

6.203 The Proposed Development will create a barrier to bird movement through the previously undeveloped lands. The landscape plans include treeline/hedgerow retention and also treeline planting in the north of the site, which will encourage birds to fly at higher flight lines near the buildings, and thus help to prevent bird collision and mortality associated with building collision.

Bats

Lighting

6.204 :

- Lighting levels should be the minimum required for health and safety requirements.
- Vertical light spill shall be minimized by the use of suitable cut off luminaires.
- No floodlighting should be used, this causes a large amount of light spillage into the sky. The spread of light should be kept below the horizontal.
- Lights should be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area.
- Narrow spectrum lighting should be used with a low UV component (UV filters can be used to reduce the UV component emitted by lights). Glass also helps reduce the UV component emitted by lights.
- The use of LED directional lighting (through the use of hoods, louvres, shields, or cowls) to restrict light to those areas where it is needed.
- Consideration the use of automatic sensor or dimming systems to minimise the duration and intensity of lighting on the site.

6.205 The technical details of the lighting plans for the Proposed Development include the following:

- Lighting will be restricted to the building perimeter, plant areas, roadways and car parking;
- All pathways will be illuminated using bollards;
- All columns will be a maximum of 5 metres high with sharp cut off luminaires, located to minimise light back spill; and,
- LED-based lighting.

6.206 These are in adherence with the guidance presented in relation to bats and lighting previously in this Chapter.

Collision Risk/Mortality

6.207 The Proposed Development will create a barrier to bat movement through the previously undeveloped lands. The landscape plans include treeline/hedgerow retention and also treeline planting in the north of the site, which will encourage birds to fly at higher flight lines near the buildings, and thus help to prevent bat collision and mortality associated with building collision.

Residual Impact of the Proposed Development

Construction and Operational Phases

6.208 Following the implementation of the mitigation measures outlined in Section above, the Proposed Development will not result in any significant residual effect on the Key Ecological Receptors identified (see Table 6.5) on its own, or cumulatively together with other Proposed Developments.

Table 6.5 Summary of the significant residual ecological effects of the Proposed Development during construction and operational stages.

Ecological Receptor	Ecological Valuation	Impacts Potentially Significant	with Significant	Potential Significance of Effects	Mitigation Measures	Compensation	Significance of Residual Effects
Designated Sites							
Grand Canal pNHA	National	Habitat fragmentation Introduction of non-native invasive species (butterfly-bush)		National	Baseline conditions of overlapping pNHA area to be retained with no modifications – buffer area of c. 50 m width will be in place between hardstanding development and the Grand Canal. Removal of non-native invasive species prior to construction	N/A	None
Habitats							
Dry meadows and grassy verges (GS2)	Local importance (higher value)	Permanent loss of habitat (c. 11.2ha) Introduction of non-native invasive species (butterfly-bush)		Local importance (higher value)	Removal of non-native invasive species prior to construction	Landscape planting outlined in Chapter 11 of the EIAR	None
Hedgerows (WL1)	Local importance (higher value)	Permanent loss of habitat (c. 0.371km) Introduction of non-native invasive species (butterfly-bush)		Local importance (higher value)	Removal of non-native invasive species prior to construction	Landscape planting outlined in Chapter 11 of the EIAR	None
Treelines (WL2)	Local importance (higher value)	Permanent loss of habitat (c. 0.128km) Introduction of non-native invasive species (butterfly-bush)		Local importance (higher value)	Mitigation measures to protect water quality	Landscape planting outlined in Chapter 11 of the EIAR	None
Fauna Species							
Badger	Local importance (higher value)	None		N/A	Pre-construction checks	N/A	None
Otter	County importance	Water quality impacts on prey availability		County importance	Mitigation measures to protect water quality	N/A	None
Small mammals	Local importance (higher value)	None		N/A	None	N/A	None
Breeding birds	Local importance (higher value)	Habitat loss Collision risk/mortality		Local importance (higher value)	Seasonal vegetation clearance Breeding bird surveys prior to vegetation clearance in breeding season These measures are in adherence for Wildlife Acts	Landscape planting outlined in Chapter 11 of the EIAR	None
Wintering birds	Local importance (higher value)	Habitat loss Collision risk/mortality		Local importance (higher value)	N/A	Landscape planting outlined in Chapter 11 of the EIAR	None
Raptors (non-Annex)	Local importance (higher value)	Habitat loss Collision risk/mortality		Local importance (higher value)	N/A	Landscape planting outlined in Chapter 11 of the EIAR	None

Bats	Local importance (higher value)	Habitat loss Collision risk/mortality	Local importance (higher value)	Bat sensitive lighting plans	Landscape planting outlined in Chapter 11 of the EIAR	None
Common frog	Local importance (higher value)	None	N/A	Pre-construction checks in adherence with Wildlife Acts	N/A	None
Common lizard	Local importance (higher value)	None	N/A	N/A	N/A	None
Fish (species of conservation concern)	County importance	Water quality impacts	County importance	Mitigation measures	N/A	None
Freshwater white-clawed crayfish	County importance	Water quality impacts	County importance	Mitigation measures	N/A	None

Cumulative impact

6.209 This section of the Biodiversity chapter presents the assessment carried out to examine whether any other Proposed Developments have the potential to act cumulatively with the Proposed Development to give rise to likely significant effects on biodiversity. As set out in the *South Dublin County Development Plan 2016-2022*, the Proposed Development site is largely zoned as 'EE' with a small area at the northern end of the site near the Grand Canal zoned as 'RU'. Lands to the south, west and east are similarly zoned for 'EE'.

Construction and Operation Phases

Surface and Foul Water

6.210 There is potential for cumulative or "in-combination" effects on water quality of downstream waterbodies located in the Liffey sub-catchment and Liffey and Dublin Bay catchment from any other projects carried out within the functional areas of the *South Dublin County Development Plan 2016-2022* (South Dublin County Council, 2016) and any other county level land use plans which can influence conditions in River Liffey: *Dublin City Development Plan 2016-2022* (Dublin City Council, 2016), the *Dún Laoghaire-Rathdown County Development Plan 2016-2022* (Dún Laoghaire-Rathdown County Council, 2016), the *Fingal Development Plan 2017-2023* (Fingal County Council, 2017), *South Dublin County Council Development Plan 2016-2022* (South Dublin County Council, 2016), or any other county level land use plans which can influence conditions in Dublin Bay via rivers and other surface water features.

Dublin Bay

6.211 The Proposed Development will not impact on the water quality in Dublin Bay, as concluded by the associated Appropriate Assessment screening report (Scott Cawley, 2021) and Hydrology chapter of this EIAR (AWN, 2021). Dublin Bay is currently unpolluted, and the Proposed Development will not result in any measurable effect on water quality in Dublin Bay. There are also protective policies and objectives in place at a strategic planning level to protect water quality in Dublin Bay (as outlined below and in Appendix 6.5). The pollutant content of future surface water discharges to Dublin Bay is considered likely to decrease in the long-term for the following reasons:

- An Bord Pleanála granted planning permission for an upgrade to the Ringsend Waste Water Treatment Plant (WWTP) in April 2019, which will increase capacity at the plant; and,
- An Bord Pleanála granted planning permission³⁰ for the Greater Dublin Drainage (GDD) Project which will involve the construction of a new regional wastewater treatment facility in Clonsilla in North County Dublin. the development of which will help alleviate capacity issues at Ringsend WWTP.

³⁰ An Bord Pleanála Case Reference PL06F.301908 - *Greater Dublin Drainage Project consisting of a new wastewater treatment plant, sludge hub centre, orbital sewer, outfall pipeline and regional bio solids storage facility*. Available online at www.pleanala.ie/casenum/301908.htm.

- 6.212 It is also an objective of the Greater Dublin Strategic Drainage Study, and all development plans within the catchment of Ringsend WWTP, to include Sustainable Urban Drainage Systems (SUDS) within new developments. The relevant development plans also have protective policies/objectives in place to protect water quality in the receiving freshwater and marine environments, and to implement the Water Framework Directive in achieving good water quality status for Dublin Bay.
- 6.213 Therefore, there is no possibility of any other plans or projects acting in combination with the Proposed Development to undermine the conservation objectives of any of the qualifying interests or special conservation interests of Natural Heritage Areas or European sites in, or associated with, Dublin Bay as a result of water quality effects.

Habitat Loss and Disturbance and/or Displacement

- 6.214 In the event that habitat loss of c.11.2ha of dry meadows and grassy verges (GS2), c.0.128km of treelines (WL2) and c.371km of hedgerows (WL1) coincided with the loss of similar habitats in the vicinity of the Proposed Development, the geographic scale of the effects could rise from local level only to county level, as these types of habitats are important for the biodiversity value of the locality and for local fauna (e.g. bats and breeding birds) in terms of providing foraging and breeding opportunities, and in addition, linear habitats create ecological corridors throughout the wider landscape. The adjacent lands around the Proposed Development are likely to continue to be developed for industrial purposes in the future, however areas to the north-west and north of the Proposed Development site are zoned as 'RU' in the *South Dublin County Development Plan 2016-2022* and are therefore likely to remain in their current use, it is unlikely that potential cumulative effects will occur.
- 6.215 There are potential impacts on fauna as a result of habitat loss arising from the development. In addition, there is potential for cumulative impacts on fauna in the area to arise as a result of habitat loss, if further hedgerows and treelines in the locality are removed, or semi-natural grassland areas are replaced by areas of hard standing or buildings and artificial surfaces. However, given the agricultural zoning of lands to the immediate west and already developed urban/industrial nature of the remaining surrounding environment, no significant cumulative effects are predicted that would increase the magnitude of the residual impacts associated with the Proposed Development as a result of habitat loss, in conjunction with the Proposed Development.
- 6.216 There are granted planning permissions for further industrial developments such as data centre developments, etc. in the vicinity of the Proposed Development site, some of which may be in construction at the same time as the Proposed Development. There is potential for cumulative impacts to arise with other local developments that would also result in the increased noise, vibration, human presence and lighting. Any disturbance effects from other such local developments are likely to be relatively minor in nature, temporary, localised and over a similarly short duration, they are not likely to cumulatively affect the bird or bat populations in conjunction with the Proposed Development considering that they have to adhere to the same policies and objectives of the South Dublin County Council Development Plan as the Proposed Development.

Protective Policies and Objectives and Conclusion

- 6.217 Any long-term effects on biodiversity are likely to be moderated by the environmental protective policies and objectives of the *South Dublin County Development Plan 2016-2022* and *Draft Biodiversity Action Plan for South Dublin County 2020-2026*.
- 6.218 There are general overarching policies in the *South Dublin County Development Plan 2016-2022* to ensure that proposals for development integrate the protection and enhancement of biodiversity (Policies G1 and G2) and to identify and protect sites of local biodiversity importance (Policy HCL15). There are also specific objectives to protect European sites and to prevent development that would adversely affect the integrity of any European site(s) (Policy HCL12), protect designated or proposed natural heritage areas (Policy HCL13), to ensure that development does not have significant impact on protected habitats and species (Policy HCL15), and to control and eradicate invasive species (Policy G2). The *South Dublin County Development Plan 2016-2022* also has specific policies and objectives relating to the protection of surface water and groundwater resources (e.g. Policies G3, IE1 and IE2) and the protection of air quality (Policy IE7).

- 6.219 Land use plans for the other local authorities (e.g. Meath County Council, Kildare County Council, Wicklow County Council and the Dublin local authorities) whose functional areas also include the Liffey and Dublin Bay catchment or other surface water catchments that drain to Dublin Bay, were examined and analysed and those land use plans also include protective environmental policies to protect biodiversity, designated sites for nature conservation and the receiving surface water, estuarine and marine environments.
- 6.220 Considering the predicted impacts associated with the Proposed Development, the mitigation measures proposed to protect the local biodiversity resource and the receiving environment, and the protective policies and objectives on the land-use plans that will direct future development locally, significant cumulative negative effects on biodiversity are not predicted.

Do-Nothing Impact

- 6.221 The continuation of the existing management practices at the Proposed Development site in a “do-nothing” scenario, would maintain the current habitats present; however, it is likely that the unmanaged dry meadows and grassy verges (GS2) habitat on site would continue to spread and overcome the improved agricultural grassland (GA1) and recolonising bare ground (ED3) over time. The Proposed Development site would continue to provide suitable foraging and breeding habitat for bird and small mammal species and suitable foraging habitat for common bat species. The downstream waterbodies would continue to sustain fish and freshwater white-clawed crayfish populations and otters feeding on them.
- 6.222 The lands are currently zoned under the South Dublin County Development Plan 2016-2022 for ‘*EE-Enterprise and Employment*’ with a small area at the northern end of the site near the Grand Canal zoned as ‘*RU-Rural and agriculture*’, and so majority of the lands would likely be developed for industrial or enterprise purposes in the future.

Monitoring

- 6.223 Not applicable. No ecological monitoring is required during the construction phase of development. The mitigation measures specifying review of the lighting plan by a bat ecologist may require additional surveys and monitoring during site construction and operation. The Local Authority may propose additional monitoring in order to address this.

Reinstatement

- 6.224 No reinstatement measures are proposed.

Difficulties Encountered

Survey Limitations

- 6.225 Breeding bird surveys were not carried out due to the timing of surveys outside the breeding bird season (March to August inclusive). However, the timing of the surveys does not pose any limitations on the ecological assessment of the subject lands, as the site is semi-urban and holds mostly common agricultural and garden species which can be identified after the end of the bird breeding season. No dedicated wintering bird or raptor surveys were undertaken within the lands, however, wintering birds and raptors were searched for extensively and recorded during the multidisciplinary field visits in 2018 and 2021. Therefore, this is not considered to have posed any significant limitations on the ecological assessment of the subject lands.
- 6.226 The static bat detectors deployed during the 2018 surveys (Scott Cawley, 2018) were deployed outside the optimum season for recording bat activity (May to August inclusive), however the weather was generally mild during the deployment period, suggesting that if bats were present, they may have been active, albeit at low levels. There was an error with one of the four static bat detectors deployed, therefore only three units collected data during the recording period. Furthermore, the static detector surveys were not more recently repeated in 2020/2021, although summer activity surveys were subsequently completed in 2019. and therefore this lack of repetition is not considered to have posed

any significant limitations on the ecological assessment of the subject lands. Due to vandalism and the derelict nature of some of the buildings within the proposed site, internal roof space inspections were restricted to areas which were safe. Due to such limitations, where necessary a precautionary approach to the impact assessment was taken to account for any deficiencies in the data.

- 6.227 Not all identified potential roost features (PRFs) for bats on trees within the site were investigated in detail using an endoscope, however, the mitigation measures recommended ensure that such detailed investigations (using infra-red illumination and video camera(s) and bat detectors) must take place before removal of trees on site, and therefore the former is not considered to pose any significant limitation on the ecological assessment of these PRFs within the subject lands.
- 6.228 The surveys in January 2021 also did not include dedicated amphibian presence/absence surveys, due to sub-optimal survey timings for these species. Common frog surveys are typically carried out in February and March and include searches for their spawn, while smooth newt surveys include specialist surveys involving trapping and/or night-time torching of suitable waterbodies between March and June. The aforementioned factors are not considered to pose any significant limitations on the ecological assessment of the subject lands due to lack of suitable habitat within the lands for smooth newt, and due to the mitigation recommendations proposed in this assessment for amphibians within the site.

7. LAND, SOIL, GEOLOGY AND HYDROGEOLOGY

7.1 AWN Consulting Ltd (AWN) has prepared this chapter of the Environmental Impact Assessment Report (EIAR) which assesses and evaluates the potential impacts of the development on the land, soil, geological and hydrogeological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

Methodology

Criteria for rating of effects

7.2 This chapter evaluates the effects, if any, which the development has had or will have on Land, Soils, Geology and Hydrogeology as defined in the Environmental Protection Agency (EPA) 'Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2017). The Draft EPA document entitled 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015) is also followed in this geological and hydrogeological assessment and classification of environmental effects. Due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document entitled 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI 2013). In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

7.3 The rating of potential environmental effects on the land, soil, geological and hydrogeological environment is based on the matrix presented in Table 1 in Appendix 7.1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the Draft EPA Guidelines (2017) publication).

7.4 The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short-term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

7.5 The NRA criteria for rating the magnitude and significance of impacts on the geological related attributes and the importance of hydrogeological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-5 in Appendix 7.1.

7.6 The principal attributes (and effects) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the Proposed Development;
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the Proposed Development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality;
- Natural hydrogeological/karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.

7.7 Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1: 100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information;
- National Parks and Wildlife Services (NPWS) – Protected Site Register; and
- South Dublin County Council - illegal landfill information.

7.8 Site specific data was derived from the following sources:

- Causeway Geotech *Lands at Ballymakailly – Ground Investigation* September 2018 (Report No. 18-0827, included as Appendix 7.3).
- Groundwater quality monitoring data, December 2020 (Appendix 7.4);
- Various design site plans and drawings; and
- Consultation with site engineers.

