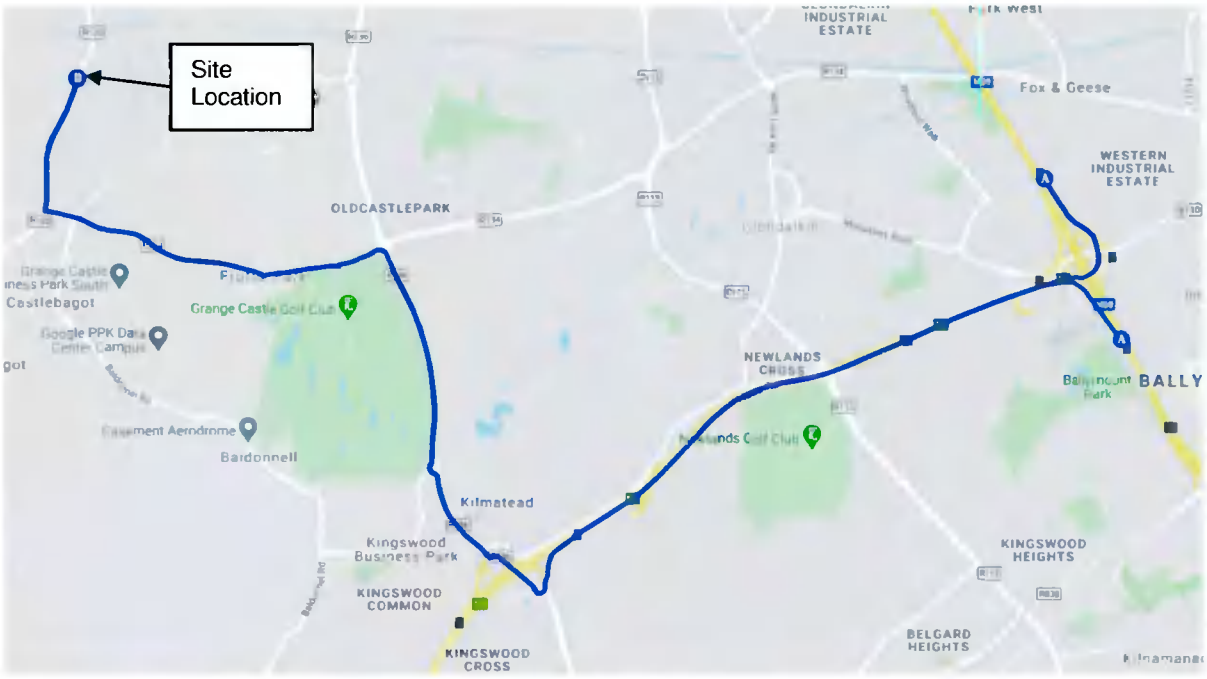

Figure 12.6 Haul route to site from M50

From Development to M50 ~ 9 km, 10 minutes
Starting at R120, Apartment 7, Head south on R120 toward New Nangor Road/R134 -> Turn left onto New Nangor Road/R134 -> Turn right onto R136 -> At the roundabout, take the 2nd exit and stay on R136 -> At the roundabout, take the 3rd exit onto the N7 ramp to Dublin ->Merge onto Naas Rd/N7 ->Keep right to stay on Naas Rd/N7Continue to follow N7 -> Merge onto M50

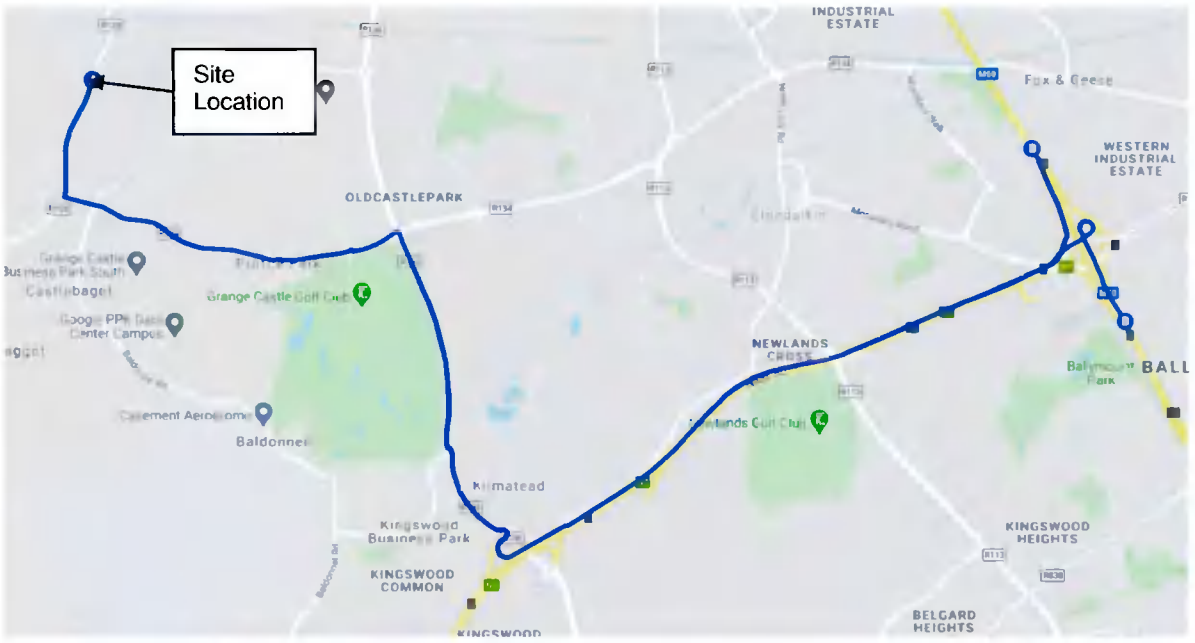

Figure 12.7 Haul route from site to M50

12.47 Arrivals and departures to the site compound are to be carried out in as few vehicle movements as possible in order to minimise potential impacts on the road network.

Operational phase

Traffic capacity

12.48 The existing background traffic flows and predicted operational phase vehicular trip generation have been set out in earlier sections of this chapter. Table 12.4 below indicates the percentage impact of the additional traffic upgraded Adamstown Road (R120).

Table 12.4 Adamstown Road (R120) – percentage impact of data centre traffic on the new R120

Condition	No. of Two-Way Trips	Percentage Impact
Base Flow	2,879	-
Current Application (AM Peak Flow)	60	2.1%

12.49 The impact of traffic associated with the proposed overall development is approximately 2.1% of the estimated flow for the upgraded Adamstown Road (R120). As the traffic dissipates throughout the network this impact will lessen on adjoining roads/junctions. These criteria are widely considered to be best practice in determining the scope for road capacity impacts.

12.50 In relation to the capacity of the road network, and increases in the number of vehicles using the network, the National Roads Authority (NRA) suggests the following thresholds for Traffic and Transport Assessments:

- traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.
- traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive.
- industrial development in excess of 5,000m2
- distribution and warehousing in excess of 10,000m2
- 100 trips in / out combined in the peak hours for the Proposed Development

12.51 These criteria are widely considered to be best practice in determining the scope for road capacity impacts.

12.52 At a maximum of 60 two-way trips in each of the peak hours for the overall development, the Proposed Development has a traffic generation less than the first criterion of 10% set out above. Additionally, the Proposed Development is forecast to have a maximum percentage impact of around 2.1% at junctions in the vicinity of R120 and R136, which is again less than the criteria set out by TII. As a result, it is not considered necessary to undertake any further junction assessment.

Car parking provision

12.53 Provision is made for 39 car parking spaces. This level of parking is sufficient for all employee and visitor parking requirements. Provision for cycle parking will also be made.

Walking, cycling and public transport

12.54 As set out earlier, the Proposed Development will provide suitable infrastructure to ensure the data centre is accessible by sustainable modes including walking and cycling. Additionally, the existing provision of public transport services at Grange Castle Business Park and the Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is sufficient to make this mode a viable alternative for future staff at the EdgeConnex data centre.

Walking and cycling infrastructure

12.55 It is also necessary to ensure that the proposal incorporates appropriate access facilities for pedestrians, cyclists and public transport users in order to facilitate trips by these modes.

"Do-nothing" scenario

12.56 Should the Proposed Development not take place, the access roads and infrastructure will remain in their current state and there will be no change. Background traffic would be expected to grow over time. Given the location and zoning of the subject site, it is reasonable to assume that a similar

development, with a potentially more intensive requirement for vehicular trips would be established on this site at some stage in the future.

Remedial and mitigation measures

Construction phase

12.57 The Construction Management Plan prepared by Winthrop that forms a stand-alone document under this application incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the Proposed Developments on-site construction activities. To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases. This will coincide with the overall site access/
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

12.58 All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff;
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

12.59 It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

12.60 A Construction Traffic Management Plan (CTMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the Proposed Development on the safety and amenity of other users of the public road.

Operational phase

12.61 The Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme provides suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that staff at the data centre are made aware of potential alternatives including information on walking, cycle routes and public transport.

12.62 The local area provides suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that staff and visitors of the Proposed Development are made aware of potential alternatives including information on walking, cycle routes and public transport.

12.63 A number of walking and cycling connection points are proposed within the development. These connection points will provide access for pedestrians and cyclists onto the R120. These facilities will provide attractive, convenient and safe routes for staff & visitors. Therefore, there are good links proposed for staff to travel by more sustainable modes.

12.64 It is proposed to provide car parking that will meet the expected-on site demand. The marketing of new pedestrian & cyclists routes along with public transport information will further reinforce the efforts been made towards a modal shift away from car-based trips.

12.65 Staff will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made upon opening of the Proposed Development, as this represents the best opportunity to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the Proposed Development, thus providing mitigation against the already minimal traffic and transport effects of the development.

Predicted impact of the Proposed Development

12.66 When considering a development of this nature, the potential traffic impact on the surrounding area must be considered for each of two stages; the construction phase and operational phase. These two distinct stages are considered separately within this section.

Construction phase

12.67 All construction activities will be governed by the Construction Traffic Management Plan (CTMP), and an outline CTMP is included with this application and the details of which will be agreed with the local authority prior to commencement of construction on site.

12.68 An outline CTMP has been prepared as part of this application. This document addresses a number of potential issues including the working hours of site staff, the traffic management for the site, the waste management, noise and vibration impacts as well as other issues to be addressed.

12.69 The outline CTMP provides the content of the final Construction Traffic Management Plan (CTMP) which shall be prepared by the appointed main contactor prior to construction of the Proposed Development. It shall be a requirement of the contract that, prior to construction, the appointed contractor shall liaise with the relevant authorities including the Transport Infrastructure Ireland (TII), Local Authorities and Emergency Services for the purpose of finalising the CTMP, which will encompass all aspects of this outline Construction Traffic Management Plan.

12.70 The CTMP shall be termed a 'Live Document', such that any changes to construction programme or operations can be incorporated into the CTMP.

12.71 The contractor will be contractually required to ensure that the elements of this outline CTMP shall be incorporated into the final CTMP. The contractor shall also agree and implement monitoring measures to confirm the effectiveness of the mitigation measures outlined in the CTMP. On finalisation of the CTMP, the contractor shall adopt the plan and associated monitoring measures. The final CTMP shall address the following issues (including all aspects identified in this outline CTMP):

- Site Access & Egress;
- Traffic Management Signage;
- Routing of Construction Traffic / Road Closures;
- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning;
- Road Condition;
- Road Closures;

- Enforcement of Construction Traffic Management Plan
- Details of Working Hours and Days;
- Details of Emergency plan;
- Communication;
- Construction Methodologies; and
- Particular Construction Impacts

12.72 A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

12.73 Whilst it is not possible at this stage to accurately identify the day to day traffic movements associated with the construction activities, based on experience of similar sites it is considered that the number of construction related heavy goods vehicle movements to and from the application site will be approximately 15 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

12.74 Similarly, the general workforce is unlikely to exceed approximately 200 (150 on average) in number, which with an allowance for shared journeys could equate to a maximum of around 120-150 arrivals and departures per day. A construction car park for workers immediately adjacent to the new access from Grange Castle Business Park will be created on the start of works by the laying of a temporary surface for vehicles. This number of construction vehicle movements is considered to be relatively low compared to the wider road network. It should be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours, and it is not considered this level of traffic would result in any operational problems.

12.75 Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have a negligible impact on pedestrian and cycle infrastructure.

Monitoring

12.76 During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices,
- Compliance with construction vehicle parking practices,
- Internal and External road conditions,
- Timings of construction activities.

Reinstatement

12.77 Not applicable in respect of traffic and transport.

Cumulative Impacts

12.78 Cumulative impacts have been assessed in relation to the existing and permitted developments and traffic schemes. The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area. A desktop study was conducted of planning applications in the vicinity of the subject development on the SDCC planning database to assess any cumulative impacts from granted or committed applications close to the subject scheme.