Receiving environment

7.9 The Proposed Development is to be located on a primarily greenfield site to the west of Grange Castle Business Park and the Newcastle Road (R120), Clondalkin, Dublin 22. The site is approximately 22.1 hectares and has a slight gradient down to the north east.

7.10 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 opposite side. Agricultural lands bound the site to the west and south.

Topography

7.11 The site is relatively flat, there is a fall of approximately 4.5-5.5m from the southwestern boundary of the site north-east towards the canal (from c. 69m AOD to c. 61m AOD). Figure 7.1 presents the topographic nature of the site and the surrounding area.

Drainage

7.12 The site is in the catchment of the Griffeen River and the existing drainage is discussed in Chapter 8 of this EIAR. There is no connectivity with the adjoining canal which is lined.

Land use

7.13 The land surrounding the site is a mixture of agricultural (currently used as pasture land predominantly for livestock grazing to the west of the R120 and to the north of the canal), residential and industrial. According to the EPA website, there are a number of licensed IPPC facilities in the locality (Takeda Pharma Ltd, Grange BackUp Power Ltd. and Pfizer Biotech) and there are no licensed waste facilities in the vicinity of the subject site. Consultation with South Dublin County Council confirmed that there are no known illegal/historic landfills within 500 metres of the site.



Figure 7.9 Site Location

Soil and subsoil

7.14 On the GSI soil classification maps, the soil type beneath the southern part of the site area predominantly comprises BminPD - Surface water Gleys / Ground water Gleys Basic. The northern portion of the overall site area is composed predominantly of BMinDW soils-Grey Brown Podzolics/Brown earths basics as presented in Figure 7.2 below.



Figure 7.10 Soil Map (Source: GSI, 2020).

- 7.15 On the GSI regional mapping the site and overburden geology comprise Quaternary Glacial Till (TLs). The Glacial Till is derived from limestone and is a common soil cover in this region as seen in Figure 7.3 below.



Figure 7.11 Subsoil Map (Source: GSI, 2020).

- 7.16 The following ground conditions were encountered during the investigation process: 0-0.3 metres below ground level (mbgl) of topsoil is present. 0.3-3.8 mbgl is a variation of firm to stiff sandy gravelly CLAY (glacial till) overlying low permeability Calp limestone (see Section 7.53).

Bedrock geology

- 7.17 Inspection of available GSI data shows that the bedrock geology underlying the site and surrounding area is dominated by rocks of Carboniferous Age. The site and local area is underlain by Dinantian (Upper Impure) Limestones or 'Calp' limestone that is dark grey to black limestone and shale of the Lucan Formation (refer to Figure 7. on next page).



Figure 7.12 Bedrock Geology Map (Source: GSI, 2020).

- 7.18 Site specific information has been derived from an extensive site investigation involving drilling and trial pitting undertaken at the site in March 2018 by Causeway Geotec (Report No. 18-0827). Fifteen boreholes were drilled, nineteen trial pits were excavated, 19 dynamic probes were conducted adjacent to the trial pits and indirect and CBR tests were undertaken at nineteen locations. Six boreholes were designed as monitoring wells.
- 7.19 The depth to bedrock throughout the site was confirmed as 0.5-3mbgl (based on investigations of current EdgeConnex site to the east). The site investigation also confirms identification of the bedrock as dark grey and black limestone. The report attached (Appendix 7.3) provides borehole and trial pit data for the area proposed for this development.
- 7.20 No bedrock outcrops were identified during the site investigations. However, bedrock outcrops occur at several locations within this region as illustrated in Section 7.29 below with a number of these located to the western part of the proposed site. Figure 7.4 above indicates faults running in south-west to north-east direction over the most north-western corner of the site. The GSI database presently lists no karst features in the immediate vicinity of the subject site and significant karstification would not be expected in this type of limestone.

Geological heritage

- 7.21 The Geological Survey of Ireland (GSI) Public Viewer www.gsi.ie/mapping was reviewed to identify sites of geological heritage for the site and surrounding area. There are no recorded sites on the development site. A full audit has not yet been completed for Dublin; however, there is no evidence of any site which could be considered suitable for protection under this programme or recorded in the South Dublin County Development Plan 2016-2022.

Economic geology

- 7.22 The Extractive Industry Register (www.epa.ie) and the GSI mineral database was consulted to determine whether there were any mineral sites close to the Proposed Development. There are no active quarries located in the immediate vicinity with the nearest quarry located approximately 4 km to

the southeast which is classified as the Belgard Quarry. The EPA ENVision website also confirmed that there are no mines on or near the site.

Geo-hazards

- 7.23 There are no expected geohazards at this location. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and the nearest landslide to the Proposed Development was 7.5km to the north, referred to as the Diswellstown event which occurred on 24th December 1999. There have been no recorded landslide events at the site. Due to the local topography and the underlying strata there is a negligible risk of a landslide event occurring at the site.
- 7.24 In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. However, currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish sea (1.0 – 2.0 MI magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the Proposed Development site.

Rating of importance of geological and soil attributes

- 7.25 Based on the TII methodology (2009) (See Appendix 7.2), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as low importance with low quality significance or value on a local scale. There are no extractable minerals or areas of geological heritage and the soils are suitable for agricultural use but are typical of surrounding agricultural land.

Groundwater – aquifer classification & vulnerability

- 7.26 Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities.

Aquifer classification

- 7.27 An inspection of the available GSI records as presented in Figure 7.5 on next page and confirmed by drilling on site indicates that the bedrock geology of the site and the surrounding area is dominated by Dinantian Limestones (Calp). The GSI has classified this aquifer as Locally Important (LI) i.e. an aquifer which is moderately productive only in local zones. See Figure 7.5 on next page.



Figure 7.13 Aquifer Classification (Source: GSI, 2020).

Aquifer vulnerability

- 7.28 Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely or of mixtures of peat, sand, gravel, glacial till, clays or silts).
- 7.29 The GSI presently classifies the aquifer in the region of the site as Extreme (E) which indicates an overburden depth of 0-3m is present. This is consistent with site investigation data and the site is considered to have Extreme Vulnerability. The GSI classifies a portion of the western part of the proposed site as X, indicating that rock is at or near the surface. No bedrock outcrops were identified in the Causeway Geotech site investigation report of September 2018. Refer to Figure 7.6 below.



Figure 7.14 Aquifer Vulnerability (Source: GSI, 2020).

Soil quality

- 7.30 During the site investigation a number of samples taken from a select number of trial pits and boreholes were analysed to identify any possible contamination on site. Samples were analysed for hydrocarbons (mineral oils, BTEX), PAHs, metals and phenols. There are no legislative thresholds for soil in Ireland and therefore results were compared with the Land Quality Management (LQM)/Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels (S4ULs) for Human Health Risk Assessment (Nathanial et al, 2015) which allow assessment based on health risk and use of the site. A review of the representative 24 soil quality analysis results does not indicate any notable contamination across the site. Laboratory results are presented in Appendices 7.3 and 7.4, and are summarised below

Metals

- 7.31 A total of 10 metals were assessed in 19 soil samples (from 15 locations). Concentrations of the majority of heavy metals analysed were found to be in line with natural background levels. All metal parameters are well below the relevant LQM/CIEH S4ULs for commercial developments. Asbestos identification analysis was undertaken of all 24 samples and no asbestos was detected in any of the samples.

Organic Hydrocarbons

- 7.32 Organic hydrocarbons were analysed in all soil samples across the subject site. 17 of the samples showed concentrations of aliphatic, aromatic, polycyclic aromatic hydrocarbon (PAHs) and phenols below their relevant levels of detection. Two locations, BH08 & BH11 were over the relevant limit of detection (LOD) for total petroleum hydrocarbons at 41mg/kg and 160 mg/kg respectively. These levels are considerably below the LQM/CIEH S4ULs for commercial land use at 28,000 mg/kg.

Groundwater quality

- 7.33 As there was no evidence of residual soil contamination based on visual assessment and laboratory analysis it is not likely that there is any resultant groundwater contamination leaching from the soil on the subject site. However, a review of groundwater quality east of the Proposed Development at the current EdgeConnex site and the downgradient Takeda site was undertaken to confirm any evidence of groundwater contamination.

7.34 A total of 9 groundwater samples were collected from the northern section of the eastern EdgeConnex site (BH01, BH06, BH10, BH11, BH15, BH17, BH18, BH19 & BH20) in June 2016. Samples were undertaken following purging of these boreholes to 3 times the well volume or until they were purged dry. In addition, a second monitoring round composed of 4 groundwater samples was carried out in December 2020 (BH05, BH10, BH11 & BH15). The samples were submitted to a UKAS accredited laboratory for analysis for COCs comprising suites of metals, speciated PAH, speciated TPH, BTEX, total phenols and inorganics. A summary of results is detailed below.

Metals

7.35 A total of 10 metals were analysed in all the groundwater samples. Only minor exceedances (marginally exceeding the groundwater regulation (S.I. no 9 of 2010 & S.I. No. 366 of 2016) were found for parameters boron, selenium and zinc. These exceedances in the metals could be related to the natural silts in the groundwater. Sampling in December 2020 did not record concentrations exceeding the abovementioned threshold values.

Organic Hydrocarbons

7.36 A range of aliphatic and aromatic hydrocarbon fractions were analysed for all of the groundwater samples. One sample exceeded the laboratory detection limit at BH15 measuring a concentration of 250ug/l which is above the Groundwater Regulation threshold value (TV) of 7.5ug/l. This is the only sample over the corresponding LOD and is down gradient of the currently proposed site. This is an isolated result as all other groundwater samples taken were below their relevant detection limits and is down gradient of the Proposed Development. The December 2020 sampling did not record aliphatic and aromatic hydrocarbon in any of the samples analysed.

BTEX/MTBE Compounds

7.37 All concentrations were recorded below laboratory detection limits in all instances for all groundwater samples.

Polycyclic aromatic hydrocarbons

7.38 Concentrations of all compounds recorded were not found to exceed the lab detection limits or the relevant thresholds in all groundwater samples.

Phenols

7.39 Total phenol analysis was carried out in all nine groundwater samples. Concentrations did not exceed the laboratory detection limits in any sample.

Inorganics

7.40 Sulphate, cyanide and pH analysis was carried out on all nine groundwater samples. Concentrations recorded low and below laboratory detection limits in a number of instances. Where concentrations were detected these were less than the assessment criteria. Only one slightly elevated concentration of pH was detected within BH06 at pH 9.3, and this is within the EPA's Interim Guideline Values (IGVs) published in 2003 and used here as there is no threshold value included in the current groundwater regulations. The December 2020 sampling did not record elevated pH in any of the samples analysed.

7.41 In summary, groundwater sampling and analysis concluded there was no evidence of any significant groundwater contamination evident downgradient of the Proposed Development site.

Hydrogeological features

7.42 There is no evidence of springs or karstification in this area according to the GSI Karst database (2015).

Areas of conservation

7.43 The lands in which the Proposed Development is located have no formal designations. The nearest designated land to the site at Grange Castle Business Park is the Grand Canal pNHA (Site Code:

002104) at c.5-10m to the north of the northern boundary of the overall site. A small area of the pNHA designation overlaps with the Proposed Development site at the north-west corner of the site. No works are proposed within this small area. As the canal is a contained feature (fully lined) there is no potential for a source pathway linkage.

Water supplies

- 7.44 The GSI Well Card Index is a record of wells drilled in Ireland. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in ROI. This current index does not show any wells drilled and springs at the site or surrounding area with the nearest recorded wells located over 3km to the west of the site. The area is serviced by public mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes. There are no groundwater drinking water protection areas within 5km of the site.

Rating of site importance of geological/hydrogeological features

- 7.45 Based on the TII methodology (2009) (See Appendix 7.2) the importance of the hydrogeological features at this site is rated as *medium importance* based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer is a *Locally Important Aquifer* but is not widely used for public water supply or generally for potable use.

Characteristics of the Proposed Development

- 7.46 The characteristics of the Proposed Development with regard to the soil, geological and hydrogeological environment are outlined below. The characteristics relate to both construction and operation activities.
- 7.47 The Proposed Development incorporates the construction of a pair of single storey data centre buildings (4 data halls) of c. 13,000sqm. The development will also include c. 2,400sqm office space. It is to be located within the north-western part of the overall lands that will include 24 no. standby emergency generators with associated flues (each 25m high) to the east of the buildings. A diesel oil tank of 30 m³ will be required for each back-up generator in the Data Centre Building (i.e., 24 no. tanks of 30 m³ will be required). All tanks will be bunded. See Chapter 2 for a comprehensive description of the development.
- 7.48 The application will also include the construction of a gas powered generation plant in the form of 3 no. single storey buildings with a gross floor area of 9,000sqm. These building will include 2 no. diesel generators each. A diesel oil tank of 6 m³ will be required for each generator (i.e., 6 no. tanks of 6 m³ will be required). All tanks will be bunded. See Chapter 2 for a comprehensive description of the development.
- 7.49 The proposed datacentre development will result in a hardstand area of approximately 21,799m², as follows:
- Access Road – Tarmac: 5,940m²;
 - Gravel Area: 5,940m²;
 - Data Hall Roof Area: 5,823m²;
 - Service Yard Slab Area – Concrete: 1,106m²;
 - Generator Yard Slab Area – Concrete: 1,020m²; and
 - Porous Asphalt (Car Park Area): 1,277m².
- 7.50 The site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner, in accordance with all relevant guidelines and specifications.

Enabling works for the Proposed Development

- 7.51 The following enabling works are proposed as part of this development:
- Removal of localised overburden material will be required during preparation of the platform for the building, but extensive excavations are not required;

- Infilling and landscaping will be undertaken and all soils & subsoils stripped will be reused for infilling, levelling or landscaping with any remainder being retained on site for future use;
- Temporary storage of fuel required for on site for construction traffic; and
- No significant dewatering is anticipated to be required for construction as no basement structures are required.

Operational activities

7.52 There will be no direct discharges to ground required for operation of the facility. Water supply will be supplied from public mains and effluent discharge will be to public sewer. Hard standing areas will reduce local recharge to ground. Diesel storage for the backup generators will be required. Each generator will be installed in an externally rated container with a self-contained belly tank (steel double wall type for leak containment and inner tank leak alarm system) with 48 hours diesel fuel storage capacity at full load.

Conceptual site model

7.53 Interpretative cross sections have been finalised for the site with views appropriate to the characterisation of the site in terms of the geological (and hydrogeological environment). The inserts below present cross sections for the site and regional area and indicate the following:

- The profile on site comprises thin topsoil overlying sandy gravelly CLAY with cobbles and boulders underlain by (Stiff) Sandy slightly gravelly SILT/CLAY with angular limestone cobbles. The overburden overlies a muddy Limestones (Calp) bedrock.
- Depth to bedrock is shallow across the site and although no outcrops were noted on the site, outcropping bedrock is evident in the surrounding area. The section shows bedrock at c. 0.5-3.0m bgl throughout the site although depth to bedrock was not confirmed for all boreholes within the site area.
- The site is situated on a partially flat developed land with gently undulating greenfield throughout. This topography of the area slopes gently from approximately +68m AOD at the south western boundary to approximately +63.5m AOD at the northern boundary of the site.
- Groundwater was encountered within the overburden in a number of trial pits (TP12, TP14, TP15, TP16), typically as seepage. Groundwater was not noted during drilling of any of the borehole locations. Where water was encountered, this was typically at depths ranging between 1.90m and 2.6m. the Calp limestone is likely to have shallow perched water along the weathered surface, however fracture connectivity will be low, Development of the site is not expected to require any significant dewatering of the bedrock aquifer.
- Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development.
- No evidence of disposal of waste material was identified the location area proposed for excavation. A very localised area of fill was identified to the north of the site however this is not proposed to be excavated. Any excavated material would likely be acceptable at an inert landfill or suitable for re-use as landscaping fill for the final development.

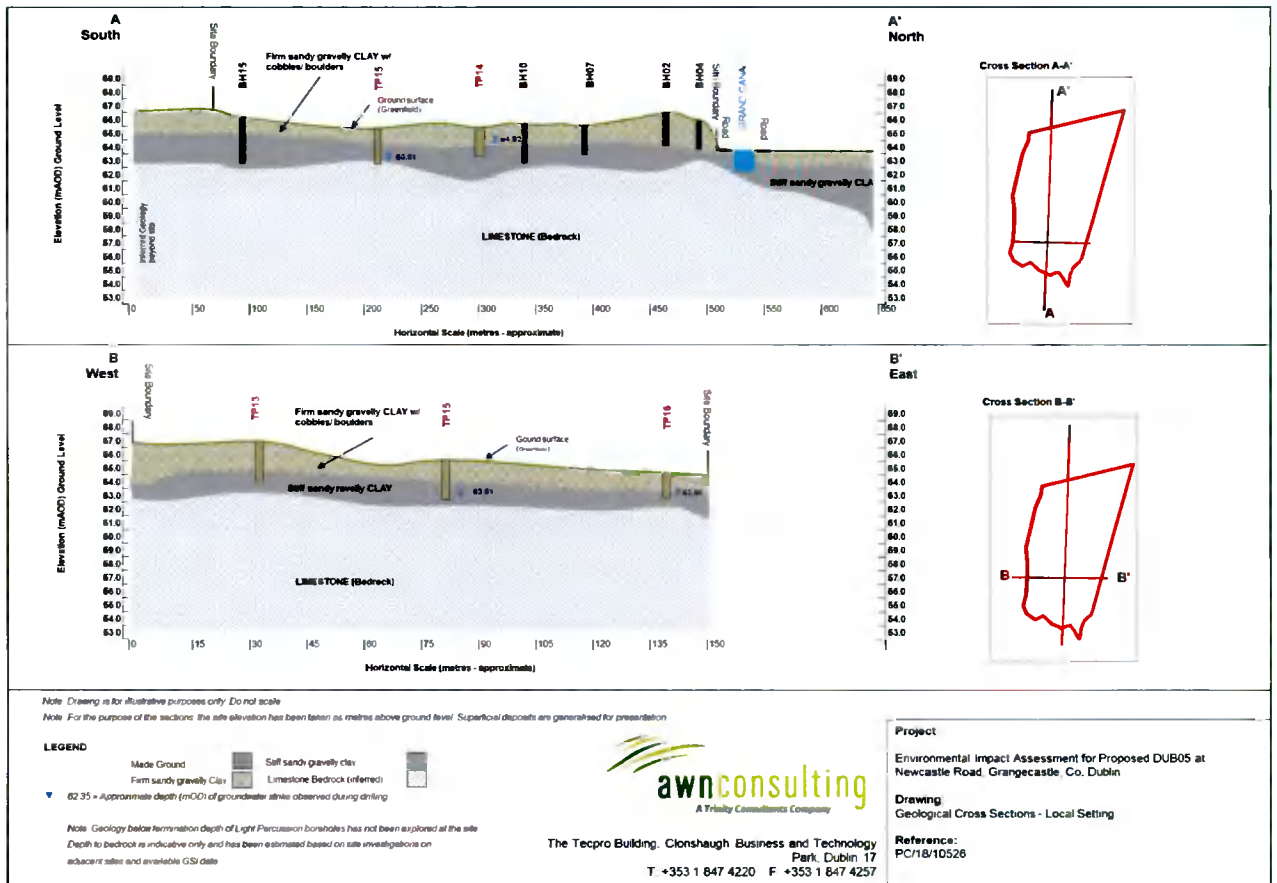


Figure 7.15 Cross-section showing the local site geology

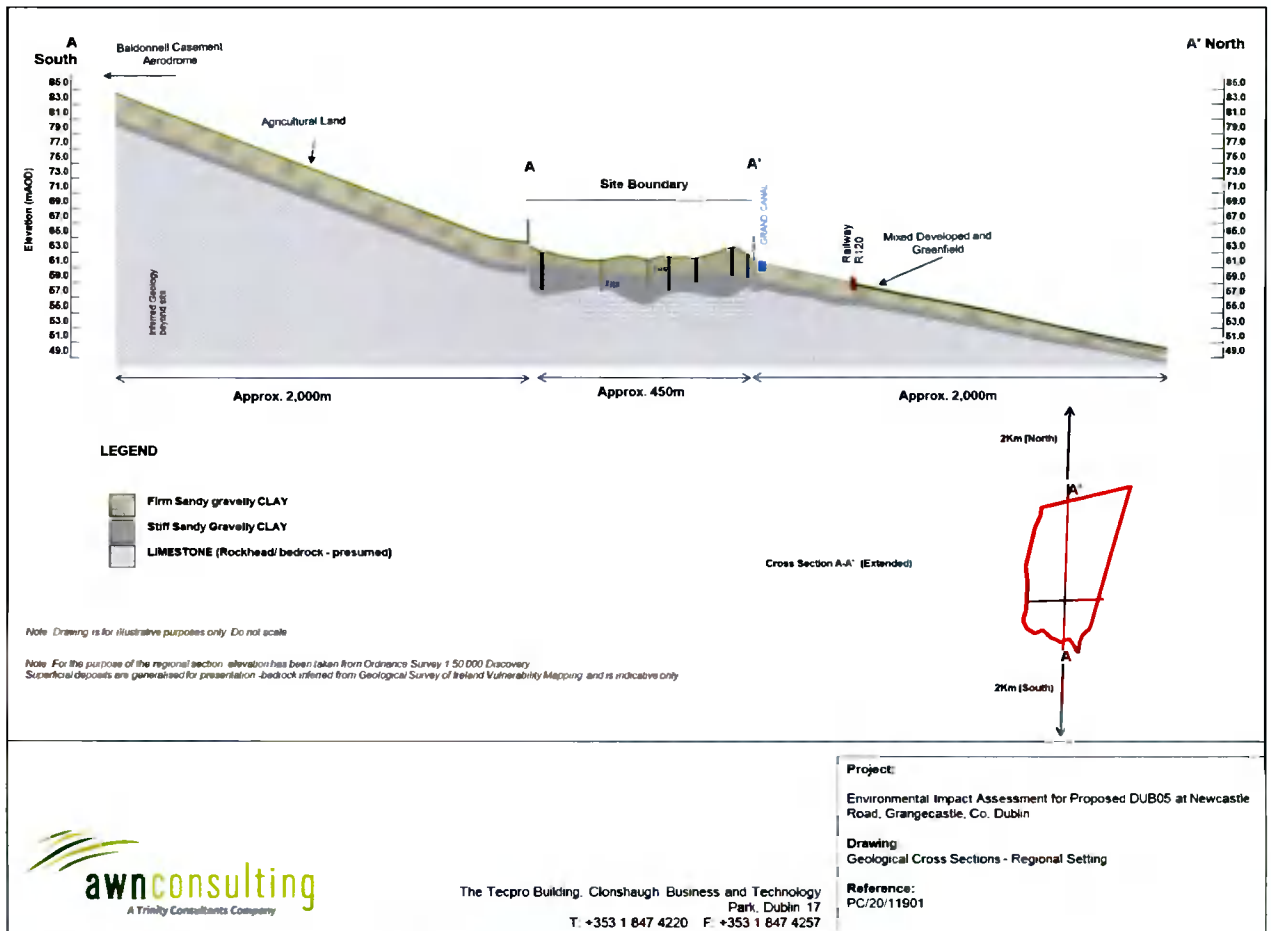


Figure 7.16 Cross-section showing the regional geology

Potential impact of the Proposed Development

- 7.54 An analysis of the potential impacts of the Proposed Development on the land, soils, geology and hydrogeological environment during its construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (hydrology) the following impacts discussed will be considered applicable to both chapter 7 and 8 of the EIAR. Waste Management is also considered an interaction.

Construction phase

Excavation and Infilling

- 7.55 Excavation and infilling within the proposed site will be required as part of the preliminary site enabling works as well the levelling of the site to render it suitable for development. Excavated material will be reused on site for infilling and landscaping works where possible. Import of fill would not be required. Site investigation and laboratory analysis has not identified any existing contamination. However, if contaminated soil/water is encountered, it will be required to be removed by a licensed waste contractor. The volumes of excavation and filling required are as follows:

- Topsoil Cut: 16,117.57m³ (area 53,725.22m² @300mm deep);
- Site Cut including Pond: 15,034.94m³ (site cut + pond)
- Site Fill including Pond: 9,159.06m³ (site fill)
- Net Cut (excluding Topsoil): 5,875.88m³

- 7.56 The excess of topsoil cut will be used for landscaping berms.

Accidental spills and leaks

- 7.57 During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Spillage or leakage of temporary oils and fuels stored on site;
- Spillage or leakage of oils and fuels from construction machinery or site vehicles;
- Spillage of oil or fuel from refuelling machinery on site; and
- Run-off from concrete and cement during pad foundation construction.

- 7.58 Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoil's and impact the underlying groundwater. Groundwater vulnerability at the site is currently classified as extreme. Any soil stripping will also further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer. However, capping of site with impermeable paving and building and associated drainage infrastructure will provide additional protection following construction

Assessment of impact

- 7.59 Based on the points stated above in relation to the construction phase the potential impact on the soils, geology and hydrogeology during construction (EPA 2017) is considered to have a short term – imperceptible impact with a neutral impact on quality. i.e. An impact capable of measurement but without noticeable consequences.

Operational phase

Indirect discharges

- 7.60 There will be no direct discharges of contaminated water to groundwater or soil environment during the operational phase. Apart from diesel fuel, there is no other bulk storage of hazardous liquids at the site which minimises the risk to soils and water. Indirect discharges could occur from the following sources:

- accidental leakages from cars in the car park areas although this will be primarily directed through the surface water drainage through an interceptor;

- accidental leakage from the bunded diesel storage tanks during refuelling; and
- overuse of pesticides and herbicides could impact on groundwater quality.

7.61 In addition, the incorporation of hard stand areas will reduce local recharge to ground. An area of 21,799m² will be covered in hardstand as follows:

- Access Road – Tarmac: 5,940m²;
- Gravel Area: 5,940m²;
- Data Hall Roof Area: 5,823m²;
- Service Yard Slab Area – Concrete: 1,106m²;
- Generator Yard Slab Area – Concrete: 1,020m²;
- Porous Asphalt (Car Park Area): 1,277m².

7.62 The overall area of hardstand is small in relation to the area of the entire aquifer and will only have a very local effect on groundwater recharge in the area i.e. no change in the overall groundwater flow regime.

Assessment of impact

7.63 Based on the points above in relation to the operation phase the potential impact on the land soils, geology and hydrogeology during operation (EPA 2017) is considered to have a long term–imperceptible impact with a neutral impact on quality. i.e. An impact capable of measurement but without noticeable consequences.

7.64 There will be a local reduction in recharge to the aquifer due to the increase in hardstand on this and surrounding developed lands, however this will not be significant in terms of the overall aquifer hydrogeological profile. There are no significant potential contaminant sources apart from a reserve capacity of diesel stored on the site. Mitigation measures are in place to reduce the potential for and impact on accidental discharges to ground.

'Do-nothing' scenario

7.65 No impact is predicted from the Do-nothing scenario as it will remain in its natural condition.

Remedial and Mitigation Measures

7.66 The design has taken account of the potential impacts of the development on the soils, geology and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology and hydrogeology. These are described below.

7.67 Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

Construction phase

Soil removal and compaction

7.68 Reuse of excavated soil on site and capping with hardstand will minimise any increase in aquifer vulnerability. Construction works will require local removal of soil cover where levelling of the site is required and its use for re-instatement elsewhere on site. According to the GSI database the bedrock vulnerability is already extreme due to the thin cover of overburden on the site, removal of soil cover will increase the vulnerability of the underlying bedrock. However due to levelling works imported fill will need to be deposited over a sizable proportion of the Proposed Development site. Overall vulnerability would not alter across the site. It is envisaged that any soil excavated will be retained on site and reused as fill material or landscaping.

7.69 Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water

drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

- 7.70 Although there is no evidence of historical contamination in the Proposed Development site, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Fuel and chemical handling

- 7.71 To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- 7.72 Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.
- 7.73 Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.
- 7.74 In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Construction Environmental Management Plan

- 7.75 A Construction Environmental Management Plan (CEMP) has been developed by Winthrop Engineering and Contracting Limited and included with the application documentation. This will be refined by the Applicant and the construction contractor prior to commencement of construction. The CEMP will incorporate the mitigation measures outlined above as they relate to the construction phase. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. This is an active document which is continuously updated to manage risk during the construction programme. All relevant personnel working on the site will be trained in the implementation of the procedures.
- 7.76 As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:
- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
 - Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
 - BPGCS005, Oil Storage Guidelines;
 - Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
 - CIRIA 697, The SUDS Manual, 2007; and
 - UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

Operational phase

Fuel and chemical handling

- 7.77 In order to minimise any impact on the underlying subsurface strata from material spillages, each generator will be installed in an externally rated container with a self-contained belly tank (steel double wall type for leak containment and inner tank leak alarm system) with 48 hours diesel fuel storage capacity at full load.
- 7.78 Any chemicals, oils, herbicides required for site maintenance will be stored in suitable contained areas. As the site will be paved any accidental emissions from fuel spills or contaminated runoff will be directed through the surface water drainage system through oil interceptors prior to discharge to the proposed attenuation tank onsite rather than infiltrate directly to ground.

Environmental Management Plan

- 7.79 An environmental management plan will be prepared and followed during the operational phase incorporating mitigation measures and emergency response measures.

Predicted impact of the Proposed Development

- 7.80 In terms of predicted specific impacts during the construction phase these will be **short-term** and **imperceptible**, and the following points are of note:
- there is no likely impact on any geological heritage sites, sensitive groundwater receptors or groundwater supplies in the vicinity of the Proposed Development site;
 - the local removal of topsoil and subsoil cover across the development area and additional of clean material where required at the site will not change the overall vulnerability category for the site of “extreme” due to current already thin cover on site. Capping of significant areas of the site by hardstand/building following construction and installation of drainage will minimise the potential for contamination of the underlying locally important aquifer.
 - apart from generators tanks there is no other bulk storage of hazardous material at the site.
 - there will be a loss of agricultural soil due to redevelopment. However, the area of redevelopment is small in the context of the overall region and;
 - the incorporation of a large hardstand area will reduce local recharge to ground. However, as this is localised it is not likely to have any impact in terms of the regional groundwater regime.
- 7.81 There are no likely significant impacts on the geological or hydrogeological environment associated with the Proposed Development of the site. It is not anticipated that any impacts will arise following the implementation of the mitigation measures discussed above. As such the impact (EPA 2017) of the Proposed Development once in operation is considered to be of **long-term and imperceptible** significance.
- 7.82 The main vulnerability arising to the soil and geology from the Proposed Development is the removal of protective topsoil during the construction phase. This removal of topsoil may produce a more direct pathway to the bedrock from any accidental leaks during construction. During operation, capping of the site will provide additional protection to the underlying aquifer from any accidental spillage/leaks on site. The primary contaminant of concern during construction and operation is diesel. If left unmitigated, an accidental leak could lead to localised contamination of the subsoil and groundwater body. The aquifer is not used for a water supply but would require remediation to meet with legal requirements relating to water quality within an aquifer under the Water Pollution Act 1990, Water Framework Directive 2000 and Groundwater Regulations (S.I. No. 9 of 2010 & S.I. No. 366 of 2016).

Cumulative Impacts

- 7.83 The cumulative impact of the Proposed Development with any/all relevant other planned or permitted developments are discussed below.

Construction phase

- 7.84 The potential for impact on land, soils and groundwater during construction primarily arises from localised accidental leaks and spills to ground. The Proposed Development does not require dewatering and with standard mitigation in place (as outlined in Section 7.63) for management of

accidental discharges, the effect due to construction in this area is considered to be a **neutral on quality and an imperceptible significance**. Contractors for the proposed and permitted development will be contractually required to operate in compliance with a CEMP which will include the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality. As a result, there will be no cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be **neutral and imperceptible**.

Operational phase

- 7.85 Overall, there will be a local change in recharge pattern due to the increase in hardstand from the proposed and permitted developments. However, based on the overall size of the underlying aquifer and measures to protect soil and water quality there will be no overall change on the groundwater body status. There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with no. 366 of 2016 and amendments. As such there will be no cumulative impact to groundwater quality. As such there will be no cumulative impact on the Groundwater Body Status. The operation of the Proposed Development is concluded to have a **long-term, imperceptible significance with a neutral impact** on soil and water quality.
- 7.86 There will be a loss of agricultural land, but the overall loss will be minimal therefore, the cumulative impact on the land is considered to be **long-term, imperceptible significance with a neutral impact**.

Monitoring

- 7.87 No monitoring is required to maintain and protect the conditions of the soil, geology and hydrogeology upon completion of the development.

Reinstatement

- 7.88 Topsoil will be reinstated to greenfield areas of the site during the landscaping operations to protect the subsoil and geology underlying the site.

8. HYDROLOGY

8.1 AWN Consulting Ltd (AWN) has prepared this chapter of the Environmental Impact Assessment Report (EIAR) which assesses and evaluates the potential impacts of the development on the hydrological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

Methodology

Criteria for rating impacts

8.2 This chapter evaluates the effects, if any, which the development has had or will have on Hydrology as defined in the Environmental Protection Agency (EPA) in accordance with 'Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2017). The Draft EPA document entitled 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015) is also followed in this hydrology assessment and classification of environmental effects. In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate. These guidelines are referenced where the methodology for assessment of effects is appropriate.