12.79 The first phase of the development of these lands under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 include the following:

Phase 1 A – expected time duration from commencement 12-14 months

- 1 no. pair of single storey data halls (each 3,500sqm) with roof plant and stand-by generators. Generators to be located to the west of the data halls with the overall development to be built to the south-east of the overall site;
- Single storey goods receiving area and store and single storey office area located to the north-east of the data halls;

- Temporary gas generator farm with 15 generators (13 operating and 2 standby) to be located to the west of the proposed data centre in lieu of the ESB sub-station when it comes online;
- Attenuation pond within the RU zoned to the north; and
- 110MW ESB sub-station and transformer compound.

Phase 1 B – expected to commence 1-2years time following completion of phase 1A and to take 8-10 months

- 1 no. pair of single storey data halls (each 3,500sqm) with roof plant and stand-by generators to be located to the immediate north of the Phase 1 development. Generators to be located to the west of the data halls;
- Temporary gas generator farm with 4 generators (all operating) to be located to the west of the temporary generators permitted under Phase 1 to be removed in circa. 2021-22 when ESB infrastructure is upgraded (now extended further); and
- Single storey goods receiving area and store and single storey office area located to the north-east of the data halls.

12.80 The permitted level of traffic of Phase 1 is illustrated in the table below.

Table 12.5 Predicted trip rates for Proposed Development

	AM Peak Hour (08:00 - 09:00)			PM Peak Hour (17:00 - 18:00)		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
Staff	40	20	60	0	0	0

12.81 The cumulative trip generation for Phase 1 (as permitted under South Dublin County Council Reg. Ref SD19A/0042 / An Bord Pleanála Reg. Ref. PL06S.305948) and the proposed scheme is shown in Table 12.6.

Table 12.6 Predicted trip rates for Proposed Development

Condition	**No. of Two-Way Trips**	**Percentage Impact**
Base Flow	2,772	-
Phase 1 (AM Peak Flow)	77	2.8%
Updated Base Flow	2,879	-
Current Application (AM Peak Flow)	60	2.1%

12.82 A theoretical estimation of the design capacity of the road, based on DMRB TA 79/99 has been calculated. DMRB TA 75/99 analysed traffic flows to assess the capacities that can be achieved for different road types and widths. From this information the main features that affect capacity have been defined and the results presented in tabular form.

12.83 Under DMRB TA 75/99 the Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is classified as a UAP1 i.e. a high standard single/dual carriageway carrying predominantly through traffic with limited access. With a road width of 7.5m, the Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme has an estimated AADT capacity of 2,772. The trips generated by the Proposed Development represent 2.1% of the estimated AADT.

13. CULTURAL HERITAGE

13.1 The following report was prepared by CRDS Ltd. on behalf of EdgeConneX Limited. It assesses the archaeological, architectural and cultural heritage impacts of a proposed data centre development (DUB05) on lands in the townland of Ballymakaily, Dublin 22. The site is located on the west side of the R120 road, to the west of Grange Castle Business Park and to the south of the Grand Canal.

Methodology

13.2 For the purpose of setting the site within its wider archaeological, architectural and cultural heritage landscape, a desk-based assessment utilising sources including the Record of Monuments and Places, the National Museum of Ireland topographical files, the database of licensed excavations, the Record of Protected Structures included in the South Dublin County Council Development Plan 2016-2022, the National Inventory of Architectural Heritage, documentary and cartographic sources was undertaken. The desk-based assessment was supplemented by a full site survey, a geophysical survey undertaken by Joanna Leigh of JML Surveys in December 2018 (Licence No. 18R0257), archaeological testing and excavation undertaken by AMS Ltd in 2019 (License No. 19E0038).

Recorded Archaeological Monuments and Places

13.3 The Record of Monuments and Places was consulted for the relevant parts of the county. This is a list of archaeological sites known to the National Monuments Service (see www.archaeology.ie). The relevant files for these sites contain details of documentary sources and aerial photographs, early maps, OS memoirs, OPW Archaeological Survey notes and other relevant publications. The list of National Monuments in State Ownership or State Guardianship, the Register of Historic Monuments, the Sites and Monuments Record and monuments covered by Preservations Orders were also assessed. All sites within c. 1km of the development were identified and are listed in Appendix 13.1 (see Figure 1, Appendix 13.5 for locations).

Recorded archaeological finds

13.4 The topographical files in the National Museum of Ireland were consulted to determine if any archaeological artefacts had been recorded from the area. This is the national archive of all known finds recorded by the National Museum. It relates primarily to artefacts but also includes references to monuments and has a unique archive of records of previous excavations. Other published catalogues of prehistoric material were also studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) and the Irish Stone Axe Project Database (School of Archaeology, U.C.D.). Finds from townlands in the study area are listed in Appendix 13.2.

Previous excavations

13.5 The Excavations bulletin website (www.excavations.ie) was consulted to identify excavations that may have been carried out within or in the vicinity of the development. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2018. The study area has been subject to a number of licensed excavations during the development of the Grange Castle Business Park and during improvements to the R120 Adamstown Road and summaries of these are listed in Appendix 13.3.

Cartographic sources

13.6 Reference to cartographic sources provides information on the development of the area. Manuscript maps consulted included the Down Survey Barony map of Newcastle and Uppercross, c. 1656 (see Figure 2, Appendix 13.5), Rocque's map of 1760 and Taylor's map of Dublin 1816. Ordnance Survey maps consulted included 6" maps, first and later editions and the Ordnance Survey 25" maps. On the 1st edition Ordnance Survey 6" map the site is shown as pastureland, with a number of internal field boundaries which have since been removed. It is bounded to the north by the Grand Canal and to the east by the Adamstown Road. The townland boundary between Ballymakaily and Grange runs along the southern boundary of the site and the townland boundary between Ballymakaily and Gollierstown runs along the western boundary. The 12th Lock (NIAH ref. no. 11204053 / RPS 125) and an associated canal bridge named Leck Bridge (NIAH ref. no. 11204052 / RPS 127) are located to the north of the

site. A complex of farm buildings is noted in the north-eastern portion of the site. A large quarry is recorded in the north-western portion of the site, likely associated with the construction of the Grand Canal and its associated lock and bridge (see Figure 3, Appendix 13.5).

Architectural Heritage

13.7 The National Inventory of Architectural Heritage (NIAH) is a systematic programme of identification, classification and evaluation of the architectural heritage of the State. The Minister for the Culture, Heritage and the Gaeltacht is currently using the Inventory as the basis for making recommendations for the inclusion of structures in the Record of Protected Structures (RPS). The South County Dublin Development Plan 2016 – 2022 consulted. The plan includes policy objectives for the protection of the county's architectural heritage through their inclusion in the Record of Protected Structures (RPS) or in Architectural Conservation Areas (ACA). The RPS is a list of every structure which is of special architectural, archaeological, artistic, cultural, scientific, social or technical interest within the council's functional area. No structures included in the NIAH or in the RPS are located within the site. All sites within c. 1km of the development were identified and are listed in Appendix 13.4 (see Figure 1, Appendix 13.5 for locations).

Site assessment

13.8 The site was initially visited on 7th December 2018 in cloudy, wet weather and on the 12th December 2018 in cloudy, dry weather, prior to any development at the site (see Figure 4, Appendix 13.5 for field locations and Figures 5-20, Appendix 13.5 for photos). The site assessments involved the examination of recorded archaeological, architectural and cultural heritage constraints and the identification of previously unrecorded features of archaeological, architectural and cultural heritage interest within the site.

Geophysical survey of site

13.9 A geophysical survey was conducted by Joanna Leigh of JML Surveys as part of the archaeological impact assessment undertaken of the Permitted Development by CRDS Ltd. The aim of the geophysical survey was to locate and identify any responses of potential archaeological interest within the site. The geophysical survey comprised of a detailed gradiometer survey throughout. This was conducted under Licence No. 18R0527, issued by the Department of Culture, Heritage and the Gaeltacht (see Figure 21, Appendix 13.5).

Archaeological testing and excavations

13.10 Archaeological testing was undertaken at the site under Licence No. 19E0038 (also Detection License No. 19R0086) by AMS Ltd, issued by the Department of Culture, Heritage and the Gaeltacht. The aim of the testing was to assess the potential features identified in geophysical survey and sample the remaining areas. Archaeological excavation of the identified features was also undertaken under the same license following consultation with the Department (see Figures 22-24, Appendix 13.5).

Receiving environment

13.11 The study area, which comprises a buffer of approximately 1km from the Proposed Development, is characterised by upstanding archaeological monuments dating to the medieval period. Archaeological excavations in the area have also uncovered a number of prehistoric sites. All recorded archaeological monuments and features noted below are located outside the site boundary.

13.12 The earliest evidence for settlement consists of the remains of a Neolithic house excavated in the townland of Kishoge to the north-east of the site. The house was roughly rectangular in shape and measured 6.05m in length by 4.5m in width. The walls comprised a foundation trench supporting oak posts and planking and it may have been subdivided internally. Domestic activity in the vicinity of the dwelling comprised pits and charcoal and a number of artefacts were recovered from these features including scrapers, waste flint and a single sherd of prehistoric pottery. Radiocarbon dates from the site indicate a Neolithic date between 3941 and 3659 BC (Excavation ref. no. 01E0061, see Appendix 13.3). A stone axehead, made from porcellanite, also of Neolithic date, was found during the excavations at the site (License No. 19E0038; see below).

13.13 Excavations in the townland of Kilmahuddrick to the south-east of the Proposed Development revealed the remains of a ploughed-out ring-barrow. Ring-barrows are generally characterised by a low, artificial mound, sometimes with an encircling ditch and bank. The excavation at Kilmahuddrick revealed a large ditch and a series of cremated bone deposits at its centre (Doyle 2005, 43). The site had been intensively ploughed in the past and no trace of the raised central mound was present. Radiocarbon dates indicated that the site originated in the early Bronze Age but its use continued into the later Bronze Age and Iron Age (Doyle 2001, 17). The site was later enclosed within a field system of early medieval date (see below). A series of cremated human deposits were uncovered within the interior of the barrow ditch associated with finds including undecorated pottery and a small black glass bead (Doyle 2001, 18).

13.14 A number of fulacht fiadh have also been revealed within the townlands of Nangor and Grange. Fulacht fiadh or burnt mounds comprise mounds of charcoal rich soil, heat-fractured stones accompanied by a trough sometimes lined with wooden planks, stone slabs or even clay (Waddell 2000). They are generally located close to water sources including streams, rivers, lakes or marshy ground. The exact use of these sites is still somewhat ambiguous with their traditional interpretation as cooking places coming into question in recent years. They date predominantly to the Bronze Age but date ranges from the Mesolithic period to the medieval period have been returned.

13.15 The remains of a field system were found enclosing a prehistoric ring-barrow in the townland of Kilmahuddrick (Doyle 2005, 43). The field system was represented by a series of linear features on the western and southern sides of the ring-barrow. Radiocarbon dates from deposits of animal bone indicated that the field system dated to the early medieval period (Doyle 2005, 52). A further series of pits and ditches of early and later medieval date were revealed during excavations in the townland of Nangor (Doyle 2002).

13.16 The place name Kilmahuddrick provides an additional indicator of early medieval activity in the vicinity of the Proposed Development. The place name contains the element 'Kil' an Anglicisation of Cell or Cill generally signifying an early medieval church (Doyle 2005, 45). The church of Kilmahuddrick was dedicated to St. Cuthbert and consists of a nave-and-chancel church situated in a disused burial ground (Ní Mharcaigh 1997, 270).

13.17 Ringforts, the characteristic settlement site of the early medieval period, generally consist of a circular area surrounded by a bank or fosse, or simply by a rampart of stone. Ringforts are usually interpreted as being defended farmsteads. Many ringforts have been partially or completely destroyed since the 1960s and often the only indication of the former presence of a ringfort is preserved in townland name elements such as Dún, Rath, Cashel or Lios. However, monuments which have experienced above-ground disturbance continue to be of archaeological interest due to the potential for subsurface remains to exist at their locations. The term 'enclosure' is applied to monuments that cannot be classified more accurately without archaeological assessment but were identified as enclosures during fieldwork or through the study of aerial photography or other sources. There are four enclosures within the study area including one in the townland of Gollierstown (DU017-093----), one in the townland of Kilmactalway (DU021-112----) and two in the townland of Ballybane (DU021-108---- and DU021-109----).

13.18 The sites of the two enclosures in Ballybane were subject to archaeological test excavation in 2016 (Excavation ref. no. 16E0531, see Appendix 13.3). AH1 (DU021-108----) comprised internal and external ditched enclosures with internal linear features and pits, likely representing an early medieval settlement site. AH5 (DU021-109----) measured c. 44m in diameter and comprised a single-ditched circular enclosure, a possible ringfort. Curvilinear responses forming a sub-circular pattern indicative of an enclosure were identified during geophysical survey of the subject site (see Appendix 13.5). The responses measured c. 30m in diameter and were enclosed within a series of fainter curvilinear trends measuring c. 70m in diameter. Archaeological test excavation is planned to determine the archaeological significance of these features and to determine if further archaeological mitigation is required (see Appendix 13.1 for further details).