8.3 The rating of potential environmental effects on the water/hydrology environment is based on the matrix presented in Table 1.1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the Draft EPA Guidelines (2017) publication).

8.4 The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

8.5 The NRA criteria for rating the magnitude and significance of impacts on the hydrological related attributes and the importance of these hydrological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Appendix 7.2.

8.6 The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from Proposed Development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

8.7 The following sources of information were consulted:

- Current EPA on-line database -Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- South Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council; and
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).

8.8 Site specific data was derived from the following sources:

- Pinnacle Consulting Engineers – Engineering Planning Report – Ballymakailly to the West of the Newcastle Rd (R120), Lucan, Co. Dublin. December 2020 (Appendix 8.3);
- Pinnacle Consulting Engineers – Flood Risk Assessment – Ballymakailly Data Centre (EDCDUB05). December 2020 (Appendix 8.4);
- Various design site plans and drawings; and
- Consultation with site engineers.

Receiving Environment

8.9 The Proposed Development is to be located on a greenfield site to the west of Grange Castle Business Park and the Newcastle Road (R120), Clondalkin, Dublin 22. The site is approximately 22.1 ha and has a slight gradient to the north-east corner. The site in terms of its current use can be split into two areas with the majority of the land forming open grassland; and a former farmhouse and associated barns as well as similar buildings forming a small element of the northern part of the site to the immediate south of the Grand Canal.

8.10 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 lands bound the site 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 buildings.

8.11 The Grand Canal is fully lined therefore there is no potential for hydrological connection between the development site and this water body.

Hydrology

8.12 The Proposed Development is located within the Ireland River Basin District (previously the Eastern River Basin District (ERBD)) in Hydrometric Area No. 09 of the Irish River Network. It is within the River Liffey catchment.

8.13 The River Liffey catchment encompasses an area of approximately 1,370km². The river extends from the mountains of Kippure and Tonduff in County Wicklow to the sea at Dublin Bay. The main channel covers approximately 120km and numerous tributaries enter along its course. The Griffeen River is the nearest water course to the site and is a tributary of the River Liffey.

8.14 The Griffeen River (stream) is located c. 330m east of the site. The Griffeen River rises in the townland of Greenoge, approximately 3.5 km south of the proposed site. It flows in a northerly direction where it is culverted beneath the Grand Canal and from there it flows north through Lucan. The Griffeen River enters the River Liffey just north of Lucan town. A section of the Griffeen River was realigned during the construction of the Business Park and associated access roads and it now runs alongside the local access road in a northerly direction to the east of the Takeda facility.

8.15 The Lucan Stream is located c. 310m to the west of proposed site and runs in a northerly direction where it enters the River Liffey north of Lucan Village and to the west of the Griffeen outfall.

8.16 The Grand Canal runs in an east to west direction along the northern boundary of the development and is classified as a proposed National Heritage Area (pNHA). The pNHA is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. There is no hydrologic connectivity between the site and Grand Canal.

8.17 The existing site is greenfield development where surface water flows via overland drainage ditches and a surface water drain into the Lucan Stream and Griffeen River. There are several drainage ditches that line field boundary hedgerows throughout the development site.

8.18 The Dublin Bay is located c. 21km to the east (i.e., downstream) of the site. The site would have an indirect hydrological connection, through the Lucan Stream, the Griffeen River and the River Liffey, with the following Natura European Sites:

- South Dublin Bay SAC;
- South Dublin Bay and River Tolka Estuary SPA,
- North Dublin Bay SAC; and
- North Bull Island SPA

8.19 Refer to Figure 8.1 below for further details in terms of local hydrology.



Figure 8.1 Site location showing local surface water drainage

Surface water quality

- 8.20 The development is located within the former ERBD, as defined under the EU Water Framework Directive (2000/60EC) European Communities Directive 2000/60EC, establishing a framework for community action in the field of water policy, (commonly known as the Water Framework Directive [WFD]).
- 8.21 The WFD requires 'Good Water Status' for all European waters, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'.
- 8.22 The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988
 - Local Government (Water Pollution) Acts 1977-1990
 - SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations
 - SI No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations.
- 8.23 The Griffeen River and the Lucan Stream belong to the LIFFEY_170 WFD surface waterbody (European Code: IE_EA_09L012100) whose most recent WFD groundwater status (2013-2018) is 'Good' with a current WFD risk score of 'not achieving good status' is under 'Review'.

- 8.24 The closest EPA surface water quality station to the site is the 'Griffeen in Lucan Village' (EPA Code RS09G010600) which is located in the Griffeen River c. 3 Km to the north (i.e., downstream) of the subject site, just before its junction with the River Liffey. Its most recent data (2019) show records which are consistently below the threshold values defined to achieve 'Good Status' (EU Environmental Objectives Regulations, SI 272/2009 and amendment SI 77/2019). However, a moderate status has been found for nitrogen and nitrate conditions.
- 8.25 Q Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. See Table 8.1 for an explanation of the ratings. Q1 indicates a seriously polluted water body; Q5 indicates unpolluted water of high quality.

Table 8.1 EPA Biological Q Ratings

Quality ratings (Q)	Status	Water quality
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

- 8.26 According to the monitoring rounds carried out by the EPA during 2019 at the 'Griffeen in Lucan Village Station', a quality rating of 'Q3' (i.e., '*Slightly Polluted*') has been defined for this station. This rating is based on its recorded nitrogen and nitrate conditions.

Surface water drainage

- 8.27 The existing site is greenfield development where surface water flows via overland drainage ditches and a surface water drain into the Lucan Stream and Griffeen River.
- 8.28 According to the South Dublin County Council information, there is a 900mm diameter road crossing, which was installed as part of the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. This pipe is then connected into a 900mm diameter pipe located along a section of road on the opposite side to the subject site. This gravity sewer then runs in a northerly direction, prior to connecting into a ditch/stream network, which discharges through 3 no. aqueducts / culverts of varying sizes and which are located beneath the Grand Canal to the east. This outfall is then drained via a tributary into the Griffeen River.
- 8.29 The aforementioned sewer / culvert, has been identified as having capacity to accommodate the proposed discharge from the subject site.

Foul water

- 8.30 Service and infrastructure have already been installed within the Grange Castle Business Park for foul water and it is proposed to connect foul water services from the Proposed Development to this.
- 8.31 According to the South Dublin County Council information, there are 2 No. 450mm diameter spur connections, located along the eastern boundary of the property, within the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. These spur connections were left out to facilitate development of these lands and for the lands further west, known as Grange Castle West. This 450mm diameter sewer then connects into the existing Grange Castle Business Park pumping station, as laid under Reg. Ref. SD16A/0214. The effluent from this pumping station is then pumped via 3 No. rising mains, i.e. 100mm, 200mm & 450mm diameter, into the local infrastructural network which ultimately discharges onto Ringsend Wastewater Treatment Plant (WWTP).
- 8.32 The existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site and there are no known issues noted with the sewer reticulation network.

Water supply

- 8.33 According to the South Dublin County Council information, there is a 16" (400mm) diameter main located along the eastern boundary of the property, within the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. 2 no. 300mm diameter capped connections with sluice valves, have been left off the aforementioned trunk water main, in order to facilitate development of these lands and for the lands further west, known as Grange Castle West.
- 8.34 The aforementioned existing watermain is ultimately fed off the existing infrastructure to the north of the 12th Lock Bridge. From discussions with the South Dublin County Council, it is understood that there is adequate capacity within the existing watermain network to supply the Proposed Development.

Flooding

- 8.35 In accordance with the guidelines produced by the Department of the Environment, Heritage and Local Government - The Planning System and Flood Risk Management (FRM) Guidelines for Planning Authorities, November 2009, a Stage 1 assessment was carried out by Pinnacle in December 2020. The Stage 1 Assessment is 'Flood Risk Identification'. The purpose of the assessment is to identify whether there may be any flooding or surface water management issues related to a plan area or Proposed Development site that may warrant further investigation.
- 8.36 Based on the indicative flood mapping, the development site is located within Flood Zone C "Low Probability". The site is classified as "Less Vulnerable" and therefore the development is classified as appropriate. Refer to Appendix 8.3 (Pinnacle FRA report) for further details.

Characteristics of the Proposed Development

- 8.37 The Proposed Development is to be located to the west of Grange Castle Business Park located in the townland of Ballymakailly between the N4 and N7 in west Dublin. The Grand Canal (pNHA) runs along the northern boundary of the site. See Figure 8.1 above for the Proposed Development location and surrounding hydrological environment.
- 8.38 The Proposed Development incorporates the construction of a pair of single storey data centre buildings (4 data halls) of c. 12,797sqm. The development will also include c. 2,404sqm office space. It is to be located within the north-western part of the overall lands that will include 24 no. standby emergency generators with associated flues (each 25m high) to the east of the buildings. A diesel oil tank of 30 m³ will be required for each back-up generator in the Data Centre Building (i.e., 24 no. tanks of 30 m³ will be required). All tanks will be bunded. See Chapter 2 for a comprehensive description of the development.
- 8.39 The application will also include the construction of a gas powered generation plant in the form of 3 no. two storey buildings with a gross floor area of 9,286sqm. These building will include 2 no. diesel generators each. A diesel oil tank of 6 m³ will be required for each generator (i.e., 6 no. tanks of 6 m³ will be required). All tanks will be bunded. See Chapter 2 for a comprehensive description of the development.
- 8.40 The proposed datacentre development will result in a hardstand area of approximately 21,799sqm, as follows:
- Access Road – Tarmac: 5,940sqm;
 - Gravel Area: 5,940sqm;
 - Data Hall Roof Area: 5,823sqm;
 - Service Yard Slab Area – Concrete: 1,106sqm;
 - Generator Yard Slab Area – Concrete: 1,020sqm; and
 - Porous Asphalt (Car Park Area): 1,277sqm.
- 8.41 The site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner, in accordance with all relevant guidelines and specifications.

- 8.42 Stormwater will discharge through an adequately sized attenuation pond at the northern end of the site ultimately discharging to the existing storm sewer to the north east of the site. The outflow from the attenuation pond, will be restricted by way of a Hydrobrake facility, which will limit the discharge to 9.60l/s, which is the calculated QBAR greenfield run-off rate. A connection to the existing off-site foul sewer and potable water network will be established.
- 8.43 The Proposed Development will result in an increased demand for water of c. 7.4 m³/day (average). A confirmation by Irish Water that this resource is available within the existing network is required.
- 8.44 With regard to foul water, the Proposed Development is proposed to discharge foul water from the Proposed Development, via a 225mm Ø gravity foul sewer outfall and discharge into the existing 450mm Ø connection. It is proposed that all foul condensate effluent from the proposed new data halls, will be connected into head manholes adjacent to the data halls. The peak wastewater flow will not be in excess of c. 0.54l/s. A confirmation by Irish Water that this discharge on the existing network is feasible is required.

Potential impact of the Proposed Development

- 8.45 The potential impacts of the construction and operational phases of the Proposed Development on the surface water environment are outlined in the following paragraphs. Due to the inter-relationship between this section and Chapter 7 (Land Soils, Geology and Hydrogeology) the following impacts discussed will be considered applicable to both.
- 8.46 It has to be noted that based on the potential sources and distance (c. 20 km downstream) there is no potential for an impact on the nearest Natura European sites (Dublin Bay SAC/SPA).

Construction phase

- 8.47 The potential impacts on local water courses in the immediate environs of the proposed site have been assessed under the following headings:
- Increased runoff and sediment loading; and
 - Contamination of local water courses.

Increased runoff and sediment loading

- 8.48 Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads
- 8.49 During the construction phase there is potential for an increased runoff due to the introduction of impermeable surfaces and the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface runoff. The potential impact of this is an increase in confined flow rates, leading to increases in surface water runoff and sediment loading which could potentially impact local drainage patterns and/or cause siltation of the existing surrounding watercourses.

Contamination of local water courses

- 8.50 During the construction phase, there is a risk of accidental pollution incidences from the following sources:
- Spillage or leakage of oils and fuels stored on site;
 - Spillage or leakage of oils and fuels from construction machinery or site vehicles;
 - Spillage of oil or fuel from refuelling machinery on site; and
 - The use of concrete and cement.
- 8.51 Machinery on site during the construction phase has the potential to result in contamination of the surface water. The potential impacts could derive from accidental spillage of fuels, oils, paints and

solvents, which could impact surface water and groundwater quality if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses.

- 8.52 Concrete operations carried out near surface water bodies during construction activities could lead to a discharge of wastewaters to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora.

Assessment of Impact

- 8.53 As the potential extent of contamination from the above sources will not significantly alter the receiving environment, and due to the low sensitivity of the receiving environment (i.e., local water courses, see assessment above), the overall impact during construction is considered to be Short Term of Moderate Significance with a neutral effect on quality in accordance with the (EPA, 2017) assessment criteria (refer to Table 1.1) and Small Adverse in accordance with the (NRA, 2009) (refer to Appendix 8.1).

Operational phase

- 8.54 Once the data centre becomes operational the potential impacts in relation to water have been assessed under the following headings:

- Increased surface water run-off;
- Contamination of surface water;
- Foul water; and
- Water supply.

Surface water runoff

- 8.55 Without proper control measures, surface water can ingress into the surrounding environment. South Dublin County Council requires all new developments to adhere to the practice of Sustainable Urban Drainage Systems (SuDS) for the control of surface water on site. This is highlighted in the Greater Dublin Strategic Drainage Strategy.

- 8.56 An increase in the hardstanding area in the development will result in an increase of surface water runoff from the site. An additional hardstand area of 21,799sqm is proposed within the subject site. Storm water from the roof areas of the proposed building units, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into a stormwater storage pond, located in a landscaped area to the northern end of the site adjacent to the canal.

- 8.57 Storm water from all car park areas and access roads / delivery areas will be drained as follows:

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers;
- A Duraflow (or similar approved), porous asphalt product.

- 8.58 Prior to discharging into the proposed pond, the storm water from the car park and access roads, which is drained via the methods as described above, will be directed through an appropriately sized Conder Separator (or similar approved) petrol interceptor.

- 8.59 The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The pond / wetland and porous asphalt, have been designed to accommodate a 1:100 year storm event + 20% climate change.

- 8.60 The outflow from the Proposed Development, will be restricted by way of a Hydrobrake facility, which will limit the discharge to 9.60l/s, which is the calculated QBAR greenfield run-off rate. The attenuation system will be fitted with a hydrobrake flow control mechanism limiting total outflow to the allowable QBAR runoff rate. Refer to the Engineering Planning Report by Project Engineers Pinnacle for further information that forms a stand-alone report with this application.

Contamination of surface water

- 8.61 Due to the nature of the facilities including the stand-by generators to be located in the vicinity of the proposed data centres there will be bulk oil storage onsite within self-contained belly tanks. If not, adequately controlled, spillage could cause contamination if allowed to enter the water environment. Accidental leakage from the diesel storage tanks during refuelling may also occur. All surface water drainage will be conducted through an interceptor system with no direct run-off to any open watercourse.
- 8.62 Within the curtilage of the site there is a potential for leaks and spillages due to the vehicle movements and parking in the car park. Any accidental emissions of oil, petrol or diesel could cause localised contamination if the emissions enter the water environment without mitigation through the use of an onsite interceptor.

Foul water

- 8.63 The Proposed Development will lead to an increase in foul water discharge. The public foul sewer system has sufficient capacity in the area. In relation to foul water, the potential effect is considered to be short-term/imperceptible in accordance with the (EPA, 2017) assessment criteria.

Water supply

- 8.64 As stated above, the Proposed Development will result in an increased demand for water of c. 7.4 m³/day (average; 0.086 l/s). This estimation has been based on Irish Water's criteria. However, a confirmation by Irish Water that this resource is available within the existing network is required. In relation to water supply, the potential effect on the water supply is considered to be short term-imperceptible in accordance with the (EPA, 2017) assessment criteria (Table 1.1).

Assessment of Impact

- 8.65 Due to the low storage of bulk chemicals on site, the absence of any substantial direct pathway to a surface water body and due to the low sensitivity of the receiving environment (see assessment above), the overall impact during construction considered to be Short-term – not significant in accordance with the (EPA, 2002) assessment criteria and Negligible in accordance with the (TII, 2009) criteria (Appendix 8.1).

'Do-nothing' scenario

- 8.66 No impact is predicted from the do-nothing scenario as it will remain in its existing condition.

Remedial or reductive measures

- 8.67 The design of the Proposed Development has taken account of the potential impacts of the development and the risks to the water environment local to the area where construction is taking place. Measures have been developed to mitigate the potential effects on the local water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.
- 8.68 These measures are part of the requirements under the Greater Dublin Strategic Drainage Study and South Dublin County Council. They are not intended to avoid or reduce any potential harmful effects to any European sites, since there is no potential impact on Dublin Bay, given the potential contaminant load chemical and the distance from source to the bay (c. 20 km).
- 8.69 A Construction Environmental Management Plan (CEMP) has been developed by Winthrop Engineering and Contracting Limited and included with the application documentation. This will be refined by the Applicant and the construction contractor prior to commencement of construction. The CEMP will incorporate the mitigation measures outlined above as they relate to the construction phase. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. This is an active document which is continuously updated to manage risk during the construction programme. All relevant personnel working on the site will be trained in the implementation of the procedures.

- 8.70 As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:
- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
 - Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
 - BPGCS005, Oil Storage Guidelines;
 - Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
 - CIRIA 697, The SUDS Manual, 2007; and
 - UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.
- 8.71 Project Engineers (Pinnacle) have outlined mitigation measures for the site in their Engineering Planning Report that accompanies this application as a stand-alone document. The following mitigation measures include, but are not limited to, those provided in that report and are designed to address the impacts associated with the construction and operational phase of the project. Due to the inter-relationship between this section and Chapter 7 (Land, Soils, Geology and Hydrogeology) the following mitigation measures discussed will be considered applicable to both.

Construction phase

- 8.72 During the construction phase, mitigation measures have been applied for the following potential impacts:
- increased runoff and sediment loading; and
 - contamination of local water courses.
- 8.73 The mitigation measures will ensure that no sediment contamination, contaminated runoff or untreated wastewater will enter any onsite drainage ditches or off-site watercourses during the construction of the Proposed Development.

Increased runoff and sediment loading

- 8.74 During the construction phase any drains carrying a high sediment load will be diverted through the settlement ponds. The settlement ponds will be located between the area of construction and the nearest field drain. Surface water runoff will not be discharged directly to local watercourses. The following mitigation measures will be adopted:
- the drainage system and settlement ponds will be constructed as a first step;
 - any excavations required will remain open for as little time as possible before the placement of fill. This will help to minimise potential for groundwater ingress into excavations;
 - silt traps will be placed in the existing drainage network around the site to minimise silt loss. These should be inspected and cleaned regularly.
 - weather conditions will be considered when planning construction activities to minimise risk of run off from the site; and
 - distance between topsoil piles etc. and streams will be maintained – to protect from dampening operations.

Contamination of local water courses

- 8.75 To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents, paints and fuels used during construction will be stored within temporary bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Filling and draw-off points will be located entirely within the bunded area(s). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

- 8.76 Wet concrete operations adjacent to watercourses will be avoided where possible. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to groundwater.
- 8.77 The contractor will be required to make provision for removal of any concrete wash waters, most likely by means of tankering off-site and no such wash waters will be discharged to groundwater. Any effluent generated by temporary onsite sanitary facilities will be taken off-site for appropriate treatment.
- 8.78 Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/equipment will take place in designated bunded areas where possible. Re-fuelling will be avoided in so far as possible at the other work sites but where necessary will take place within appropriately bunded areas.
- 8.79 If it is not possible to bring a machine to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. The vehicles and equipment will not be left unattended during refuelling. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment.
- 8.80 The generation of runoff from stockpiles of soils, excavated during construction, will be prevented from entering watercourses by diverting runoff to the settlement ponds on site, and removing the material off-site as soon as possible to designated storage areas.

Operational phase

Increased surface water run-off

- 8.81 The proposed drainage system for the site is outlined in Pinnacle's Engineering Planning Report and has been designed in accordance with Greater Dublin Strategic Design System (GSDS) specifications. The drainage system will include a Stormtech attenuation system or similar. Roof water will be directed into an onsite reticulation system which will drain, along with road run-off, into the attenuation ponds which is to be located to the north of the site. A hydrobrake will also be installed at the outflow to reduce the ultimate discharge.
- 8.82 Pinnacle have identified that the above storm water drainage systems will accommodate a 1:2 year storm frequency. The attenuation system is also designed to accommodate a 1:100 year storm event accounting for a 20% increase with climate change.

Contamination of surface water

- 8.83 Due to a variety of measures such as the design of the attenuation system with hydrocarbon interceptors, the speed restrictions in place and the fact that no refuelling will be carried out on site (when practicable), the likelihood of any spills entering the water environment from vehicles on site is negligible.
- 8.84 Run-off from the car park areas and access roads / delivery areas will be drained following these options:
- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers; and
 - A Duraflow (or similar approved), porous asphalt product.
- 8.85 To minimise any impact from material spillages, all oils, solvents, paints and fuels to be stored onsite will be stored within permanently bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30mm for rainwater ingress). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

Foul water

- 8.86 In their Engineering Planning Report Pinnacle have proposed to discharge foul water from the Proposed Development, via a 225mm diameter gravity foul sewer outfall and discharge into the existing 450mm diameter connection. The increase in flow to the existing public foul sewer is not expected to have a negative effect on the foul drainage system in the area.

Water supply

- 8.87 The water system will be metered to facilitate detection of leakage and the prevention of water loss. Dual & low flush toilets and water economy outlets and water saving measures will also be proposed.

Predicted impact of the Proposed Development

- 8.88 This section describes the predicted impact of the Proposed Development following the implementation of the planned mitigation measures.

Construction phase

- 8.89 The absence of any substantial direct pathway to a water course and the implementation of mitigation measures highlighted above will ensure that the predicted impacts on the surface water environment do not occur during the construction phase and that the residual impact will be **short-term /imperceptible/neutral** in accordance with the (EPA, 2017) assessment criteria. Following the TII criteria for rating the magnitude and significance of impacts on the water and hydrological related attributes, the magnitude of impact is considered **negligible**.

Operational phase

- 8.90 There will be no direct discharges of contaminated water to the surface water environment during the operational phase. Any accidental emissions of chemicals or oil, petrol or diesel leaks could cause contamination of stormwater discharge if the emissions enter the stormwater system unmitigated.
- 8.91 The implementation of mitigation measures highlighted above will ensure that the predicted impacts on the surface water environment do not occur during the operational phase and that the residual impact will be **long-term / imperceptible-neutral** in accordance with the (EPA, 2017) assessment criteria. Following the TII criteria for rating the magnitude and significance of impacts on the water and hydrological related attributes, the magnitude of impact is considered **negligible**.

'Worst-case' scenario

- 8.92 The main vulnerability arising to the hydrology from the Proposed Development is from potential spillages (hydrocarbons) onsite entering stormwater drainage during the operation phase. Stormwater will eventually discharge to surface water bodies but there is no likely impact on receiving water quality above surface water regulations (S.I no 77 of 2019).

Cumulative impacts

- 8.93 The cumulative impact of the Proposed Development with any/all relevant other planned or permitted developments are discussed below having regard to South Dublin County Council Reg. Ref. SD19A/0042 / An Bord Pleanála Ref. ABP-305948-19.

Construction phase

- 8.94 Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.
- 8.95 Contamination of local water sources from accidental spillage and leakage from construction traffic and construction materials unless project-specific CEMPs are put in place for each development and complied with. As stated, there are no notable surface water features onsite and no direct hydrological pathways to offsite surface water bodies.

- 8.96 There is a potential for contamination of watercourses during mitigation measures are required to manage sediment run-off and fuel leakages during construction and operation. All developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (S.I No 77/2019 EU Environmental Objectives (Surface Waters) Amendment Regulations 2019) such that they would be required to manage runoff and fuel leakages.
- 8.97 The residual cumulative impact on water and hydrology for the construction phase is anticipated to be **short-term, neutral** in terms of quality and of **not significant** significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

Operational phase

- 8.98 Potential cumulative impacts included in the operational phase include:
- Increased hard standing areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the site;
 - Increased risk of accidental releases from fuel storage/delivery unless mitigated adequately
 - Increased risk of accidental discharge of hydrocarbons from car parking areas and along roads and unless diverted to surface water system with petrol interceptor; and
 - Any additional foul discharges should be treated where appropriate and/or diverted to the foul sewer system and not directly to ground.
- 8.99 Similar mitigation measures to those described in this chapter will need to be implemented to protect water quality.
- 8.100 Increase in wastewater loading and water supply requirement is an impact of all development: Each development will require approval from IW confirming available capacity in the water and wastewater infrastructure. The surface water and foul drainage infrastructure and water supply requirements for the Proposed Development has been designed to accommodate the future indicative substation development.
- 8.101 Development will result in an increase in hard standing which will result in localised reduced recharge to ground and increase in run-off rate. However, each permitted development are required by the Local Authority to comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) and Local Authority requirements by providing suitable attenuation on site to ensure greenfield run-off rates and ensure that there is no increase in offsite flooding as a result of development.
- 8.102 The residual cumulative impact on water and hydrology for the operational phases is anticipated to be long-term, neutral in terms of quality and not significant significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

Monitoring

- 8.103 No monitoring of the surface water is required to protect the hydrological environment upon completion of the development beyond visual inspection of the attenuation pond, hydrocarbon interceptors and fuel storage bunds to highlight potential contamination from hydrocarbons or excess sediment flow.

Reinstatement

- 8.104 Not applicable in respect of hydrology issues.

9. NOISE AND VIBRATION

9.1 It is proposed to develop a new data centre (DUB 05), to the west of the R120 and a previously permitted data centre (i.e. Phases 1, 2, 3 and 4) and north of the permitted Phase 5 (DUB 04) on lands at Grange Castle, adjacent to the Grange Castle Business Park. In addition is proposed to develop three Gas Power Plant buildings to the rear of the previously permitted DUB 04 building. Figure 9.1 illustrates the proposed and approved facility in the context of the surrounding environment. Buildings and associated noise sources have been exported from the noise modelling package (DGMR *iNoise*) into Google Earth for illustrative purposes.

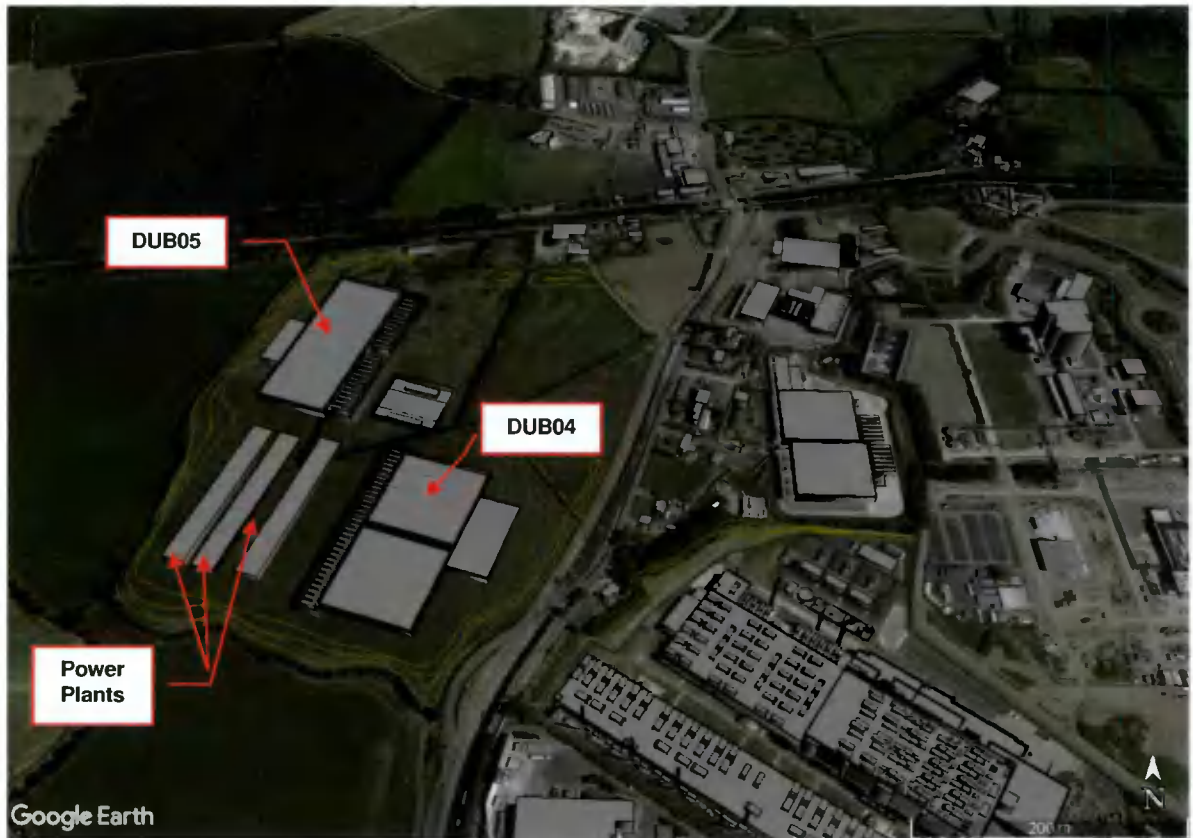


Figure 9.1 Site location and context (Source: Google Earth)

Methodology

9.2 The following methodology has been adopted for this assessment:

- review appropriate guidance and previous planning noise conditions in order to identify appropriate noise criteria for the site;
- carry out noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- development of a detailed 3D noise model to consider the proposed site and the previously permitted development phases; and
- comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

9.3 Appendix 9.1 presents a glossary of the acoustic terminology used throughout this document. In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

Fundamentals of acoustics

- 9.4 In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.
- 9.5 A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).
- 9.6 The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.
- 9.7 The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 9.2.
- 9.8 The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

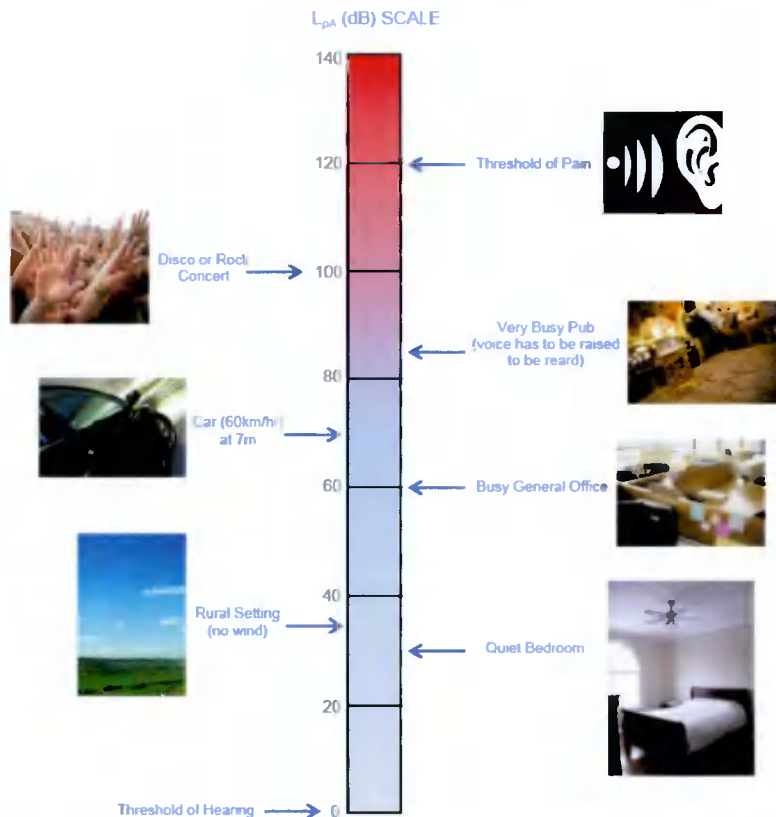


Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

Receiving environment

- 9.9 A series of noise surveys have been undertaken as part of the planning application prepared for the project. Table 9.1 reviews the findings of these surveys. Full details of the noise monitoring are presented in Appendix 9.2 of the appendices document. Review of the data confirms that the noise criteria proposed in this assessment are appropriate considering the prevailing noise environment.
- 9.10 Noise measurements were conducted at three positions on and in the vicinity of the site that are representative of noise environment expected at the nearest noise sensitive locations. Details for the particular locations are outlined below:
- Location S01* Located in the north eastern corner of the site in line with the common boundary of the nearest noise sensitive locations at the junction of the R120 and the Grand Canal.
- Location S02* Located on the south western corner of the site along with the common boundary of a nearby noise sensitive location. The location is representative of the row of noise sensitive locations that along the R120 beyond the western boundary of the Proposed Development.
- Location S03* Located in the vicinity of a residential location to the north east of the Proposed Development site. The property is located on the boundary of the Grange Castle Business Park and is immediately adjacent to a number of commercial premises.
- Location S04* Located in the north eastern concern of the development lands. This location is considered to be representative of noise levels currently experienced in the vicinity of the residential properties on the Grand Canal to the north.
- Location S05* Located in the south western concern of the development lands. The location is considered to be representative of noise levels currently experienced in the vicinity of the halting site located to the south west at some 200 m distance.
- 9.11 A review of daytime, evening and night time noise levels at the monitoring locations are presented in Table 9.1. See Appendix 9.2 for further details.