13.19 There is extensive archaeological and documentary evidence for the later medieval settlement of the study area. Records show that the Cistercian abbey of St. Mary's held lands in the vicinity of Clondalkin, including the townlands of Ballymacheilmer and Kilmacuddrick (now Kilmahuddrick) from the 12th century. The name Kilmahuddrick is derived from Cell Mo-Chudric or the church of St. Cuthbert. The

lands may have come into the abbey's possession before the arrival of the Normans but the possession of Ballymacheilmer was confirmed to the abbey in two charters of Henry II dating to 1174 and 1197. John Comyn, Archbishop of Dublin confirmed the lands, chapel and titles in 1186.

13.20 At the time of the dissolution the 'Grange of Balichelmer' and the 'vil of Kilmacodryke' were still listed as part of the abbey's landholdings. The Grange of Balichelmer is likely to correspond with the modern townland of Grange. One hundred and fifty-two acres at Grange were listed in the monastic possession at the time of the dissolution of the monasteries c. 1540-41. In 1641 Grange was in the hands of the Fagan of Feltrim, an Irish Papist (Simington 1945, 304). In 1650 Grange was occupied by a farmer called Nicholas Wolverston and twenty other persons, including a weaver and a 'greymerchant'. The 'vil of kilmacodryke' corresponds with the townland of Kilmahuddrick to the immediate south-east of the Proposed Development. At the time of the dissolution the holding at Kilmahuddrick comprised 51 acres. In 1641 Kilmacuddrick was held by Mr Aylmer an Irish Papist (Simington 1945, 304). In 1666, the lands of Kilmahuddrick were held by Patrick Thunder (Ball 1906, 71).

13.21 Several tower houses were constructed in the study area in the later medieval period including one in the townland of Grange (DU017-034----) and one in the townland of Adamstown (DU017-029----). Tower houses are small, fortified residences which were constructed following a period of unrest in the fourteenth century. Tower houses have various defensive features including thick walls, battlements and narrow windows. As time progressed and the requirement for defence lessened tower houses were replaced by hall houses and fortified residential houses. Residential extensions were also added to existing tower houses to provide more comfortable accommodation for the occupiers.

13.22 The upstanding remains of Grange Castle (DU017-034----) are located c. 1km to the east of the Proposed Development and consist of a rectangular, three-storey structure with plastered walls. Grange Castle is shown on the Down Survey map (see Figure 2, Appendix 13.5). An early description by Cooper in 1780 describes the castle as a 'neat well-built castle inhabited by a farmer and kept in very good repair'. The castle is uninhabited and had fallen into disrepair but is currently subject to a programme of conservation by South Dublin County Council. Archaeological excavation undertaken adjacent to the castle in 1997 revealed a curving ditch containing charcoal, mortar, flint and animal bones. Finds including a decorated bone comb, stick-pin and knife provided a twelfth to thirteenth century date. Preliminary works undertaken in 2016 in advance of planned conservation works revealed that the tower house and later Georgian house possess shallow foundations. (Excavation ref. no. 97E0116ext and 16E0510 see Appendix 13.3).

13.23 In the mid-eighteenth century a group of noblemen and merchants decided to form a company to undertake the construction of a canal aimed initially at providing fresh water for Dublin City and a water-borne transport system to the countryside west of Dublin. Work began on the Grand Canal and the canal was opened for traffic in February 1779 (Delaney 1995, 21). The Grand Canal forms the northern boundary of the site and the 12th Lock and associated bridge are located immediately to the north-west of the site. The site of the Proposed Development is located immediately to the south of the 12th Lock. A complex of canal related structures was constructed including the 12th Lock itself, the lock keeper's house built to the designs of the Grand Canal Company's engineer Thomas Omer and Leck Bridge which has been widened to facilitate modern traffic requirements. A number of industrial buildings were constructed alongside the canal including two nineteenth century mill buildings.

13.24 The area has been subject to intensive farming practices, and it is likely that this has resulted in the destruction of the above ground expression of other sites.

Results of Site assessment

13.25 The site was visited on 7th December 2018 in cloudy, wet weather and on the 12th December 2018 in cloudy, dry weather, prior to any development at the site (see Figure 4, Appendix 13.5 for field locations and Figures 5-20, Appendix 13.5 for photos). The site assessments involved the examination of recorded archaeological, architectural and cultural heritage constraints and the identification of previously unrecorded features of archaeological, architectural and cultural heritage interest within the site.

13.26 The site is located within the townland of Ballymakaily. The 1st edition Ordnance Survey 6" map indicate that the site was once subdivided into a number of smaller fields; these former divisions are not in

evidence on the ground. The field has historically been in agricultural use, with both grazing and tillage in evidence. A 110kv electricity line, erected c. 2000, crosses the northern portion of the site, running in an east-west direction.

13.27 The site is located on the western side of the R120 (Adamstown Road) which has recently been realigned and to the west of the Grange Castle Business Park. It is bounded to the north by the Grand Canal with the 12th Lock, lock-bridge, lock keeper's cottage located to the north-east of the site. A complex of mill buildings is located to the north of the site on the north bank of the canal. The western and southern boundaries include earthen banks covered in mature hedgerow and trees.

13.28 Field 1 is a relatively flat field in tillage. The internal field boundaries evident on the 1st edition Ordnance Survey 6" and the 25" Ordnance Survey maps have been removed. Some of the removed boundaries are evident on aerial photographic coverage of the site as linear crop marks. The field is bounded to north-east by wet ditch covered in mature hedgerow with a slight bank to north. A concrete bridge over the ditch in the northern corner allows access to Field 5. It is bounded to the east by a timber post fence with a recent drainage channel along the interior. The local road to the east of the boundary has recently been improved. The field is bounded to the south by townland boundary between Ballymakaily and Grange. This boundary comprises a wet ditch/small stream to the south and a slight earthen bank measuring between 0.2-0.5m in height with some evidence of stone facing particularly at the western end. The field is bounded to the west by the townland boundary between Ballymakaily and Gollierstown. This boundary comprises an earthen bank, c. 0.3m in height, covered with mature hedgerow and trees with a deep, wet ditch to the west. The proposed data centre is located in the south-eastern corner of the field.

13.29 Field 2 is located to the north of Field 1. It is in rough pasture and there is an ESB pylon in the north-western corner. The northern boundary of the field runs along the south bank of the Grand Canal. The field is bounded to the west by the townland boundary between Ballymakaily and Gollierstown. This boundary comprises an earthen bank, c. 0.3m in height, covered with mature hedgerow and trees with a deep, wet ditch to the west.

13.30 Field 3 is a gently undulating field in pasture. A quarry is shown in the north-west corner of the field on the 1st edition Ordnance Survey 6" map and the 25" Ordnance Survey map. It is likely that the quarry was opened during the construction of the Grand Canal. A large grassed over earthen bank survives on the site of the former quarry. The eastern boundary comprises a wet ditch to the west with an earthen bank covered in trees to the east. The southern boundary comprises an earthen bank to the north, between 0.3 and 1m in height, and a ditch to the south. There is a concrete drinking trough in the south-west corner of the field. The western boundary comprises a slight bank with some stone facing to the east and a ditch to the east. The proposed ESB substation is located in the south-east corner of the field.

13.31 Field 4 is a gently undulating field in rough pasture. There is an ESB pylon in the north-east corner. The laneway leading to the complex of farm buildings runs along the north-eastern boundary of the site.

13.32 Field 5 is a relatively flat field in tillage. It is bounded to the north-west by a ditch with a flowing stream in the base and a slight bank to the south side. A flat-arched concrete bridge crosses the stream in the western corner allowing access to Field 1. The field is bounded to the east by a timber post fence with a drainage channel along its interior which was inserted as part of the local road improvement works. The field is bounded to the south-west by a wet ditch with slight bank to north.

13.33 Field 6 is located in the north-eastern corner of the site and comprises a wet field in rough pasture. The remains of a partially demolished complex of farm buildings and agricultural yards survives in the north-west corner of the field. The farmhouse is a mid-twentieth century structure and replaced the building shown on the 1st edition Ordnance Survey map. A three-bay single-storey with loft outbuilding of early nineteenth century date survives to the north of the farmhouse. An early nineteenth century cottage stands outside the north-eastern boundary of the field. There is a large earthen embankment located along the laneway leading to the farm complex.

13.34 A group of structures located on the northern bank of the Grand Canal and outside the boundary of the Proposed Development are included in the Record of Protected Structures or National Inventory of Architectural Heritage for South County Dublin. These include Leck Bridge (RPS ref. no. 127/ NIAH

ref. no. 11204052), the 12th Lock (RPS ref. no. 125 / NIAH ref. no. 11204053), the two-storey former mill building (RPS ref. no. 118 / NIAH ref. no. 11204054), the Lock Keeper's House (RPS ref. no. 119 / NIAH 11204056) and a mill building (NIAH ref. no. 11204055). While the upper elements of the data centres will be visible from these structures, proposed landscaping along the northern site boundary will ameliorate any significant visual impacts (see Appendix 13.4 for full descriptions).

Results of geophysical survey

13.35 The survey area totals c. 20 hectares and is contained within six fields (see Figure 21, Appendix 13.5). The north-eastern field comprised of rough ground and vegetation and was not suitable for survey. Detailed gradiometer survey was conducted through the remaining five fields. There are no recorded monuments within the application area.

Field 1

13.36 A series of linear responses (A) throughout Field 1 are typical of former field boundaries. Many of these are depicted in historic mapping. In the centre of Field 1, there are clear responses (B) which appear to form a sub-circular pattern. These measure c. 30m in diameter. Although in places the responses have a diminished magnetic signal, the sub-circular form of the response is clearly visible and is interpreted as of archaeological potential. The plough damaged remains of an enclosure may be represented here. Faint curvilinear responses (C) enclose the probable enclosure (B). Although the trends are barely discernible in the data, they are considered to be of interest, possibly representing an external boundary feature or annex of the enclosure, with a diameter of c.70m around the enclosure. In the north of Field 1, there are a series of responses (D) that appear to form a vague rectilinear pattern. The responses appear to be perpendicular to the existing field boundary. Although it is possible that these are of archaeological interest, it is equally possible that these represent the remains of a former farm building or result from more recent agricultural activity. An archaeological interpretation is cautious. In the east of Field 1 there is a cluster of isolated responses (E). It is possible that these represent pit-type features or an area of burnt material. However, no further responses of interest are located in the vicinity and it is possible that more deeply buried ferrous debris is located here. Responses (F) form a linear pattern and are typical of a former field division. Although these may be similar to (A), it is possible that they represent an older boundary and may be of archaeological interest. This is speculative. In the northwest of Field 1 there is an area of increased magnetic response (G). The possible origin of this is unclear. It may represent more recent ground disturbance. However, it is equally possible that a ploughed out spread of archaeological burnt material is represented here. Archaeological interpretation is tentative but must be considered.

Field 2

13.37 Field 2 is dominated in the north by modern magnetic disturbance. This is thought to be from recent ground disturbance and modern activity. A clear rectilinear area of disturbance (H) is unusual and perhaps marks the former location of a building. This is most likely modern in origin and not considered to be of archaeological interest. Broad amorphous responses (I) appear to be associated with curvilinear ploughing trends. These are unusual in form and interpretation is tentative. These are considered to represent more recent activity and no clear archaeological interpretation can be provided.

Field 3

13.38 A rectilinear area of magnetic disturbance (J) is similar in shape and for to (H) in Field 2. This may represent the former location of a building and is considered to be modern in origin. Faint linear trends orientated north to south are indicative of ploughing activity. An area of increased response (K) has no clear pattern and may represent modern activity. Faint linear trends (L) in proximity to (K) suggest possible former field divisions. In the south of Field 2 there is another area of increased response (M). There are associated isolated responses and it is possible that a spread of archaeological burnt material is represented here. This response may equally be associated with the rectilinear response (D), located 40m to the south. Although interpretation is unclear, an archaeological interpretation must be considered.

Field 4

13.39 Field 4 comprises of numerous modern ferrous responses. No clear responses of archaeological potential were recorded.

Field 5

13.40 No clear responses of interest were recorded. A linear trend (N) is most likely agricultural in origin. Associated responses are ferrous in nature and suggest a modern origin.

Results of Archaeological Testing and Excavation

13.41 Archaeological testing was undertaken at the site under Licence No. 19E0038 (also Detection License No. 19R0086) by AMS Ltd, issued by the Department of Culture, Heritage and the Gaeltacht. The aim of the testing was to assess the potential features identified in geophysical survey and sample the remaining areas. Archaeological excavation of the identified features was also undertaken under the same license following consultation with the Department (see Figure 22, Appendix 13.5).