Table 9.1 Review of noise levels

Location	Period	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)		
		L _{Aeq,15min}	L _{AFMax}	L _{A90,15min}
S01	Day	58 – 61	76	44 – 47
	Evening	53	63	45
	Night	48 – 49	67	42 – 43
S02	Day	48 – 49	73	41 – 43
	Evening	44	61	41
	Night	40 – 41	63	38 – 39
S03	Day	52 – 53	76	47 – 48
	Evening	51	68	49
	Night	49 – 51	70	48
S04	Day	51 – 62	78	42 – 57
	Evening	48 – 62	87	39 – 50
	Night	42 – 61	79	37 – 55
S05	Day	39 – 56	77	37 – 52
	Evening	37 – 51	76	34 – 50
	Night	36 – 50	65	32 – 48



Figure 9.3 Noise monitoring locations (Source: Google Maps) (Note survey 2016 prior to operation of earlier phases of Edgeconnex)

9.12 In terms of the various locations the following significant noise sources (in subjective order of influence) were noted:

Table 9.2 Significant noise sources

Location	
S01	S02
<ul style="list-style-type: none"> • R120 road traffic noise. • Water running in a nearby canal in absence of traffic. • Site work and plant noise associated with existing sites. • During evening period noise dominated by traffic and water noise associated with the canal. • During night time plant noise from existing facilities (to the East and South) is the dominant background source. 	<ul style="list-style-type: none"> • Plant noise from facility to the south. • Noise from existing site including impulsive noise (bangs) and reverse alarms. • Dogs barking and birdsong. • During the evening distant traffic noise and plant noise noted. • During night time existing plant noise from southern existing facilities is the dominant source. Distant traffic also noted.
S03	S04
<ul style="list-style-type: none"> • Noise dominated by existing plant noise from adjacent facility. • Occasional bus passing by. • Water flow from nearby watercourse. 	<ul style="list-style-type: none"> • R120 road traffic noise. • Water flow from nearby watercourse. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted.

<ul style="list-style-type: none"> • Reverse alarms and construction noise from nearby site. • As above for evening period with the exception of construction noise. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted. 	
S05	
<ul style="list-style-type: none"> • R120 road traffic noise. • Water flow from nearby watercourse. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted. 	

- 9.13 It should be noted that the noise criteria applied for this stage of the development are based on noise data and assessment obtained before the Phase 1 site was operational and/or considered planning conditions issued for previous phases by the local authority and/or An Bord Pleanála (ABP) and therefore addresses any concern of 'background creep' and is considered a suitably conservative approach.

Characteristics of the Proposed Development

- 9.14 The Proposed Development will involve groundworks and the development of the proposed new buildings and infrastructure. The proposed buildings include a new data centre building and an associated gas generator farm that will be used to power the site in the short-term and during periods when requested to do so by the national grid operator. Emergency back-up generators are also proposed, to protect the facility against grid power failure.
- 9.15 When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:
- construction phase; and
 - operational phase.
- 9.16 As stated, the construction phase will involve extensive excavation over the development site and the erection of new buildings over a phased construction period. The primary sources of outward noise in the operational context are deemed long term and will involve:
- building services noise;
 - emergency site operations; and
 - additional vehicular traffic on public roads.
- 9.17 These issues are discussed in detail in the following sections.

Potential impact of the Proposed Development

Construction phase

Criteria for rating noise impacts

- 9.18 There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.
- 9.19 In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise*.
- 9.20 The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a potential significant noise impact is associated with the construction activities.

- 9.21 This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.3 sets out the values which, when exceeded, signify a potential significant effect at the facades of residential receptors as recommended by BS 5228 – 1. These are cumulative levels, i.e. the sum of both ambient and construction noise levels.

Table 9.3 Example threshold of potential significant effect at dwellings

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB)		
	Category A ^A	Category B ^B	Category C ^C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends ^D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

- A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
 B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
 C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
 D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

- 9.22 It should be noted that this assessment method is only valid for residential properties. The approach is as follows: for each period (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5 dB. Baseline monitoring carried out as part of this assessment would indicate that the categories detailed in Table 9.4 are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

Table 9.4 Rounded baseline noise levels and associated categories

Period	Baseline Noise Category	Construction Noise Threshold Value L _{Aeq,1hr} (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A	65
Evening (19:00 to 23:00hrs)	A	55
Night time (23:00 to 07:00hrs)	A	45

- 9.23 See Section 9.55 for the assessment in relation to this site. If the construction noise level exceeds the appropriate category value, then a potential significant effect is deemed to occur.
- 9.24 This assessment process determines whether a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*³¹, which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.5 sets out these levels.

Table 9.5 Maximum permissible noise levels at the facade of dwellings during construction

Days and Times	Noise Levels (dB re. 2x10 ⁻⁵ Pa)	
	L _{Aeq(1hr)}	L _{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

- 9.25 In exceptional circumstances there may be a requirement that certain construction works are carried out during night time periods.

³¹ *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland (TII)

Criteria for rating vibration impacts

- 9.26 Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).
- 9.27 It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.
- 9.28 Guidance relevant to acceptable vibration within buildings is contained in the following documents:
- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*, and;
 - British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.
- 9.29 BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.
- 9.30 BS 5228 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values, minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case-by-case basis.
- 9.31 The TII document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* also contains information on the permissible construction vibration levels as follows:

Table 9.6 Allowable vibration during construction phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Operational phase*Criteria for rating noise impacts*

- 9.32 South Dublin County Council (SDCC) do not outline absolute noise limits or specific noise guidance in relation to industrial developments such as the operations considered here. In the absence of such guidance from the local authority consideration is given to the relevant content of the following documents:
- Planning conditions for previous phases development on the wider site issued by SDCC;
 - Planning condition for the adjacent DUB04 development (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948) as issued by An Bord Pleanála (ABP); and
 - Environmental Protection Agency: “*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*”.
- 9.33 SDCC have issued the following planning conditions in relation to previous phases of development on the wider site:

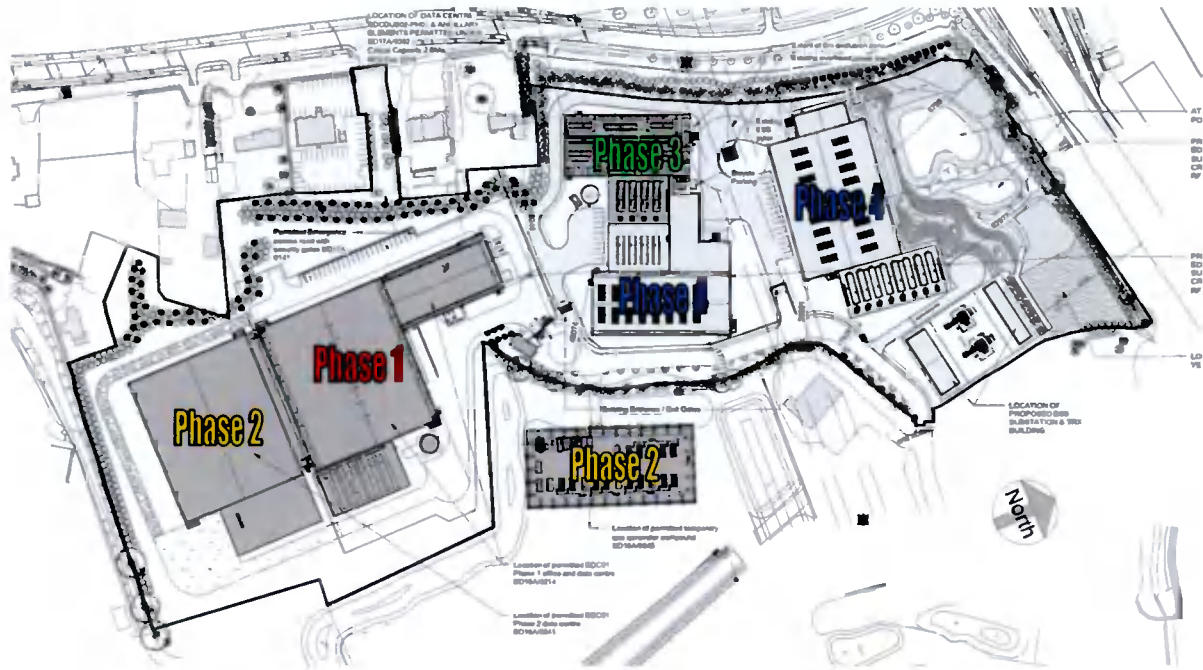


Figure 9.4 Site phasing

Phase	Detail
1	<p>Condition 13 (Ref: SD16A/0214 Decision Order No. 0757) deals with operational noise associated with Phase 1 of the development. The following extracts are the relevant sections in terms of the current discussions:</p> <p><i>The equipment which would generate noise at the facility and the associated abatement measures shall be designed to ensure that tonal noise does not arise at the noise sensitive locations due to the operation of the facility. Appropriate attenuation measures, including management procedures and a maintenance programme shall be put in place to ensure that tonal noise does not create a nuisance at residential properties on the R120 or the Grand Canal. All mechanical plant items such as motors, pumps and air conditioning units shall be serviced regularly to avoid excessive noise being generated.</i></p> <p>In summary, the SDCC permission associated with Phase 1 of the development outlined specific noise conditions in relation to Phase 1 of the development. It is therefore considered appropriate to apply the noise criterion adopted as part of the submitted EIAR for Phase 1 i.e. 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and that site emissions should not be tonal in nature.</p>
2	<p>Condition 15 (Ref: SD16A/0345 Decision Order No. 1151) deals with operational noise associated with Phase 2 of the development. The following extracts are the relevant sections in terms of the current discussions:</p> <p><i>Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A).</i></p> <p><i>In addition, the applicant/developer shall comply with the following requirements:</i></p> <p><i>The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.</i></p> <p>In summary, noise from Phase 2 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature.</p>
3	<p>Condition 13 (Ref: SD17A/0141 Decision Order No. 0730) deals with operational noise associated with Phase 3 of the development. The following extracts are the relevant sections in terms of the current discussions:</p>

Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A) as per the EIA under scenario A and A1. All mitigation measures detailed in the must be utilised to ensure the cumulative noise does not exceed 46.2dB(A) as per the EIS under scenario A and A1 at the nearest noise sensitive locations.

In addition, the applicant/developer shall comply with the following requirements:

The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.

In summary, noise from Phase 3 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature. Cumulative noise levels shall not exceed 46.2dB(A).

A small extension to the Phase 3 development was granted under ABP Order Ref: ABP-300752-18. There was no material effect in terms of noise associated with the granted extension.

- 4 Condition 3 (Ref: SD18A/0298 Decision Order No. 1128) deals with operational noise associated with Phase 4 of the development. The following extracts are the relevant sections in terms of the current discussions:

Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A) as per the EIA under scenario A and A1. All mitigation measures detailed in the must be utilised to ensure the cumulative noise does not exceed 46.2dB(A) as per the EIS under scenario A and A1 at the nearest noise sensitive locations.

In addition, the applicant/developer shall comply with the following requirements:

The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.

In summary, noise from Phase 4 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature. Cumulative noise levels shall not exceed 46.2dB(A).

- 9.34 The most recent planning application for the site was granted permission by ABP which applied the following noise condition to the permitted development site:

"16. The operational noise level shall not exceed 55 dB(A) $L_{eq,1\text{ hour}}$ (corrected for any tonal or impulsive component) at the nearest noise sensitive locations, including dwellings, between 0800 and 2000 hours, Monday to Friday inclusive, and shall not exceed 45 dB(A) $L_{eq,1\text{ hour}}$ at any other time. All sound measurement shall be carried out in accordance with ISO 1996-1 :2016 "Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures". Procedures for the purpose of determining compliance with this limit shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

Reason: To protect the amenities of property in the vicinity of the site."

- 9.35 Based on a review of the EPA NG4 guidance the following noise criteria would be considered appropriate at the nearest noise sensitive locations:

- Daytime (07:00 to 19:00hrs) 55dB $L_{Ar,15min}$
- Evening (19:00 to 23:00hrs) 50dB $L_{Ar,15min}$
- Night time (23:00 to 07:00hrs) 45dB $L_{Aeq,15min}$

- 9.36 A number of generators are proposed for the site that are to be used in emergency situations when grid power supplies fail. It is common practice to allow a relaxation of noise limits associated with emergency plant operations. Section 4.4.1 of EPA NG4 also contains the following comments in relation to emergency plant items:

"In some instances, licensed sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site".

- 9.37 It is therefore considered that the proposed noise criterion of 55dB $L_{Aeq,T}$ on the these units is appropriate in emergency scenarios. Note that this criterion applies to the emergency generators only. The noise criteria discussed in Table 9.7 for daytime, evening and night time periods will be applied to the day to day operations of the data halls and the proposed temporary gas generator park.
- 9.38 Summary of proposed noise criteria: In terms of operational noise the specific noise from the proposed site will not exceed the following criteria at noise sensitive residences:

Table 9.7 Proposed operational noise criteria

Daytime (07:00 to 19:00hrs)	Evening (19:00 to 23:00hrs)	Night-time (23:00 to 07:00hrs)
55dB $L_{A,T}(15mins)$	50dB $L_{A,T}(15mins)$	45dB $L_{Aeq,(15mins)}$
Emergency Operations		
55dB $L_{Aeq,(15mins)}$		

- 9.39 *Assessment of significance* – The assessment of significance of impact involves the assessment of the baseline data and the use of professional judgement. The relationship between the magnitude of increase in noise level and typical perceived impact is shown in Table 9.8. It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10dB would be described as a doubling of loudness.

Table 9.8 Significance of change in noise level

Change in Sound Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Impacts ³²
0	None	No Change	No Change
0.1 – 2.9	Imperceptible	Negligible	Imperceptible Impact
3 – 4.9	Perceptible	Minor	Slight Impact
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate Impact
10 – 14.9	Over a doubling of loudness	Major	Significant Impact
>15	Over a doubling of loudness	Profound	Profound Impact

- 9.40 General comment in relation to noise at common boundaries with adjacent sites will be presented in the relevant sections of this document. These criteria have been derived from relevant local and national guidance as outlined previously.

Criteria for rating vibration impacts

- 9.41 Guidance as to an acceptable magnitude of vibration during the operational phase of the development is best taken from British Standard BS 6472 (1992): *Guide to Evaluation of human exposure to*

³² Environmental Protection Agency – *Guidelines on the information to be contained in Environmental Impact Statements* (Section 5), 2002.

vibration in buildings (1Hz to 80Hz). The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3mm/s by daytime and 0.2mm/s by night-time.

- 9.42 It should be noted that the Proposed Development will not give rise to any significant levels of vibration off site and therefore the associated impact is not significant.

Forecasting methods

- 9.43 Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise*. Prediction calculations for building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation*.

Construction phase

- 9.44 It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the Proposed Development, a variety of items of plant will be in use, such as rock breakers, excavators, lifting equipment, dumper trucks, compressors and generators.
- 9.45 The proposed general construction hours are 07:00 to 19:00hrs, Mondays to Fridays and 09:00 to 13:00hrs on Saturdays. There are also occasional weekday evening works proposed, however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities, as is the case for activities prior to 8am.
- 9.46 Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the proximity of sensitive locations to site works however, there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

Table 9.9 Typical noise levels associated with construction plant items

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB LAeq,1hr)
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (D7.6)	77
	Poker Vibrator (C4.33)	78
Steel Erection	Tower Crane (C4.48)	76
	Articulated lorry (C11.10)	77
General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

- 9.47 Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS 5228-1. Table 9.9 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

9.48 For the purposes of the assessment we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this report.

9.49 Table 9.10 presents the predicted daytime noise levels for an indicative construction period on site. Construction noise sources are assumed to be running 66% of the time. The predictions have been prepared to one of the nearest residential noise sensitive locations to the site which is some 230 m to the south of the proposed generator buildings (i.e. NP23), at a nearby halting site. Additional predictions have been prepared to the nearest noise sensitive location on the far side of the R120, some 300 m from the proposed DUB 05 data halls (i.e. NP20).

Table 9.10 Review of potential daytime construction noise impact

Loc. (Ref Fig 9.5)	Phase	Predicted Construction Noise Level $L_{Aeq,1hr}$ (dB)	Daytime Construction Noise Criteria $L_{Aeq,1hr}$ (dB)	Complies?
NP20	Foundations	52	70 Weekdays / 65 Saturdays	✓
	Steel Erection	48		✓
	General Construction	51		✓
	Landscaping	50		✓
NP23	Foundations	54	70 Weekdays / 65 Saturdays	✓
	Steel Erection	51		✓
	General Construction	53		✓
	Landscaping	52		✓

9.50 Due to the proximity of the works to the nearest residences for the Proposed Development, management of construction noise will need to be applied on a proactive day to day basis. An outline construction noise and vibration management plan is presented in Appendix 9.3. There are no construction activities that would be expected to give rise to noise construction levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 9.5 on an on-going basis or give rise to a potential significant impact through the process outlined in Table 9.4. The impact on the noise environment due to construction activities will be transient in nature and mitigation measures will be implemented to minimise the impact of construction activities on the noise environment.

9.51 In terms of the additional construction traffic on local roads that will be generated as a result of this development the following comment is presented. In order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% along the local road network. As outlined in the relevant sections of chapter relating to traffic, additional traffic introduced onto the local road network due to the construction phase of the Proposed Development will not result in sufficient changes in traffic volume to cause a significant noise impact.

9.52 It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 07:00 to 19:00hrs Monday to Friday. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. Saturday working or evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance.

Operational phase

9.53 The primary sources of outward noise in the operational context are deemed medium term and will involve:

- building services noise;
- emergency site operations; and
- additional vehicular traffic on public roads.

9.54 These issues are discussed in detailed in the following sections. See Appendix 9.4 for details of the noise modelling undertaken for this assessment and associated assumptions.

9.55 *Building Services Noise / Emergency Site Operation* – Three scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A – Typical Operation;
- Scenario A1 – Typical Operation with Gas Generators in use;
- Scenario B – Emergency Operation (i.e. typical operation plus all diesel generators);
- Scenario C – Typical Operation (with generator testing), and
- Scenario C1 – Typical Operation (with generator testing) with Gas Generators in Use.

9.56 Scenario A would be considered to be the most representative of the day to day operation of the site once a permanent electrical supply is provided. Detailed noise data for plant items associated with typical site operation are presented in Appendix 9.4. Sound power levels for items relevant to Scenario A are summarised as follows:

Table 9.11 Sound power levels advised for DUB05 condenser units

Item	Sound Power Levels, dB								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Total	94	91	82	78	72	70	69	63	81
Left Side	86	83	74	70	64	62	61	55	73
Right Side	86	83	74	70	64	62	61	55	73
Front (Evaporator)	84	81	72	68	62	60	59	53	71
Rear (Condenser)	86	83	74	70	65	62	61	55	73
Top	90	87	78	74	69	66	65	59	77

9.57 Note that work has been undertaken with the design team to reduce overall noise levels associated with the proposed condenser units from an originally proposed level of some 91 dB(A) L_w to the level quoted above of some 81 dB(A). This equates to a halving of noise associated with these plant items.

9.58 Scenario A1 is considered to be representative of the day-to-day operation of the site during the periods where gas powered generators will power the site prior to the connection to the electrical grid. The Gas Generator plant items are assessed on the basis of a maximum A-Weighted Sound Pressure Level of 75dB L_{pA} at 1m distance, with them being housed internally within a building. See Appendix 9.4 for specific details and assumptions relevant to this aspect of the assessment.

Table 9.12 Sound power levels assumed for DUB05 internal gas generator units

Item	Sound Power Levels dB								dB(A)
	63	125	250	500	1000	2000	4000	8000	
75dB(A) at 1m Gen Set	108	105	98	94	90	86	81	79	97

9.59 Scenario B is representative of an emergency situation when a power outage or issue with supply from the national grid has occurred. Noise data for generators used in noise prediction calculations are presented in Appendix 9.4. In summary the Dub 4 generators are required not to exceed a maximum A-Weighted Sound Pressure Level of 75dB L_{pA} at 1m distance.

9.60 Scenario C considers the impact associated with the occasional testing of proposed emergency generators.

9.61 Figure 9.5 highlights the nearest noise sensitive locations for which predictions have been carried out. Various noise contours are also presented for the different scenarios in order to demonstrate the noise impact of the Proposed Development over a wider area.



Figure 9.5 Noise prediction locations (Source: Google Earth)

- 9.62 It should be noted that the predicted noise levels presented for Scenario A, A1, B and C consider the cumulative operation of all Edgeconnex Phase 1 to 4 and DUB04 operations (permitted development on site) as well as the Proposed Development (DUB05).
- 9.63 The results of the iterations of the noise model are presented in Table 9.13 and Table 9.14. All plant will be selected such that no tonal noise emissions are evident at noise sensitive locations. Note the predictions have been presented for the façades of the various noise sensitive locations that have a direct line of sight to the Proposed Development.

Table 9.13 Predicted plant noise levels for various scenarios

Location	Predicted dB L _{Aeq,T}		
	Scenario A Typical Operation (all Edgeconnex Data Centres)	Scenario B Emergency Operation (with all Edgeconnex generators)	Scenario C Typical Operation (with Edgeconnex Dub 4 generator testing)
NP01	38	54	39
NP02	38	55	40
NP03	33	52	33
NP04	33	51	35
NP05	35	55	36
NP17	36	51	38
NP18	36	51	38
NP19	42	55	43
NP20	36	51	39
NP21	35	51	40
NP22	37	52	38
NP23	34	53	39
NP24	38	48	38
NP25	37	47	38
NP26	37	50	38

Table 9.14 Predicted plant noise levels for various scenarios – with gas generation buildings

Location	Predicted dB LAeq,T	
	Scenario A1 Typical Operation + Gas Generator Building	Scenario C1 Typical Operation (with generator testing) + Gas Generation Building
NP01	39	39
NP02	39	40
NP03	33	33
NP04	34	35
NP05	36	36
NP17	37	38
NP18	38	38
NP19	43	43
NP20	37	39
NP21	37	40
NP22	38	38
NP23	39	39
NP24	38	38
NP25	37	38
NP26	38	38

- 9.64 The predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption.
- 9.65 *Comment on Adopted Noise Criteria Day to Day Operations* – The predicted noise levels presented in Table 9.15 and 9.16 have been compared to the relevant day, evening and night time noise criteria as adopted for this assessment.
- 9.66 Note A of Table 9.15 and 9.16 indicates that the emergency generator testing shall take place only between 9am and 5pm. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.
- 9.67 *Scenario A, A1* – All locations are within the relevant adopted daytime and evening limits by a significant margin. All locations comply with the night time criterion. Figure 9.6 presents a noise contour for Scenario A with Figure 9.7 presenting Scenario A1.

Table 9.15 Comparison of predicted noise levels vs. adopted noise criteria

Location	Period	Scenario A – Typical Operation			Scenario C – Typical Operation (Generator Testing)		
		Predicted dB L _{Aeq,T}	Adopted Limit dB L _{Aeq,15min}	Complies ?	Predicted dB L _{Aeq,T}	Adopted Limit dB L _{Aeq,15min}	Complies?
NP01	Day	38	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP02	Day	38	55	✓	40	55	✓
	Evening		50	✓			
	Night		45	✓			
NP03	Day	33	55	✓	33	55	✓
	Evening		50	✓			
	Night		45	✓			
NP04	Day	33	55	✓	35	55	✓
	Evening		50	✓			
	Night		45	✓			
NP05	Day	35	55	✓	36	55	✓
	Evening		50	✓			
	Night		45	✓			
NP17	Day	36	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP18	Day	36	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP19	Day	42	55	✓	43	55	✓
	Evening		50	✓			
	Night		45	✓			
NP20	Day	36	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP21	Day	35	55	✓	40	55	✓
	Evening		50	✓			
	Night		45	✓			
NP22	Day	37	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP23	Day	34	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP24	Day	38	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP25	Day	37	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP26	Day	37	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			

Note A Indicates that the emergency generator testing shall take place only between 9am and 5pm. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

Table 9.16 Comparison of predicted noise levels vs. adopted noise criteria – temporary generator park

Location	Period	Scenario A1 – Typical Operation			Scenario C1 – Typical Operation (Generator Testing)		
		Predicted dB LAeq,T	Adopted Limit dB LAeq,15min	Complies?	Predicted dB LAeq,T	Adopted Limit dB LAeq,15min	Complies?
NP01	Day	39	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP02	Day	39	55	✓	40	55	✓
	Evening		50	✓			
	Night		45	✓			
NP03	Day	33	55	✓	33	55	✓
	Evening		50	✓			
	Night		45	✓			
NP04	Day	34	55	✓	35	55	✓
	Evening		50	✓			
	Night		45	✓			
NP05	Day	36	55	✓	36	55	✓
	Evening		50	✓			
	Night		45	✓			
NP17	Day	37	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP18	Day	38	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP19	Day	43	55	✓	43	55	✓
	Evening		50	✓			
	Night		45	✓			
NP20	Day	37	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP21	Day	37	55	✓	40	55	✓
	Evening		50	✓			
	Night		45	✓			
NP22	Day	38	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP23	Day	39	55	✓	39	55	✓
	Evening		50	✓			
	Night		45	✓			
NP24	Day	38	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP25	Day	37	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			
NP26	Day	38	55	✓	38	55	✓
	Evening		50	✓			
	Night		45	✓			

Note A Indicates that the emergency generator testing shall take place only between 9am and 5pm. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

- 9.68 *Scenario C & C1* – All locations are within the relevant adopted daytime limits during periods when a single generator is undergoing routine testing. Figure 9.8 presents a noise contour for the worst case of these two scenarios, i.e. Scenario C1.
- 9.69 *Comment on Emergency Operations* – As discussed previously in the rare and exceptional event of a failure in electricity supply from the national grid standby generators will operate in order to maintain the sites operations. As discussed it is appropriate to adopt a criterion of 55dB $L_{Aeq,T}$ for such scenarios. Table 9.17 reviews the predicted levels for Scenario B.

Table 9.17 Comparison of predicted noise levels vs. adopted noise criterion – emergency generators

Location	Period	Scenario B – Emergency Operation (with all generators)		
		Predicted dB $L_{Aeq,T}$	Adopted Limit dB $L_{Aeq,15min}$	Complies?
NP01	Emergency Operation	54	55	✓
NP02		55		✓
NP03		52		✓
NP04		51		✓
NP05		55		✓
NP17		51		✓
NP18		51		✓
NP19		55		✓
NP20		51		✓
NP21		51		✓
NP22		52		✓
NP23		53		✓
NP24		48		✓
NP25		47		✓
NP26		50		✓

- 9.70 *Scenario B* All locations are within the relevant adopted criterion. Figure 9.9 present noise contours for Scenario B.
- 9.71 *Summary* – Scenario A, A1, C and C1 are representative of the typical day to day operations envisioned for the site. Review of the predicted noise levels and associated noise contours confirms that the site specific levels comply with the day, evening and night time criteria adopted for this assessment and typically espoused by SDCC. Scenario B is representative of emergency situations such as a power outage on the national grid. Review of the predicted noise levels and associated noise contours confirm that slight exceedances of the criteria for emergency scenario are expected where there is full site power failure.
- 9.72 *Review of Increases in Noise Level* – Table 9.18 presents the predicted changes in noise level associated with the development at the nearest noise sensitive locations to the site (i.e. NP01, NP21, NP23 and NP24).

Table 9.18 Review of predicted changes in existing noise levels

Loc.	Scenario A – Typical Operation Daytime				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Average Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	38	45	45.8	+0.8	Imperceptible Impact
NP21	35	42	42.8	+0.8	Imperceptible Impact
NP23	34	42	42.6	+0.6	Imperceptible Impact
NP24	38	42	43.5	+1.5	Imperceptible Impact
Loc.	Scenario A – Typical Operation Night Time				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Average Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	38	42	43.5	+1.5	Imperceptible Impact
NP21	35	38	39.8	+1.8	Imperceptible Impact
NP23	34	38	39.5	+1.5	Imperceptible Impact
NP24	38	38	41	+3	Slight Impact

- 9.73 Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is 'imperceptible' for Scenario A – Typical Operation during daytime periods. In term of night time periods the predicted changes are expected to have a 'imperceptible or 'slight' impact on the nearest noise sensitive locations.

Table 9.19 Review of predicted changes in existing noise levels – with gas generation buildings

Loc.	Scenario A1 – Typical Operation Daytime				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Average Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	39	45	46	+1	Imperceptible Impact
NP21	37	42	43.2	+1.2	Imperceptible Impact
NP23	39	42	43.8	+1.8	Imperceptible Impact
NP24	38	42	43.5	+1.5	Imperceptible Impact
Loc.	Scenario A1 – Typical Operation Night Time				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Average Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	39	42	43.8	+1.8	Imperceptible Impact
NP21	37	38	40.5	+2.5	Imperceptible Impact
NP23	39	38	41.5	+3.5	Slight Impact
NP24	38	38	41	+3	Slight Impact

- 9.74 Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is 'imperceptible' in relation to Scenario A1 – Typical Operation during daytime and 'imperceptible' to 'slight' for night-time periods.
- 9.75 *Additional vehicular traffic on public roads* – In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: given that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25%, it is considered that additional traffic introduced onto the local road network due to this development will not result in a significant noise impact.

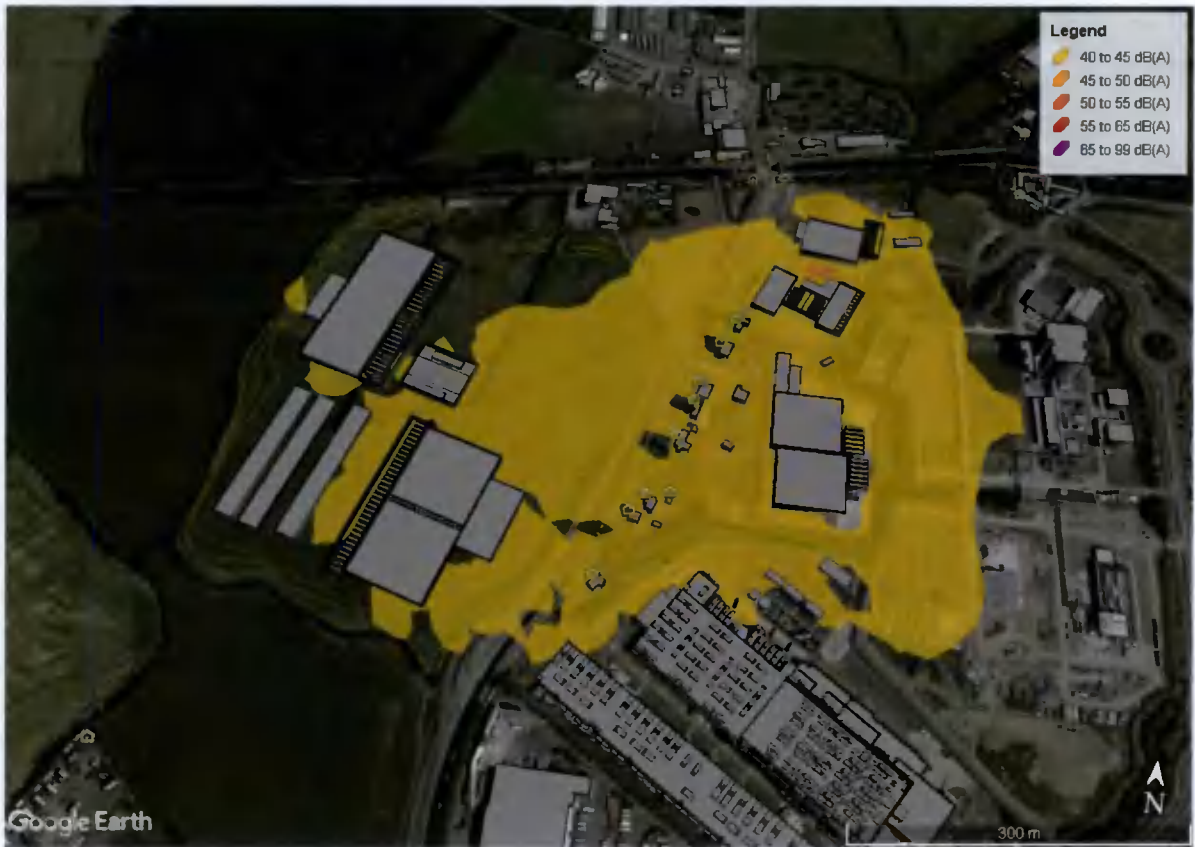


Figure 9.6 Scenario A – Noise contour – typical operation

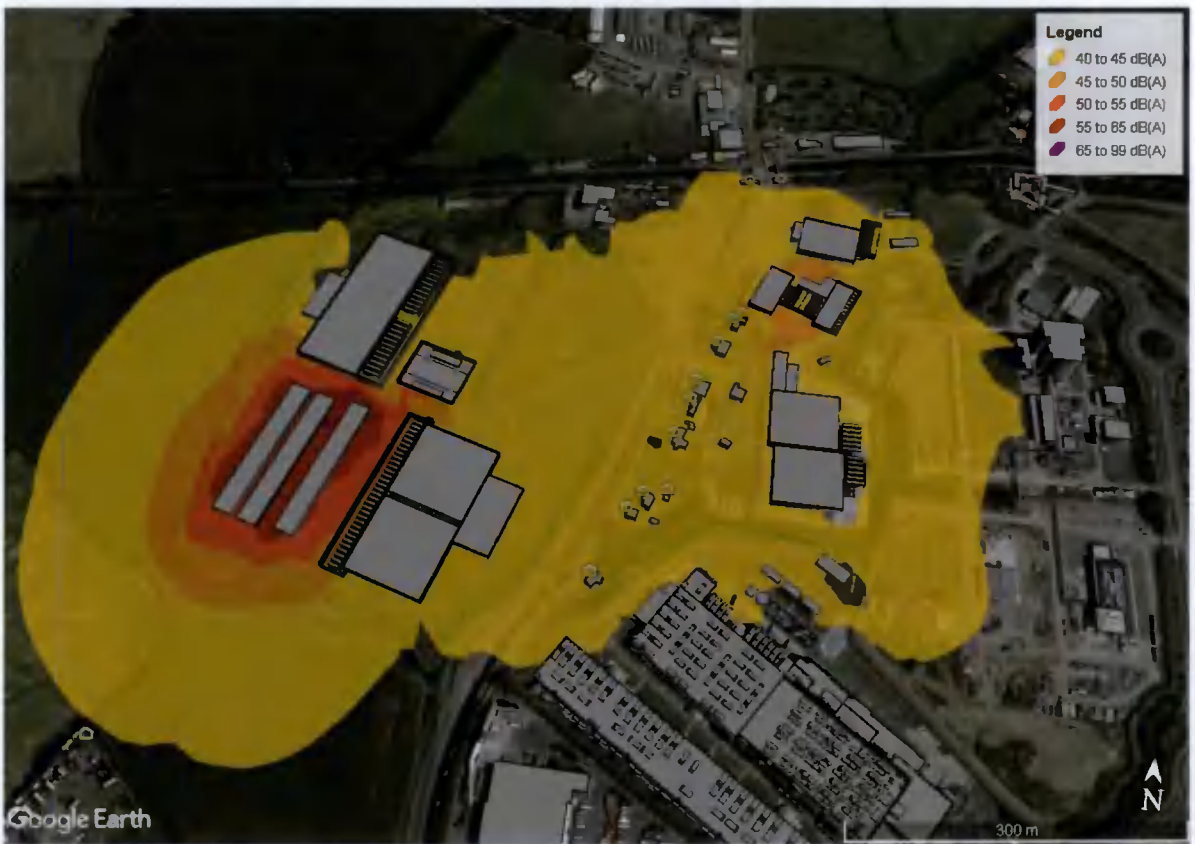


Figure 9.7 Scenario A1 – Noise contour – typical operation + Temporary Generator Park