13.42 This work revealed the buried remains of a significant archaeological complex that was thought at the time to comprise a long-running ditch, suggested to form part of an ancient field system (Area 1); a small spread of burnt stones of potential prehistoric date (Area 2); and a large, circular enclosure, seemingly defined by two, widely-spaced concentric ditches (Area 3).

13.43 Archaeological excavations were undertaken by AMS Ltd over a 16-week period, from May to September 2019. It includes the completed specialist reports relating to the artefactual, environmental and faunal evidence recovered from the site, as well as the results of 16 radiocarbon dates.

13.44 Full excavation of these areas revealed an impressive array of features associated with multi-phase settlement and agricultural activity possibly extending from early prehistoric to modern times (see Figure 23-24, Appendix 13.5). The principal remains were identified in Area 3 and comprise two successive phases of enclosure. The earliest phase comprised a large, circular enclosure defined by two, widely spaced concentric ditches and associated with several possible radial ditches. This was followed by the construction at the same location of a large, sub-circular ditched enclosure. Both enclosures produced evidence for internal occupation, while their enclosing ditches were likely originally accompanied by internal earthen banks.

13.45 The enclosures, which represent impressive examples of the widespread ringfort (or ráth) monument type, appear to have enjoyed a measure of long-term continuity of use from the sixth- to eleventh-centuries AD. They likely functioned as enclosed settlements or farmsteads of the upper echelons of early Irish society. The investigations also produced limited evidence for pre-enclosure, prehistoric, activity in Areas 2 and 3, mostly in the form of pits filled with burnt material. A number of prehistoric artefacts, most notably a polished stone axehead and a leaf-shaped flint arrowhead, may also be indicative of early prehistoric activity in the locality, though the possibility that these are curated objects cannot be dismissed. Evidence for medieval and post-medieval agricultural activities is also represented by a network of linear and curvilinear ditches and drains; the long-running linear ditch identified in Area 3 probably relates to post-medieval agriculture.

Characteristics of the Proposed Development

13.46 The proposal will consist of 2 no. single-storey data halls and standby generators with associated flues, associated office and service areas, water towers and pump rooms, yard and attenuation pond. The development will also include 3 no. gas power plants with associated flues within a walled yard (see Figure 25, Appendix 13.5). A full description of the Proposed Development is set out in Chapter 2 of this EIA Report.

13.47 Ancillary site works will include connections to existing infrastructural services, fencing, signage, new vehicular access from the realigned R120, internal service roads and car and bicycle parking and site landscaping of the overall site.

Potential impacts of the Proposed Development

Construction phase

13.48 The Proposed Development site has been subject to substantial archaeological investigation, including desk-based research, a site walkover, geophysical survey and archaeological testing, which identified a number of archaeological features. These have been excavated under license. There is a potential for discrete archaeological features to be encountered during the construction phase in areas not subject to intensive testing.

Operational phase

13.49 The operational phase of the project will have no impact on archaeological, architectural and cultural heritage.

'Do-nothing' scenario

13.50 The 'do-nothing' scenario will have no impact on archaeological, architectural and cultural heritage.

Remedial and mitigation measures

Construction phase

13.51 A programme of licensed archaeological monitoring will be agreed with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht, for areas not previously subjected to archaeological testing.

13.52 A report outlining the results of the programme of archaeological monitoring will be prepared and will include a detailed method statement for any archaeological excavation of features identified, agreed in advance with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht. The report will include a schedule of works detailing timeframes, personnel and logistical requirements.

13.53 Any areas that require archaeological excavation will be cordoned off to facilitate the archaeological team to carry out the excavations. A buffer zone will be agreed with National Monuments Service and no construction works will be undertaken in these areas until archaeological excavations have been completed.

13.54 Provision has been made for all costs associated with archaeological testing, any required excavations and reporting of the results to the standards required by the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht.

13.55 The remedial or reductive mitigation measures outlined here are subject to the approval of the National Monuments Service of the Department of Culture, Heritage and the Gealtacht.

Operational phase

13.56 No remedial or reductive measures are considered necessary during the operational phase of the Proposed Development, as the operational phase will not give rise to any adverse impacts.

Predicted impact of the Proposed Development

Construction phase

13.57 The construction phase of the Proposed Development will not impact directly on any sites included in the Record of Monuments and Places. Geophysical survey and testing identified a number of archaeological features which were subsequently excavated. Should any further sub-surface archaeological features survive in areas not already subjected to testing, the ground disturbance phase of the Proposed Development would impact negatively on them.

Operational phase

13.58 The operational phase of the Proposed Development is not predicted to have any impact on archaeological, architectural and cultural heritage.

'Worst case' scenario

13.59 Not applicable in the case of archaeological, architectural and cultural heritage.

'Do nothing' scenario

13.60 In a do-nothing scenario development will not occur on the site and no potential subsurface archaeological features will be impacted.

Monitoring

13.61 No further archaeological monitoring will be required once construction is completed.

Reinstatement

13.62 Not applicable in respect of archaeological, architectural and cultural heritage.

Cumulative Impacts

Construction phase

13.63 Previous developments in the area, including those undertaken within the Proposed Development site boundary, have identified previously unrecorded archaeological features. These sub-surface features would not have been known had development not occurred and the excavation of these features, although resulting in their removal, has added to the academic understanding of the history of the area through archaeological research and reporting.

13.64 As archaeological assessment will be completed in advance of development and there are no operational impacts, the cumulative impact of the Proposed Development and surrounding developments is deemed to be neutral and not significant.

Operational phase

13.65 No cumulative impacts on archaeological, architectural and cultural heritage are expected as a result of the operational phase of the Proposed Development.

14. WASTE MANAGEMENT

14.1 This Chapter was undertaken by AWN Consulting Limited (AWN) to evaluate potential environmental impacts associated with waste generation and management during the construction and operational phases of the proposed Data Centre and 3 no. gas powered power plants at Ballymakaily, Co. Dublin.

14.2 A site-specific Construction & Demolition Waste Management Plan (C&D WMP) has been prepared to deal with waste generation during the construction phase of the Proposed Development and is included as Chapter 14 - Appendix 14.1 of the Appendix document.

14.3 The C&D WMP along with the mitigation measures in Section 14.52 -14.60 will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

Methodology

14.4 The assessment of the impacts of the Proposed Development arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents (as set out in Sections 14.10 – 14.19 of this Chapter), along with an extensive document review to assist in identifying current and future requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation is provided in Appendix 14.1 of the Appendix document.

14.5 This Chapter is based on the Proposed Development, as described in Chapter 2 (Description of the Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation and levelling); and
- Operational phase.

14.6 A desk study was carried out which includes the following tasks:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

14.7 Estimates of construction waste generation during the construction phase of the Proposed Development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research, other available research sources and waste collection data from the existing neighbouring development.

14.8 Mitigation measures are proposed to minimise the effect of the Proposed Development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Sections 14.52 – 14.60 of this Chapter.

14.9 A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 7 - Land, Soils, Geology and Hydrogeology. Chapter 7 of the EIA Report also discusses the environmental quality of soils which will have to be excavated to facilitate construction of the Proposed Development.

Legislation and Guidance

14.10 Waste management in Ireland is subject to EU, national and regional waste legislation which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the

Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended).

14.11 In addition, the Irish government issues regular policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. In September 2020 the government released a new policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan 'A Waste Action Plan for a Circular Economy' was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to a new economy, where climate and environmental challenges are turned into opportunities.

14.12 The strategy for the management of waste from the construction phase is carried out in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* published by the Department of Environment, Heritage and Local Government (DoEHLG) in 2006. The guidance document published by FAS and the Construction Industry Federation (CIF) *Construction and Demolition Waste Management: A handbook for Contractors and Site Managers* were also consulted in the preparation of this assessment.

14.13 There are currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, British Standards and other relevant studies and reports including BS 5906:2005 Waste Management in Buildings – Code of Practice, the Eastern-Midland Region Waste Management Plan 2015 – 2021, the EPA National Waste Database Reports 1998 – 2012 and the EPA National Waste Statistics Web Resource.

Receiving environment

14.14 In terms of waste management, the receiving environment is largely defined by South Dublin County Council (SDCC) as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.

14.15 The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

14.16 The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "*70% preparing for reuse, recycling and other recovery of construction and demolition waste*" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020. The National Waste Statistics update published by the EPA in August 2020 identifies that Ireland's current progress against this C&D waste target is at 77% and our progress against 'Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)' is at 51%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive, however the EPA are yet to confirm that these were met.

14.17 The *South Dublin County Council Development Plan 2016 – 2022* sets out a number of objectives and actions for the South Dublin area in line with the objectives of the waste management plan.

14.18 Waste objectives and actions with a particular relevance to the Proposed Development are as follows:

Objectives:
IE5 Objective 1: To support the implementation of the Eastern–Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies and policy actions.
IE5 Objective 2: To support waste prevention through behavioural change activities to de-couple economic growth and resource use.

IE5 Objective 3: To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the value recovery and recirculation of resources.
IE5 Objective 8: To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste.

Actions:

- Support and facilitate the separation of waste at source into organic and non-organic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used and recycled or composted and divert organic waste from landfill, in accordance with the National Strategy on Biodegradable Waste (2006).
- Implement the objectives of the National Waste Prevention Programme at a local level with businesses, schools, householders, community groups and within the Council's own activities.
- Promote an increase in the amount of waste re-used and recycled consistent with the Regional Waste Management Plan and Waste Hierarchy and facilitate recycling of waste through adequate provision of facilities and good design in new developments.
- Implement the South Dublin Litter Management Plan 2015 - 2019).

14.19 In terms of physical waste infrastructure, SDCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

Characteristics of the Proposed Development

14.20 The Proposed Development is described in detail in Chapter 2 (Description of the Proposed Development) of this EIA Report. It proposes the demolition of an abandoned farm dwelling and agricultural buildings located to the north of the site and the construction of a pair of single storey data centre buildings of c. 12,797sqm. The development will also include c. 2,404sqm office and loading bay space. It is to be located within the north-western part of the overall lands that will include a generator yard with 24 no. standby emergency generators with associated flues (each 25m high) to the east of the buildings. The data centres will be served by 39 car parking spaces of which 4 no. spaces will be EV spaces. It is intended that 2 of these spaces will be provided for disabled parking vehicles. The data centre and associated elements will require a slight adjustment to the landscaping along the western boundary.

14.21 The application will also include the construction of a 3 no. gas powered generation plant in the form of 3 no. single storey buildings with a gross floor area of c., 9,286sqm that will contain 61 gas generators within all of the buildings with associated flues that will be 25m in height, and grouped in pairs. The development will also include an AGI Plant centrally along the southern boundary of the site. The aspects relevant to this chapter are described in the following sections.

Demolition phase

14.22 There will be waste materials generated from the demolition of the abandoned, dilapidated buildings, and associated garage and other farm buildings. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete etc.

14.23 Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP included as Appendix 14.1 of this EIAR. The C&D WMP provides an estimate of the main waste types likely to be generated during the construction phase of the Proposed Development and these are summarised in Table 14.1.

Table 14.1 Estimated off-site reuse, recycling and disposal estimates for demolition waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	118.8	0	0.0	85	101.0	15	17.8
Concrete, Bricks, Tiles, Ceramics	673.2	30	202.0	65	437.6	5	33.7
Plasterboard	52.8	30	15.8	60	31.7	10	5.3
Asphalts	13.2	0	0.0	25	3.3	75	9.9
Metals	198.0	5	9.9	80	158.4	15	29.7
Slate	105.6	0	0.0	85	89.8	15	15.8
Timber	158.4	10	15.8	60	95.0	30	47.5
Total	1320.0		243.5		916.7		159.7

Construction phase

14.24 During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

14.25 There will be soil excavation works required during the construction phase to facilitate site levelling, foundation construction, service trenches and access routes. It is anticipated that excavated soils/stones will be inert/non-hazardous material suitable for re-use on site. The project engineers (Pinnacle) have estimated that c. 15,034m^3 of soil, subsoil and stones will be excavated, with c. 9,159 m3 reused on site. The remaining c. 5,875m^3 soil, subsoil and stones will require removal from the site. In addition c. 16,117 m^3 of topsoil is to be excavated, it is currently proposed that the majority of this excavated topsoil will be reused on site for landscaping. These estimates will be refined prior to commencement of construction.

14.26 As detailed in Chapter 7 (Land, Soils, Geology & Hydrogeology) a site investigation was completed in March 2018 by Causeway Geotec (Report No. 18-0827) to determine the presence of any historic contamination. No significant contamination has been identified during these investigations, this would be expected due to the historic agricultural use of the site. As such, it is unlikely any contaminated material will be encountered during construction of the Proposed Development.

14.27 Excess soils/stones that are not required and/or suitable for reuse on-site, will be removed off-site either as a waste or, where appropriate, as a by-product. Where the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011. EPA agreement will be obtained before re-using the excess soils as a by-product. However, it is not currently anticipated that any excavated material will be removed offsite for reuse as a by-product.

14.28 If the material that requires removal from site is deemed to be a waste, removal and reuse/recycling/recovery/disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011).

14.29 In order to establish the appropriate reuse, recovery and/or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery

facilities/landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

14.30 Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste electrical and electronic equipment (WEEE), printer/toner cartridges and waste batteries may also be generated infrequently from site offices.

14.31 Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP included as Appendix 14.1 of the Appendix document included with the EIA Report. The C&D WMP provides an estimate of the main waste types likely to be generated during the construction phase of the Proposed Development and these are summarised in Table 14.2.

Table 14.2 Estimated off-site reuse, recycling and disposal estimates for construction waste

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	501	10	50	80	401	10	50
Timber	425	40	170	55	234	5	21
Plasterboard	152	30	46	60	91	10	15
Metals	121	5	6	90	109	5	6
Concrete	91	30	27	65	59	5	5
Other (includes cabling, ducting, conduits, packaging and plastics)	228	20	46	60	137	20	46
Total	1519		345		1031		143

14.32 It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the construction waste that will be generated from the construction of the Proposed Development as the exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario.

14.33 An outline Construction Environmental Management Plan (CEMP) has been prepared to accompany the planning application by Winthrop Engineering and Contracting Limited. The appointed main contractor will be required to prepare a detailed CEMP prior to commencement of construction which may refine the above waste estimates.

Operational phase

14.34 The Proposed Development will give rise to a variety of waste streams during the operational phase, i.e. when the project is completed, and fully operational. The majority of waste will be generated from packaging for equipment deliveries to the facility which is likely to be at its peak in the early months of operation but will reduce as the data halls are filled with servers and other equipment. Waste will also be generated from the occupants of the building during operations. These waste types will mainly be non-hazardous. The main non-hazardous and hazardous waste expected to be generated from the operational phase is summarised below.

Segregation of waste materials onsite

14.35 All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the South County Development Plan 2016 – 2022 (Policy SI20 and Objective SIO16). Table 14.3 below summarises the anticipated management strategy to be used for typical wastes to be generated at the data storage facilities.

Table 14.3 Anticipated onsite waste management

Waste Type	Hazard Y/N
Packaging Waste	N
Office Waste	N
General Non-Hazardous Waste	N
Empty Containers	N
Canteen Waste	N
Kitchen Waste	N
Non-hazardous WEEE	N
Landscaping waste	N
UV & Fluorescent Tubes	Y
Waste Oil	Y
Waste sludge from oil separator	Y
(Wet) Batteries	Y
(Dry) Batteries	Y
Electronic Equipment (Servers Hard Drives)	N
Electrical Equipment (Cabling)	N
Refrigerant Gas from chillers	Y

Management of wastes moving offsite

14.36 All waste leaving site will be recycled or recovered, with the exception of those waste streams where appropriate recycling facilities are currently not available. All waste leaving the site will be transported by suitably permitted contractors and taken to suitably licensed or permitted facilities. All waste leaving the site will be recorded and copies of relevant documentation maintained on site.

Hazardous waste

14.37 Hazardous waste may be generated from batteries, contaminated chemical drums and other packaging. If the packaging contains residues of or if it is contaminated by dangerous substances, it may be classed as a hazardous waste (depending on the volume and concentration of contaminants). If the drums are found to be unsuitable for re-use, they will be classed as a waste. Any waste classed as hazardous will be stored in a designated area (suitably bunded, where required) and will be removed off site by a licensed hazardous waste contractor(s).

14.38 Oil interceptors will require cleaning at stages throughout the lifetime of the facility. This should be undertake by a licenced contractor and all wastes are to be transported offsite and disposed of appropriately. All relevant documentation will be made available to the proposed facility operator.

Potential Impacts of the Proposed Development

14.39 This section details the potential waste impacts associated with the Proposed Development.

Construction phase

14.40 The Proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation, demolition and construction. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste. Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The indirect effect of litter issues is the presence of vermin within the development and the surrounding areas.

14.41 The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in indirect negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

14.42 Wastes arising will need to be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, reuse, recycling, recovery, and/or disposal as appropriate. There are numerous licensed waste facilities in the Eastern Midlands region which can accept hazardous and

non-hazardous waste materials and acceptance of waste from the Proposed Development would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. The majority of demolition and construction materials are either recyclable or recoverable.

14.43 There is a quantity of excavated material which will need to be excavated to facilitate the Proposed Development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 7 (Land, Soils, Geology & Hydrogeology). It is anticipated that c. 5,875 m^3 soil, subsoil and stones and up to c. 16,117 m^3 of topsoil will be generated from the construction works. it is currently proposed that the majority of the excavated topsoil will be reused on site for landscaping. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in an appropriate manner.

14.44 The overall potential impact of waste generation and management on the local and regional environment during the construction phase, in the absence of mitigation, is likely to be ***negative, significant,*** and ***short term***.

Operational phase

14.45 The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill. However, in the absence of mitigation, significant effects are not likely.

14.46 The nature of the development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

14.47 If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas.

14.48 Waste contractors will be required to service the development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

14.49 The overall potential impact of waste generation and management on the local and regional environment during the operational phase, in the absence of mitigation, is likely to be ***negative, not significant*** and ***long-term***.

Remedial and mitigation measures

14.50 This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

Construction phase

14.51 A project specific C&D WMP has been prepared in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* guidance document issued by the Department of Environment, Heritage and Local Government (DoEHLG). Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the Proposed Development. Prior to commencement of

construction, the contractor(s) will be required to refine/update this document to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

14.52 The project engineers have estimated that c. 5,875 m^3 soil, subsoil, and stones and up to c. 16,117 m^3 of topsoil will be generated from the excavations to facilitate construction. The main contractor will endeavour to ensure that surplus material is reused on site where possible. Surplus material that is not required for reuse onsite, will be reused or recovered off-site insofar as is reasonably practicable. Where there is no suitable reuse or recovery option available, it will be disposed of at an authorised facility.

14.53 In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be temporarily stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A person responsible for waste management will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

14.54 Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material that requires removal off-site. If any of the material is to be reused on another site as by-product (and not as a waste), this will be completed in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)* as detailed in the C&D WMP (Appendix 14.1).

14.55 These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997 to 2009* and the *EMR Waste Management Plan (2015 - 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

Operational phase

14.56 All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible area on the site. In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Dry Mixed Recyclables;
  - Organic food/green waste;
  - Mixed Non-Recyclable Waste;
  - Batteries (non-hazardous and hazardous);

  - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment; and
  - Cleaning chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.).
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly labelled with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

14.57 These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997* and the *EMR Waste Management Plan (2015 - 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

Predicted Impacts of the Proposed Development

14.58 This section describes the predicted impact of the Proposed Development following the implementation of the remedial and mitigation measures.

Construction phase

14.59 A carefully planned approach to waste management as set out in Sections 14.52 – 14.57 and adherence to the C&D WMP during the construction and demolition phase will ensure that the impact on the environment will be ***neutral***, ***imperceptible,*** *and* ***short-term.***

Operational phase

14.60 During the operational phase, a structured approach to waste management as set out in Sections 14.58 – 14.60 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***neutral***, ***imperceptible,*** and ***long-term.***

Residual Impacts of the Proposed Development

14.61 The implementation of the mitigation measures outlined in Section 14.52 -14.60 will ensure that the high rate of reuse, recovery and recycling is achieved at the development during the demolition, excavation and construction phases as well as during the operational phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

Monitoring and/or Reinstatement

Construction phase

14.62 The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the construction phase where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&D WMP specifies the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste, as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

Operational phase

14.63 During the operational phase, facility management personnel should monitor waste generation volumes against the predicted waste volumes outlined earlier. There may be opportunities to reduce the equipment and number of bins required for the development where estimates have been too conservative. Reductions in equipment/bin requirements will reduce waste contractor costs. Waste legislation and SDCC Waste Bye-Laws should also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

Reinstatement

14.64 In the event that the proposed data centre development is discontinued, there is not likely to be any significant impacts on waste management at the site. Where contaminated soil is encountered and excavated at the site with the intention of removal from site for off-site treatment or disposal, a management plan should be put in place in the event that the work is stopped and the contamination is left exposed to the public and the environment.

Cumulative Impacts

14.65 The anticipated cumulative effect of the Proposed Development with any/all relevant other planned developments as outlined in Chapter 2 or permitted developments as outlined in Chapter 3 are discussed in below for construction and operational phases respectively. In particular this consideration has included the permitted data centre and substation developments (SDCC Reg. Ref. SD19A/0042 / An Bord Pleanála Ref. ABP-305948-19) at the development site, as well as the permitted data centre and substation development on the directly adjacent site, and the potential for the future data centre development on the site.

Construction phase

14.66 The construction of the Proposed Development and other surrounding proposed, permitted and future developments will require site clearance, excavations and levelling, which will generate a requirement for soil removal and/or import, works on these site occurring concurrently will also generate additional C&D Waste in the local area. An increased density of construction activities in the short term will impact in respect to waste on increased traffic from waste contractors, but overall is likely to provide an improvement in the efficiencies of waste collections in the area and will be short term.

14.67 Provided mitigation measures set out in the planning permissions / EIA Reports for these developments are implemented during construction of the Proposed Development, the cumulative effect will be and ***neutral, imperceptible,*** and ***short-term***.

Operational phase

14.68 The waste quantities to be generated from the operation of the Proposed Developments within the overall landholding are anticipated to be relatively small for the scale of development.

14.69 There are existing residential properties close by, along with similar data centre developments on neighbouring sites and these developments will generate similar waste types. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely to provide an improvement in the efficiencies of waste collections in the area.

14.70 The Proposed Development and other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative effects associated with waste generation and waste management. As such it is considered that the cumulative effect relating to waste management will be ***neutral***, ***imperceptible,*** and ***long-term***.

15. MATERIAL ASSETS

15.1 This chapter provides a description of factors likely to be affected by the Proposed Development. The chapter will identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the Proposed Development on material assets as required under Article 3(1) of the 2014 EIA Directive and Annex IV of the 2014 EIA Directive.

15.2 The chapter includes a description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

15.3 In 2011, EIA Directive (2011/92/EU), material assets included architectural and archaeological heritage. In accordance with the 2014 EIA Directive, those heritage aspects are dealt with as components of cultural heritage (which are addressed in Chapter 13 of this EIA Report). The EPA Draft EIA Report Guidelines 2017 state that material assets are now taken to mean built services and infrastructure, roads and traffic as well as waste management. In this EIA Report, the impacts on some of the material assets described above have been considered in the following chapters:

- Chapter 5, Population and Human Health;
- Chapter 10, Air Quality & Climate;
- Chapter 12, Traffic & Transportation; and
- Chapter 14, Waste Management.

15.4 The European Commission Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017) refers to a number of examples of material assets including buildings, other structures, mineral resources and water resources. The impacts on mineral resources and water resources have been considered in the following chapters of this EIA Report:

- Chapter 7, Land, Soils, Geology & Hydrogeology; and
- Chapter 8, Hydrology.

15.5 This chapter assesses ownership and access (including buildings and other structures), built services and infrastructure, which have not already been addressed elsewhere in this EIAR. The potential impacts on built services and infrastructure, if any, are assessed in terms of the following:

- Power and Electricity supply;
- Telecommunications;
- Surface water infrastructure;
- Foul drainage infrastructure; and
- Water supply.

15.6 The Proposed Development will not impact on any other structures. Assessment of impact on utilities has been undertaken by confirmation of supply with the various key utility suppliers of South Dublin County Council (SDCC), Eirgrid, ESB Networks, and Irish Water (IW). Mitigation measures are proposed where required.

Ownership and access

15.7 The Proposed Development site as described in Chapter 1 and 2 of this EIA Report is owned by the applicant. The Proposed Development site is primarily greenfield and is bound by the south-east and greenfield land to the west and south.

15.8 The Proposed Development site includes an abandoned and former residential property and other buildings that will be demolished as a result of the Proposed Development.

15.9 Access to the site will be via the permitted access off R120 that provide access to a proposed purpose built access road that will provide independent access to the proposed data centres on site. The access road will not provide access to the surrounding lands given the location in such close proximity

to the R136 extension road that will open up Grange Castle West to the south and west of the site. The site will be fully secured with a high security fence, CCTV and surveillance systems that will be located inside the surrounding berms and landscaping. There is good visibility on approach to the permitted access point as detailed in Chapter 12 of this EIA Report relating to Traffic and Transportation.

Receiving environment

15.10 The proposed drainage infrastructure has been described in Chapter 2 (Description of the Proposed Development) and Chapter 8 (Hydrology). Detailed water supply and drainage design information is provided in the stand alone Engineering Planning Report, prepared by Pinnacle, Consulting Engineers, which accompanies the planning application. The associated built services and infrastructure in the vicinity of the site are summarised in the following sections.

Power and electrical supply

15.11 The availability of power is a key consideration in site selection. The relative proximity to the Kilmahud substation and other substations will facilitate the permanent electricity supply connection to the Proposed Development in the future subject to agreements on connection from Eirgrid. The Flexible Demand offer from Eirgrid and the timelines involved require both a short-term and a permanent back-up solution to providing power to the Proposed Development site. Power Plant 1 will enable the full operation of the permitted data centre on site, and will enable, if required the dismantling the permitted Aggreko Power Plant that has capacity to provide power to only a small portion of the permitted development on site.

Telecommunications

15.12 A fibre optic cable distribution network will be installed within the site to serve the permitted development and will be extended within the site to serve the Proposed Development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator. There is sufficient capacity in the network for the Proposed Development.

Surface water infrastructure

15.13 It is proposed that surface water will be directed into an onsite reticulation system before being discharged to an attenuation pond to the north of the site – refer to Drawing nos. PIN-05-ZZ-DR-C-0201-P01 and PIN-05-ZZ-DR-C-0202-P01. The pond has been sized to accommodate the predicted storm water volumes generated during a 1-in-100 year storm event, increased by 20% for the predicted effects of climate change. Both attenuation ponds will drain to the east and outfall into an existing 900mm storm sewer that was installed as part of the R120 upgrade works to the east of the Proposed Development site. The Pinnacle Consulting Engineers, Flood Risk Assessment and the Engineering Planning Report review the existing and proposed surface water environment and accompanies the planning application for the Proposed Development.

Foul drainage infrastructure

15.14 The Proposed Development will discharge via a 225mm gravity sewer to the existing 450mm connection granted under SDCC Reg. Ref. SD19A/0042 / An Bord Pleanála Ref. ABP-305948-19 and then into a 450mm spur connection located along the eastern boundary of the site. This sewer then connects into the Grange Castle Business Park pumping station; and from there into 3 no. rising mains into the local infrastructural network.

15.15 All foul effluent generated is directed via gravity and regional pumping stations to the regional Wastewater Treatment Plant at Ringsend in Dublin for ultimate disposal. All foul drainage infrastructure is under the administrative control of Irish Water. It is noted that separate foul and storm water drainage systems service the Proposed Development site. Further detail in relation to wastewater discharge is presented in the Pinnacle Consulting Engineers, Engineering Planning Report, and Chapter 8 Hydrology.

15.16 A pre-connection enquiry (PCE) form was submitted to Irish Water in February 2021 which addressed water demand for the development. The waste water infrastructure that will connect into the Grange Castle pumping station will demonstrate that the arterial infrastructure are in compliance with requirements of Irish Water Code of Practice and Standard Details and in adequate condition and capacity to cater for additional load from the Proposed Development.

Water supply

15.17 The Proposed Development site will be supplied from the mains water supply from the previously granted 150 mm Ø network within the site as permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948. This is fed from the existing 400mm Ø trunk main located along the R120 to the east of the site.

15.18 A completed Pre-Connection Enquiry form was submitted to Irish Water in February 2021. Potable water resources are under the administrative control of Irish Water who have been consulted and are continuing to be engaged with in terms of water supply to ensure that suitable measures are discussed and agreed with them to maintain adequate water supply.

Characteristics of the Proposed Development

Construction phase

Power and Electrical Supply

15.19 During construction, contractors will require power for heating and lighting of the site and their onsite construction compound. The power requirements will be relatively minor. It is proposed that a temporary power supply be established for the construction phase.

15.20 An existing 110kV overhead power line traverses the northern part of the site, as illustrated on the drawings prepared by Henry J Lyons Architects which accompanies the planning application. This power line will be unaffected by the Proposed Development. Any diversion of other existing electrical services will be carried out in consultation with ESB Networks to ensure there is no impact on existing users.

Telecommunications

15.21 Telecommunications including fibre required during the construction phase will be provided via a temporary mobile connection. A fibre optic cable distribution network will be installed within the site for the entire Proposed Development. The installation of a new fibre optic cable network on the site will be carried out in accordance with best practice standards. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

Surface water and foul drainage infrastructure and water supply

15.22 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. A temporary connection to the mains water supply will be established for the construction phase. The water demand during the construction phase will not be significant enough to affect existing pressures. A temporary connection to the foul water drainage network will also be required. The foul water drainage network has sufficient available capacity for the wastewater discharges from the welfare facilities for the short to medium term construction phase. Approval for temporary connections to the water supply and foul water drainage network will be sought from Irish Water by the contractor. If any storm water collects in the excavations during construction, it will need to be discharged to sewer. Any discharge water will be treated using a silt-buster or similar to removed suspended solids prior to discharge.

Operational phase

Power and electrical supply

15.23 The Proposed Development includes the construction of 3 no. power plants that will be constructed in a phased basis to provide power, in the short-term, to the permitted development as granted under

SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948, the Proposed Development and a potential future development. The new cabling within the site will include the drilling and laying of ducts and cables under or adjacent to the new road infrastructure proposed.

15.24 The permanent power supply to the overall development of the entire site will be provided via the permitted two storey 110kV GIS Substation with associated transformer compound that is located centrally within the Proposed Development site and to the east of the proposed data centre. This will be connected via an 110kV transmission line from a suitable connection / substation that is yet to be determined by Eirgrid. The application for the provision of the transmission lines, which do not form part of this application, may be determined as Strategic Infrastructure Development (SID) through the pre-application consultations with the Board. It is planned to construct the permitted GIS Substation during the later part of the construction phase of the Proposed Development. It is proposed to commence in Q2, 2022 and be completed in Q3, 2024. The GIS Substation and transmission line will be designed to support power demand for the full development of the Proposed Development of the site.

15.25 There is a requirement for the Power Plants to provide both a short-term and back-up power solution to the Proposed and Permitted Development. This is due to the Flexible Demand conditional Eirgrid offer that is in place for the site. This requires a back-up solution to the National Grid above that of the temporary diesel generators, once the Proposed Development is connected to the National Grid. This is due to the constrained nature of the National Grid within the Greater Dublin area.

15.26 In the event of a loss of power supply to the site (i.e. temporary grid blackout), the 24 no. diesel powered back-up generators will be activated, but not the Gas Powered Plants. These generators are designed to automatically activate and provide power to the Proposed Development pending restoration of mains power. Based on the Operator's experience, the back-up generators will rarely be used other than for routine testing. The Proposed Development will have an overall maximum operational demand of 30MW.

Telecommunications

15.27 The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator. The fibre optic cable distribution network within the Proposed Development site will be maintained and managed by the Operator.

Surface water infrastructure

15.28 Any new development must adhere to the Surface water infrastructure design requirements of SDCC and the Design Guidelines of the Regional Code of Practice for Drainage Works and the Greater Dublin Strategic Drainage Study. The proposed drainage network has been designed to convey the captured storm water on site and to direct it to proposed attenuation areas. The storm water system has been modelled to ensure no physical clashes with other utilities, notably the proposed foul drainage system.

15.29 The drainage design requirements as set out in the Engineering Planning Report by Pinnacle, Consulting Engineers states that the Proposed Development and other developments on the overall site must restrict post development run-off rates to the pre-development greenfield rates. In practice to accommodate this requirement, on site storage will be provided to temporarily store rainwater generated on site. The permitted and proposed attenuation areas have been sized to accommodate all storm water generated from runoff from building roofs, yards and the proposed road network. In total due to the size of the Proposed Development a number of attenuation methods are proposed that include two attenuation ponds and dry swales. The attenuation pond, proposed under this application has a capacity of c. 4,000m^3. An addition 304m^3 of storage is provided within the pipe network within the site. The pond has been sized to accommodate the predicted storm water volumes generated during a 1-in-100 year storm event, increased by 20% for the predicted effects of climate change as detailed within the Engineering Planning Report by Pinnacle, Consulting Engineers.

15.30 A second design requirement for the storm water system is to comply with the general principles of sustainable urban drainage, this requires that storm water generated on site is passed through a treatment process to enhance its overall quality prior to discharge. Flows from the development will be limited to 9.6 l/sec via hydro-brake flow control device. Further details on these are provided in the

Engineering Planning Report by Pinnacle Consulting Engineers that accompanies the planning application.

Foul drainage infrastructure

15.31 Domestic effluent arising from occupation of the data centre facility buildings will be collected in foul sewers within the site and discharged to the existing Grange Castle pumping station. The proposed foul network has been designed in accordance with the requirements of Part H of the Building Regulations, and the Irish Water's Code of Practice for Wastewater Infrastructure. The effluent from the Proposed Development discharges into the local pumping station and ultimately discharges to the municipal Waste Water Treatment Plant (WWTP) at Ringsend.

15.32 Based on the nature and extent of the Proposed Development, the peak discharge will be 0.54litres/s. The overall wastewater discharge is presented in the Engineering Planning Report by Pinnacle, Consulting Engineers that accompanies this planning application. Further reference is made to the sewerage and waste water treatment system in Chapter 8 Hydrology.

Water supply

15.33 The proposed internal potable water network is to be designed in accordance with Irish Waters Code of Practice for Water Infrastructure. It is proposed to take a connection off the already permitted 150mm network with the the site which will feed off the existing 400mm trunk main along the R120. The proposed main, hydrants, values and bedding details are all designed to Irish Water standards.

15.34 Water is required for cooling equipment, cleaning, general potable supply for drinking and sanitary facilities, in addition to fire fighting requirements. It is proposed that water requirements will be sourced from mains water supply. As noted in the previous section and in the Engineering Planning Report *by Pinnacle Consulting Engineers*, a PCE (Ref. CDS21000754) was submitted to IW in February 2021 which addressed water demand for the development. Further discussions are ongoing with Irish Water.

Potential impacts of the Proposed Development

Construction phase

Power and electrical supply

15.35 During construction, contractors will require power for heating and lighting of the site and their onsite accommodation. In addition, some on site equipment/plant will require power. A construction compound and temporary power supply will be installed for the construction of the Proposed Development. The power requirements for the construction phase will be relatively minor and therefore the power demand for the construction phase will have a short to medium term imperceptible impact.

15.36 As the construction of the proposed electricity connection to the Power Plants and Data Centres are entirely within the red line boundary, it is not anticipated that this would have any offsite impact until such time as a future SID application is made. This connection will not be in place prior to the construction compound being installed. Excavations within the vicinity of existing electrical services will be carried out in consultation with ESB Networks to ensure there is no impact on existing users.

15.37 The potential impact associated with power and electrical supply for the construction phase will be a ***short to medium term, neutral and imperceptible***.

Telecommunications

15.38 Telecommunications including fibre required during the construction phase will be provided via a mobile connection. A fibre optic cable distribution network will be installed within the site for the entire Proposed Development from the permitted development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator. The potential impact associated with telecommunications for the construction phase will be a ***short to medium term, neutral and imperceptible***.

Surface water infrastructure

15.39 The Proposed Development site does not contain any existing surface water drains and currently drains into the field drains and drains along the R120 Adamstown Road.

15.40 Mitigations will be put in place to manage run-off during the construction phase. Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (such as silt traps, silt sacks and settlement tanks/ponds). As the surface water connection works are entirely within the Proposed Development site, these works would not have any potential offsite impact.

15.41 The length of the construction period (3.5 years) will mean that all the proposed attenuation pond will be in place prior to the commencement of works in relation to Power Plant 2 and 3. In order to mitigate any impact on surface water runoff a new surface water drainage network with a new attenuation pond to the north with the RU zoned lands will be constructed as part of the Proposed Development. The full proposed attenuation system for the Permitted and Proposed Development will be in place prior to the completion of Power Plant 1 and therefore will be operational during the construction phase of the Proposed Development.

15.42 The potential impact on surface water for the construction phase is ***short to medium term, neutral*** and ***imperceptible***.

Foul drainage infrastructure

15.43 Welfare facilities (canteens, toilets etc.) will be required for the construction compound and workers on site. Portable toilets will be provided onsite for construction staff. The works contractor will be required to apply to Irish Water for connection to discharge any surface water which collects in excavations, if it is required. The works contractor will be obliged to comply with any conditions of the discharge license to control discharge quality and rate of flow.

15.44 The connection to the existing Grange Castle pumping station outside the red line boundary of the site would not have any offsite impact beyond the works to the local road infrastructure during its implementation. This will not negatively impact the existing foul drainage network.

15.45 The potential impact on foul drainage for the construction phase is ***short to medium term, neutral*** and ***imperceptible***.

Water supply

15.46 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. This will be provided by a temporary connection into the existing watermain along the eastern boundary of the site, which is fed from the public supply. The demand during the construction phase will not be significant enough to affect existing pressures.

15.47 As the connection works would not have any perceptible offsite impact. The potential impact associated with water supply for the construction phase is ***short to medium term, neutral*** and ***imperceptible.***

Operational phase

Power and electrical supply

15.48 The Proposed Development will have a maximum operational electrical demand of 30MW. It has been confirmed by discussions with Eirgrid that there is sufficient power available from the existing area network for the Proposed Development subject to their Flexible Demand Offer. This will require the Power Plant to provide permanent back up power to the data centre development as proposed and permitted above and beyond the ability of the diesel back-up generators that have limited capacity to operate as back-up generators.

15.49 There is a potential ***long-term, neutral, moderate*** effect on power and electrical supply during the operational phase of the Proposed Development.

Telecommunications

15.50 There is sufficient capacity available in the network to accommodate the development, so there are ***no potential impacts*** associated with telecommunications for the Proposed Development for the operational phase.

Surface water infrastructure

15.51 It is proposed to collect the surface water runoff from the Proposed Development and discharge an attenuated flow via the proposed attenuation pond to the existing surface water drainage network.

15.52 If the surface water runoff is not attenuated to acceptable flows, there is potential for an increase in surface water flow offsite due to the higher runoff generated following development of the site. The allowable discharge rate is 9.6l/s as determined in the Engineering Planning Report by Pinnacle Consulting Engineers. This runoff rate will not be exceeded, as addressed in Chapter 8 (Hydrology) and the Engineering Planning Report.

15.53 The potential impact associated with surface water for the operational phase is ***long term, neutral*** and ***imperceptible***.

Foul drainage infrastructure

15.54 It is proposed to collect the foul sewerage from the Proposed Development and discharge via a 225mm pipe into the existing 450mm connection into the Grange Castle Pumping Station. The wastewater discharged from the Pumping Station will ultimately discharge to the Ringsend WWTP and will not materially impact on its capacity.

15.55 The potential impact associated with foul drainage for the operational phase is ***long term, neutral*** and ***imperceptible***.

Water Supply

15.56 The water supply will be sourced from mains water supply via a 150mm connection from the already permitted connection of the Permitted Development to serve the Proposed Development site. The design requires a peak water demand of up to 0.43 litres per second (l/s). Where water demand is required during a short term drought, additional supply can be provided from an alternative source such as tanker supply.

15.57 The potential impact associated with water supply for the operational phase is ***long term, neutral*** and ***imperceptible***.

Remedial and mitigation measures

Construction phase

15.58 Construction of the Proposed Development will require connections to water supply and drainage infrastructure, power and telecommunications. Ongoing consultation with SDCC, Irish Water, Eirgrid, ESB and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community.

Power and Electricity Supply

15.59 The power demand for the construction phase will be relatively minor and the temporary connection works are entirely within the Proposed Development site, so that this would not have any potential offsite impact. The excavation of trenches within the vicinity of existing electrical services will be carried out in consultation with ESB Networks to ensure there is no impact on existing users. Once completed,

ESB Networks will be mobilised to complete the commissioning in accordance with the ESB Network requirements. No remedial or mitigation measures are required in relation to power supply for the construction phase.

Telecommmunications

15.60 A fibre optic cable distribution network will be installed within the site for the Proposed Development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator. No remedial or mitigation measures are required in relation to telecommunications.

Surface water infrastructure

15.61 Run-off water containing silt will be contained on site and treated to ensure adequate silt removal. The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to service in existing surface water drainage network. There will not be any interruptions to service in existing surface water sewers. Should interruptions to surface water infrastructure be anticipated, they will be agreed in advance. Strict quality control measures as outlined under the CEMP of the contractor will be undertaken while laying pipes to minimise or eradicate infiltration (where existing water in the ground enters the surface water infrastructure) and ex-filtration (where water in the surface water infrastructure escapes into the ground).

Foul drainage infrastructure

15.62 A temporary connection to the foul water drainage network will be made and is required for the welfare facilities for the construction staff. The foul water drainage network has sufficient available capacity for the wastewater discharges from the welfare facilities for the short term construction phase.

15.63 The works contractor will be obliged to put a number of measures as outlined in Chapter 2 of this EIA Report and will be detailed within the CEMP in place to ensure that there is no impact on the existing foul drainage network during the construction works.

15.64 Foul drainage construction for the Proposed Development will be in accordance with the relevant standards for design and construction, including the Irish Water Code of Practice for Wastewater Infrastructure, The Building Regulations Technical Guidance Document 'Part H' & the Regional Code of Practice for Drainage Works. Strict quality control measures that will be outlined within the CEMP will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

15.65 Portable toilets will be provided for construction staff. The existing sewer will be extended into the site to facilitate the Proposed Development. As the construction works are entirely within the site boundary and business park, this would not have any offsite impact. The works contractor will be obliged to put a number of measures in place as outlined under the CEMP to ensure that there is no impact on the foul drainage network of the business park. Strict quality control measures as outlined under the CEMP will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

Water supply

15.66 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. A temporary connection will be put in place for the construction phase. As the connection works are entirely within the Proposed Development site, and would therefore not have any potential offsite impact. The works contractor will be obliged to put best practice measures in place as outlined within the CEMP and elsewhere to ensure that there are no interruptions to service from the existing watermain. There will not be any interruptions to service from the existing water main, but should interruptions be required, they will be agreed in advance. Strict quality control measures as set out as best practice and as outlined under the CEMP will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

Operational phase

Power and electricity supply

15.67 Eirgrid's All-Island Generation Capacity Statement 2017-2026 (published April 2017) sets out that Eirgrid has the capacity to provide for such developments and has factored this demand in its projections out to 2026. The Flexible Demand offer from Eirgrid requires an onsite energy generation solution for the site in the case where there are capacity issues on the National Grid. The Power Plants, as well as providing short term permanent power will also provide mitigation back-up power supply in line with the Eirgrid offer for the site.

15.68 The *Heat Recovery Feasibility Report* that accompanies this planning application also describes how waste heat associated with the facility has the capacity with a future district heating scheme developed by others. Further detail is provided in the *Heat Recovery Feasibility Report by Ethos engineering* which accompanies the planning application.

Telecommunications

15.69 There is sufficient capacity available in the area network for the Proposed Development. Therefore, no remedial or mitigation measures are required in relation to telecommunications.

Surface water infrastructure

15.70 The surface water drainage system for the Proposed Development incorporates runoff control in the form of attenuation, which will restrict discharge from the Proposed Development to the allowable greenfield runoff rate. The attenuation storage and interceptors allows for any detritus material to be removed from the water and aids in particulate removal, increasing overall storm water quality prior to disposal.

15.71 To limit the discharges from the attenuation zones to pre-development levels flow control devices are required. It is proposed to use 'Hydrobrake' flow control systems to achieve the required discharge rates. SuDS measures will prevent an increase in the rate of surface water runoff offsite. The allowable greenfield runoff rate has been established by the project engineers, Pinnacle, Consulting Engineers, using the methodology set out in the Water Services Report. A Class 1 Bypass Oil Separator will be used to treat runoff prior to discharging from site.

Foul drainage infrastructure

15.72 Foul drainage for the Proposed Development will be in accordance with the Building Regulations Technical Guidance Document H for design and construction and Irish Waters Code of Practice for Wastewater Infrastructure. The foul drainage network will be maintained by maintenance staff to ensure system is fit for purpose and to address any operational issues should they arise over the life time of the Proposed Development.

15.73 No additional remedial or mitigation measures are required in relation to foul drainage infrastructure.

Water supply

15.74 Cold water storage tanks will be provided as part of the Proposed Development; pumps will supply water to the Proposed Development from the storage tanks. The storage tanks will act as break tanks and buffer demand on the public watermain infrastructure. Further discussions are ongoing with Irish Water. No remedial or mitigation measures are required in relation to water supply.

Predicted impacts of the Proposed Development

Construction phase

Power and Electricity Supply

15.75 Power for the construction phase will be made available via the temporary power supply. The predicted impact will be ***short to medium term***, ***neutral*** and ***imperceptible*** for the construction phase.

Telecommunications

15.76 The predicted impacts associated with telecommunications for the Proposed Development for the construction phase will be ***short to medium term***, ***neutral*** and ***imperceptible*** for the construction phase.

Surface Water Infrastructure

15.77 The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to service in existing surface water sewers. There will not be any interruptions to service in existing surface water sewers, but should interruptions be anticipated, they will be agreed in advance. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration (where existing water in the ground enters the surface water infrastructure) and ex-filtration (where water in the surface water infrastructure escapes into the ground).

15.78 The predicted impact will be ***short to medium term***, ***neutral*** and ***imperceptible*** for the construction phase.

Foul drainage infrastructure

15.79 The works contractor will put appropriate measures as outlined in the CEMP in place to ensure that there are no impact on the existing foul drainage network. Foul drainage for the Proposed Development will be in accordance with the Building Regulations Technical Guidance Document H for design and construction. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration. The predicted impact will be ***short to medium term***, ***neutral*** and ***imperceptible*** for the construction phase.

Water supply

15.80 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. A temporary connection will be put in place for the construction phase. As the connection works are entirely within the Proposed Development site, it not anticipated that this would have any offsite impact. The works contractor will be obliged to put best practice measures and as outlined in the CEMP in place to ensure that there are no interruptions to service from the existing watermain. There will not be any interruptions to service from the existing water main, but should interruptions be anticipated, they will be agreed in advance. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.

15.81 The predicted impact will be ***short to medium term***, ***neutral*** and ***imperceptible*** for the construction phase.

Predicted impact – construction phase

15.82 The nature of the impacts of the different elements of the Proposed Development and the implementation of mitigation measures detailed in this chapter will ensure that the predicted impacts on the material assets will be *short to medium term*, *neutral* and *imperceptible* for the construction phase.

Operational phase

Power and electrical supply

15.83 Eirgrid's All-Island Generation Capacity Statement 2017-2026 (published April 2017) sets out that Eirgrid has the capacity to provide for such developments and has factored this demand in its projections out to 2026. Furthermore, it has been confirmed by discussions with Eirgrid that there is sufficient power available from the existing area network for the Proposed Development. However, the nature of their Flexible Demand Offer; and the timeline for when permanent power will be available at the site requires both a short-term permanent power supply that is off-grid; as well as a permanent back-up power supply above that provided by the diesel generators.

15.84 The *Heat Recovery Feasibility Report* describes how waste heat associated with the facility could be utilised with a future district heating scheme developed by others. Further detail in terms of energy efficiency of mechanical systems; ventilation systems and lighting is provided in the *Heat Recovery Feasibility Report* in accordance with the Energy Efficiency Directive 2012/27.

15.85 It is predicted that there will be a ***long-term, neutral, moderate*** effect on power and electrical supply during the operational phase of the Proposed Development.

Telecommunications

15.86 Network capacity for the Proposed Development will be readily available via the fibre network in the area. There are ***no predicted impacts*** associated with telecommunications for the Proposed Development for the operational phase.

Water supply

15.87 On-site water storage is and will be provided at each of the proposed data centre facilities, which buffers demand on the public watermain infrastructure. The predicted impact will be ***long-term***, ***neutral*** and ***imperceptible*** for the operational phase.

Foul drainage infrastructure

15.88 The operator has engaged with Irish Water and SDCC to ensure that there is sufficient capacity in the public sewer to cater for the Proposed Development. The predicted impact will be ***long-term***, ***neutral*** and ***imperceptible*** for the operational phase.

Surface water infrastructure

15.89 The Proposed Development will incorporate SuDS in the form of attenuation, swales and other measures. The project engineers, Pinnacle, Consulting Engineers, have determined the allowable discharge rate from the site will be 9.6l/sec, which is the equivalent greenfield runoff rate for the site catchment area. The SUDS measures and flow control device will be used to limit surface water runoff to the allowable greenfield runoff rate. The discharge from site will pass through hydrocarbon interceptors to remove any hydrocarbons and screen rubbish, debris and sediment from the surface water.

15.90 The predicted impact will be ***long-term***, ***neutral*** and ***imperceptible*** for the operational phase.

Predicted impact – operational phase

15.91 The nature of the impacts of the different elements of the Proposed Development and the implementation of mitigation measures will ensure that the predicted impacts on the material assets will be ***long-term***, ***neutral*** and ***not significant.***

Residual impacts

15.92 The Proposed Development entails minimal use of material assets examined in this chapter (i.e. power and electrical supply, telecommunications, surface water infrastructure, foul drainage infrastructure and water supply) during construction. The overall predicted impact of the Proposed Development can be classed as ***neutral, long-term*** and ***not significant*** with respect to material assets.

15.93 Interactions are addressed in Chapter 16 of this EIA Report.

16. INTERACTIONS

16.1 This chapter of the EIA Report addresses potential interactions and inter-relationships between the environmental factors discussed in the preceding chapters. This covers both the construction and operational phase of the Proposed Development.

16.2 As a requirement of the EIA Directive, the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015, not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed.

16.3 In the main, the majority of EIA Report chapters have already included and described assessments of potential interactions between aspects however this section of the assessment presents a summary and assessment of the identified interactions. These interactions have been identified and considered by the various specialists contributing to this impact assessment.

16.4 The Project Team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the Proposed Development.

DISCUSSION – POSITIVE IMPACTS

16.5 Interactions that are considered to have a positive effect (i.e. a change which improves the quality of the environment) are outlined in this section.

Planning and Alternatives on:

Population and Human Health

16.6 The Proposed Development will create up to 150 no. permanent full-time jobs (excluding maintenance contractors and visitors) and up to 250 temporary jobs during the construction phase, which will have a ***long-term***, ***positive and short – medium term*** effect on employment in the west Dublin and wider area.

Landscape and Visual on:

Biodiversity

16.7 The construction of the Proposed Development will involve the removal of some of the existing landscaping. However, this will be replaced by other suitable landscaping treatments and overall will have a ***long-term, slight*** and ***positive*** impact.

DISCUSSION – NEUTRAL IMPACTS

16.8 Interactions that are considered to have a neutral effect (i.e. no effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error) is outlined in this section.

Land, Soils, Geology and Hydrogeology on:

Population and Human Health

16.9 There will be a loss of soil available for agricultural use due to the development. However, within the overall context of Ireland's available farmland, the loss is considered negligible. In addition, the employment created by the construction and operation of the Proposed Development counterbalances this economic loss and so the impact is ***long-term, imperceptible*** and ***neutral***.

Hydrology

16.10 The main potential impact of the construction works proposed is on surface water quality (due to sediment laden run-off, material spillages) and groundwater quality (due to removal of protective soil) in the environs of the construction area; however, the implementation of a CEMP as detailed in Chapter 2 (Description of the Proposed Development) and Chapter 8 (Hydrology) will ensure the effect will be ***short to medium term, imperceptible*** and ***neutral***.

Biodiversity

16.11 The local loss of agricultural land as a result of site development, which is considered to be of no significant ecological value, is negligible.

Air Quality and Climate

16.12 There is a potential for the construction activity to impact on air quality in terms of dust generated but mitigation measures outlined in both Chapter 7 (Land, Soils, Geology & Hydrogeology) and Chapter 10 (Air Quality & Climate) of this EIA Report, implemented through the CEMP, will ensure a ***short to medium term, not significant*** and ***neutral*** effect.

Cultural Heritage

16.13 Archaeological assessment and investigation of the Proposed Development site has identified features of archaeological interest on the site. The Proposed Development has the potential to impact on unidentified archaeological features during construction works. However, mitigation measures detailed in Chapter 13 (Cultural Heritage) will ensure that the effect is ***long-term, imperceptible*** and ***neutral***.

Waste Management

16.14 As detailed in Chapter 14 (Waste Management), c. 16,200m^3 of excavated soil may be generated from the site preparation, excavations and levelling works required to facilitate construction. It is anticipated that all of this soil will be reused on site. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 14 and the requirements of the C&D Waste Management Plan (included as Appendix 14.1), will ensure the effect is ***long-term, imperceptible*** and **neutral.**

Hydrology on:

Population and Human Health

16.15 The Proposed Development will generate wastewater emissions (foul water) from the site. This will discharge via a new connection to the Grange Castle Pumping Station and ultimately discharge to the Local Authority wastewater treatment plant (WWTP) at Ringsend in Dublin. The effect is considered to be ***long-term, imperceptible*** and ***neutral***.

Land, Soils, Geology and Hydrogeology

16.16 As there is potential for direct run-off to a watercourse to off the site via local drainage ditches, mitigations will be put in place to manage run-off during the construction phase. Surface water during the construction phase of the Proposed Development will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds) (please refer to Chapter 8 (Hydrology)). Any surface water run-off will be attenuated to the greenfield runoff rate for the site. The effect will be ***short to medium term***, ***imperceptible*** and ***neutral***.

Biodiversity

16.17 The Proposed Development will result in increased surface water run-off. Any surface water run-off will be attenuated to the existing greenfield runoff rate and will be discharged offsite via the proposed 1 no. attenuation ponds and associated other measures with both the proposed and permitted attenuation ponds draining to the east into an existing culvert. The hydrocarbon interceptors,

attenuation storage and flow control device ensure emissions are controlled. The nearest European designated site is located c. 5km north-west of the Proposed Development site. A tributary of the Griffeen River, the Baldonnel Stream, flows east-west through the Proposed Development site and connects it to European sites in Dublin Bay c. 17km to the east via the surface water network. These and other sites are considered to fall well outside the zone of influence of the Proposed Development due to the lack of source-pathway-receptor links. The predicted effect will be ***long-term*** and ***neutral.***

Waste Management

16.18 Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the Proposed Development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 14 such that the effect of the waste generation will be ***long-term, imperceptible*** and ***neutral.***

Air Quality and Climate on:

Hydrology

16.19 Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised and therefore the predicted effect from air (including dust) on the water environment during construction is ***short to medium term, imperceptible*** and ***neutral.*** The operational procedures and other general site maintenance regime in accordance with the Environmental Safety and Health Management System for the facilities will ensure that the impact of the facility complies with all ambient air quality legislative limits and therefore the predicted impact from air (including dust) on the water environment is ***long term, imperceptible*** and ***neutral.***

Biodiversity

16.20 Mitigation measures during the construction phase of the Proposed Development will ensure that dust generation is minimised and the effect on biodiversity will be ***short to medium term***, ***imperceptible*** and ***neutral.*** Results from the modelling of air emissions including emissions from back-up generators during the operational phase show that the emissions from the facility will comply with the relevant air quality legislative limits, and as such there will be a ***long-term, imperceptible, neutral*** effect on biodiversity.

Noise and Vibration on:

Population and Human Health

16.21 The potential impact of noise and vibration on the local population is discussed in Chapter 5 (Population and Human Health) and Chapter 9 (Noise & Vibration). Due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be negative but short term. The noise levels that are encountered at the nearest noise sensitive locations are predicted to be within relevant noise criteria that have been adopted for the operation of the proposed data centre facilities and associated infrastructure. These criteria have been selected with due consideration to human health, and as such there will be a ***long term, not significant***, ***neutral*** effect on human health.

Waste Management on:

Population & Human Health

16.22 The potential impacts on human beings in relation to the generation of waste during the demolition, construction and operational phases are that incorrect management of waste could result in littering which could cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&DWMP and the mitigation measures outlined in chapter 14 of this EIA Report, will ensure appropriate management of waste and avoid any negative impacts on the local population long-term, imperceptible and neutral.

Land, Soils, Geology and Hydrogeology

16.23 Excavated soil and stone may be generated from the site preparation, excavations and levelling works required to facilitate construction. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 14 and the requirements C&D Waste Management Plan (included as Appendix 14.1) to ensure that soils take from site are reused appropriately, will ensure the effect is short-term, imperceptible and neutral.

Hydrology

16.24 Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the Proposed Development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 15 such that the effect of the waste generation will be long-term, imperceptible and neutral.

Traffic

16.25 Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the site during the construction and operational phases of the development. However due to the reuse of the majority of soil on site this will be minimised. The increase in vehicle movements as a result of waste generated during the construction phase will also be temporary in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase but these movements will be imperceptible in the context of the overall traffic and transportation increase and has been addressed in Chapter 15 Traffic and Transportation. Provided the mitigation measures detailed in Chapter 15 are adhered to, the effects should be short to long-term, imperceptible and neutral.

Traffic on:

16.26 The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

Air Quality

16.27 The Air Quality and Climate Chapter of this EIAR states that the impact of the Proposed Development on air quality and climate is considered Long-term and imperceptible for the Operational Stage of the Proposed Development. The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the Proposed Development.

16.28 There is the interaction between Land and Soils Chapter where the import and export of construction materials is considered. It is noted that the designs have been developed to achieve a near balance of the cut and fill materials on site, which minimise construction related traffic. The associated construction traffic has been considered in the construction stage impacts and Construction Management Plan included with the application.

16.29 Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.

Human Health

16.30 During the construction stage, the risk of accidents associated with the Proposed Development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to reduce the risk of road traffic accidents during the construction phase. Furthermore, it is expected that the risk of accidents would be low during the construction of the Proposed Development considering the standard construction practices which are to be used and no unusual substance or underground tunnelling works required or predicted.

16.31 A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts which are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified. There will be a slight increase in traffic on the local road network.

Material Assets on:

Population and Human Health

16.32 The Proposed Development will have an impact on material assets such as surface water drainage, water supply, wastewater drainage, power supply and road infrastructure. The individual chapters of this EIA Report (Chapter 12 Traffic and Transportation and Chapter 15 Material Assets) have assessed the capacities of the available infrastructure to accommodate the Proposed Development and the implementation of the mitigation measure proposed in each of these chapters will ensure there are no residual negative impacts on the local population. The predicted effect is therefore ***imperceptible*** to ***not significant*** and ***neutral***.

Hydrology

16.33 The Proposed Development will result in changes to surface water drainage, water supply and wastewater networks. However, a combination of mitigation measures to be implemented as detailed in Section Chapter 8 (Hydrology), as well as the capacity already built into these networks, will ensure that these changes will result in a ***long-term, imperceptible*** and ***neutral*** impact.

DISCUSSION – NEGATIVE IMPACTS

16.34 The interactions that are considered to have a negative effect (i.e. a change which reduces the quality of the environment) is outlined in this section.

Noise on:

Biodiversity

16.35 Noise generated during the construction phase of the Proposed Development will have a ***short to medium term negative*** impact on fauna which are likely to be displaced during construction works.

Air Quality and Climate on:

Landscape

16.36 The Proposed data centre will include a series of generator flues that will be grouped in eight groups of three attached along its eastern elevation. The Proposed Power Plants will include a series of generator flues that will be grouped in six groups of two, three and four flues and attached along their western elevation (Power Plants 1 and 3), and eastern elevation (Power Plant 2). The uppermost part of the flues of the Data Centre and Power Plants, at 25m in height, will extend above each facility, and will be visible– either against the sky or against a backdrop of landscape depending on the relative elevation of the vantage point.

16.37 The site is part of a suitably zoned commercial/industrial area, the flues have been designed as an integral part of the overall architectural design. The development, including the flues, will be consistent with the emerging landscape character of the area and will be minimal. The residual impact will not be significant and will generally range from ***imperceptible/not significant*** and ***negative / neutral*** from the surrounding area.

Population and Human Health

16.38 The mitigation measures set out in Chapter 10 (Air Quality and Climate) that will be put in place at the proposed facility will ensure that the impact of the facility complies with all ambient air quality legislative limits and therefore the predicted impact is ***long term, imperceptible*** *to* ***slight*** and ***negative.***

Land, Soils, Geology and Hydrogeology on:

Noise

16.39 Impacts associated with excavation works will be transient in nature and have a short to medium term impact on the noise environment, which will be mitigated by the implementation of the construction noise and vibration management plan outlined in Appendix 9.3. The effect will be ***slight, negative*** and ***short to medium term*** in duration.

Landscape and Visual on:

Population and Human Health

16.40 The predicted impact of the Proposed Development on the landscape is described in Chapter 11. The Proposed Development includes architectural and landscape proposals that will ensure the development is integrated into its setting, including the use of landscaped berms and planting which will provide visual screening. Residual landscape and visual effects from the wider locality arising from the Proposed Development will not be significant, and will generally range from ***not significant*** to ***moderate***, and ***negative*** but in accordance with emerging trends in the area.

SUMMARY

16.41 In summary, the interactions between the environmental factors and impacts discussed in this EIA Report have been assessed and the majority of interactions are ***long-term*** and ***neutra***l.

Table 16.1 Overview of potential interactions

Interaction	Planning and alternatives	Population and human health	Biodiversity	Land, Soils, Geology and Hydrogeology	Hydrology	Noise & vibration	Air Quality & Climate	Landscape and visual impact	Traffic	Cultural Heritage	Waste Mngmnt	Material assets
Planning and alternatives		✓	x	x	x	x	x	x	x	x	x	x
Population and human health			✓	✓	✓		✓	✓	✓	x	✓	✓
Biodiversity				✓	✓	✓	✓	✓	x	x	x	x
Land, Soils, Geology and Hydrogeology					✓	✓	✓	x	x	✓	✓	x
Hydrology						x	✓	x	x	x	✓	✓
Noise & vibration							x	x	x	x	x	x
Air Quality & Climate								✓	✓	x	x	x
Landscape and visual impact									x	x	x	x
Traffic										x	✓	x
Cultural Heritage											x	x
Waste management												x
Material Assets												

✓ - positive interactions between factors
✓ - neutral interactions between factors
✓ - negative interactions between factors
X – no interaction of note

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