Figure 9.8 Scenario B – Noise contour – emergency operation (with all generators)

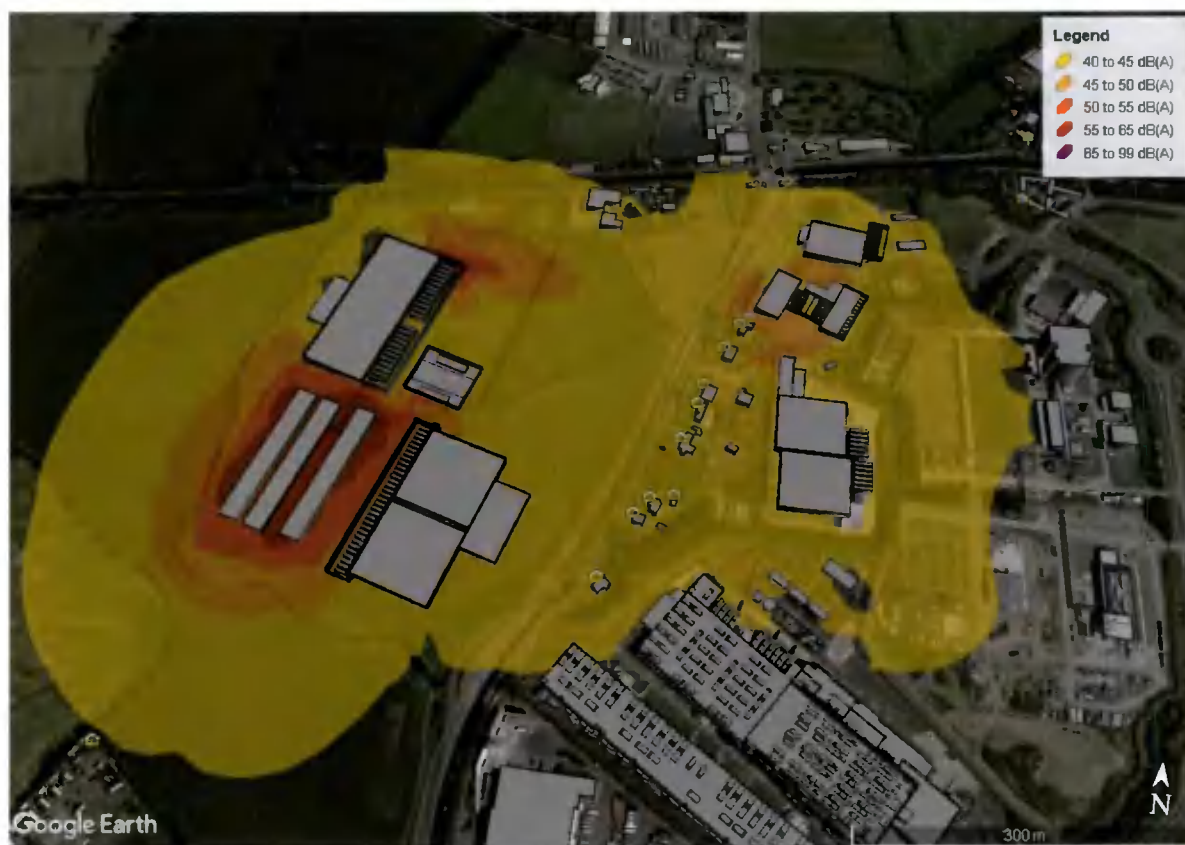


Figure 9.9 Scenario C1 – Noise contour – typical operation (with generator testing)

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). (Interxion EIS NP15)	37	41.4	29	43		✓
NP23 (Receiver noise levels not presented Microsoft & Interxion 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) (Interxion 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 (NO₂) 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 lands 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 (NO₂) 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 NO₂ 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 NO₂ 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 SO₂ (67% below 2001 levels), 65 kt for NO_x (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH₃ (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 SO₂ (65% below 2005 levels), 65 kt for NO_x (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH₃ (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 SO₂ in recent years but failed to comply with the ceilings for NH₃, 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 SO₂, NO_x, NMVOC, NH₃, PM_{2.5} and CH₄. In relation to Ireland, 2020 emission targets are 25 kt for SO₂ (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 NH₃ (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 SO₂, 40.7 kt (69% reduction) for NO_x, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH₃ 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 NO₂ 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 (NO₂) 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 km² 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.

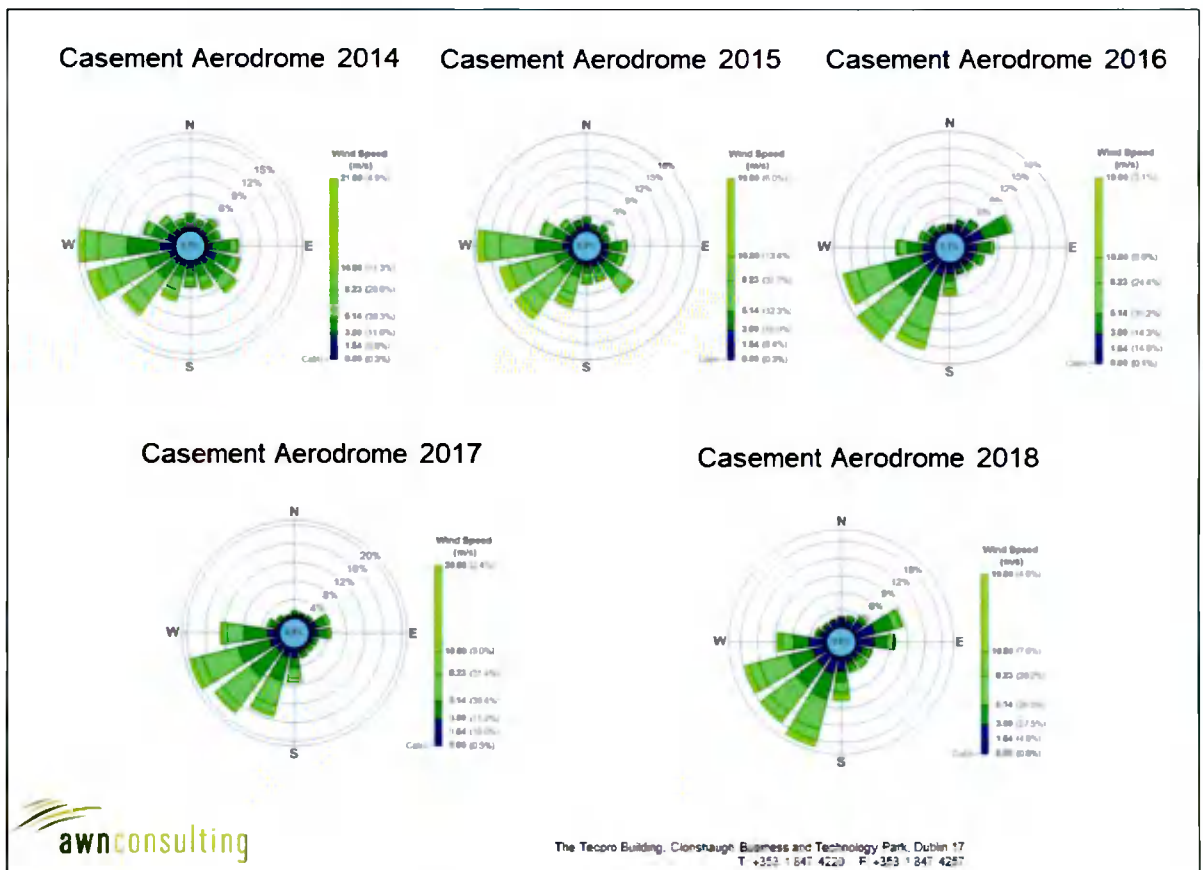


Figure 10.1 Casement Aerodrome Windrose 2014 - 2018

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 NO₂ was undertaken in detail. In relation to CO, PM₁₀, 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 NO₂ 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 µg/m³ compared to the 1-hour NO₂ standard of 200 µg/m³. Similarly, levels of PM₁₀/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 NO₂ Impact Assessment*" (UK EA, 2016). The methodology is based on considering the statistical likelihood of an exceedance of the NO₂ 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 account 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 NO₂ NAAQS for the Prevention of Significant Deterioration Program" (2010) and "Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard" (2011):

- Firstly, the PVMRM algorithm may have a tendency to overestimate the conversion of NO to NO₂ 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 NO_x in the stack gas is already in the form of NO₂ before the gas leaves the stack (in reality the levels are usually closer to 5% based on the USEPA database of NO₂/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 NO₂, 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 NO₂ are below both the annual and 1-hour limit values, with annual average levels ranging from 13 - 22 µg/m³ 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 $\mu\text{g}/\text{m}^3$. Based on these results, an estimate of the current background NO_2 concentration in the region of the Proposed Development is 15 $\mu\text{g}/\text{m}^3$ 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 ($\mu\text{g}/\text{m}^3$)

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year					
			2014	2015	2016	2017	2018	2019
Rathmines	Urban Background	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	17	18	20	17	20	22
		99.8 th ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	105	105	88	86	87	102
Ballyfermot	Suburban Background	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	16	16	17	17	17	20
		99.8 th ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	93	127	90	112	101	104
Dun Laoghaire	Suburban Background	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	15	16	19	17	19	15
		99.8 th ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	86	91	105	101	91	90
Swords	Suburban Background	Annual Mean NO_2 ($\mu\text{g}/\text{m}^3$)	14	13	16	14	16	15
		99.8 th ile 1-hr NO_2 ($\mu\text{g}/\text{m}^3$)	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 CO₂ and N₂O 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, CO₂ and N₂O 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 CO₂ and N₂O 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 where 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;
- Bowers 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 NO₂ 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 NO₂. For the worst-case year, emissions from the site lead to an ambient NO₂ 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 NO₂ 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	99.8 th ile of 1-hr means	117.2	147.2	200
NO ₂ / 2015	15	Annual Mean	18.8	33.8	40
	30	99.8 th ile of 1-hr means	116.0	146.0	200
NO ₂ / 2016	15	Annual mean	15.8	30.8	40
	30	99.8 th ile of 1-hr means	124.5	154.5	200
NO ₂ / 2017	15	Annual mean	18.3	33.3	40
	30	99.8 th ile of 1-hr means	124.5	154.5	200
NO ₂ / 2018	15	Annual mean	20.6	35.6	40
	30	99.8 th 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)

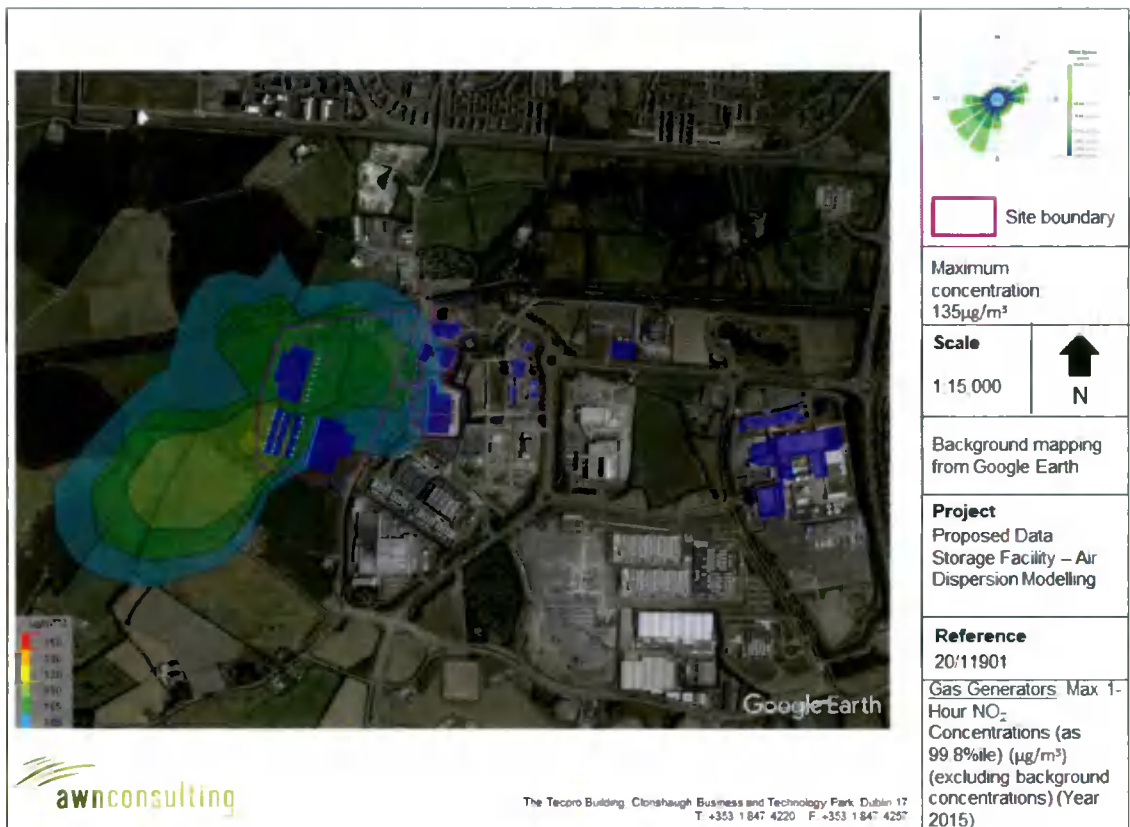


Figure 10.2 Scenario 1 Maximum 1-Hour NO₂ Concentrations (as 99.8th percentile) (Year 2018)



Figure 10.3 Scenario 1 Annual Mean NO₂ 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 NO₂ 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 NO₂. For the worst-case year, emissions from the site lead to an ambient NO₂ 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 NO₂ 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	99.8 th percentile of 1-hr means	121.7	151.7	200
NO ₂ / 2015	15	Annual Mean	22.0	37.0	40
	30	99.8 th percentile of 1-hr means	120.9	150.9	200
NO ₂ / 2016	15	Annual mean	21.0	36.0	40
	30	99.8 th percentile of 1-hr means	128.3	158.3	200
NO ₂ / 2017	15	Annual mean	22.4	37.4	40
	30	99.8 th percentile of 1-hr means	129.0	159.0	200
NO ₂ / 2018	15	Annual mean	22.3	37.3	40
	30	99.8 th percentile 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 NO₂ Concentrations (as 99.8th percentile) (Year 2018)

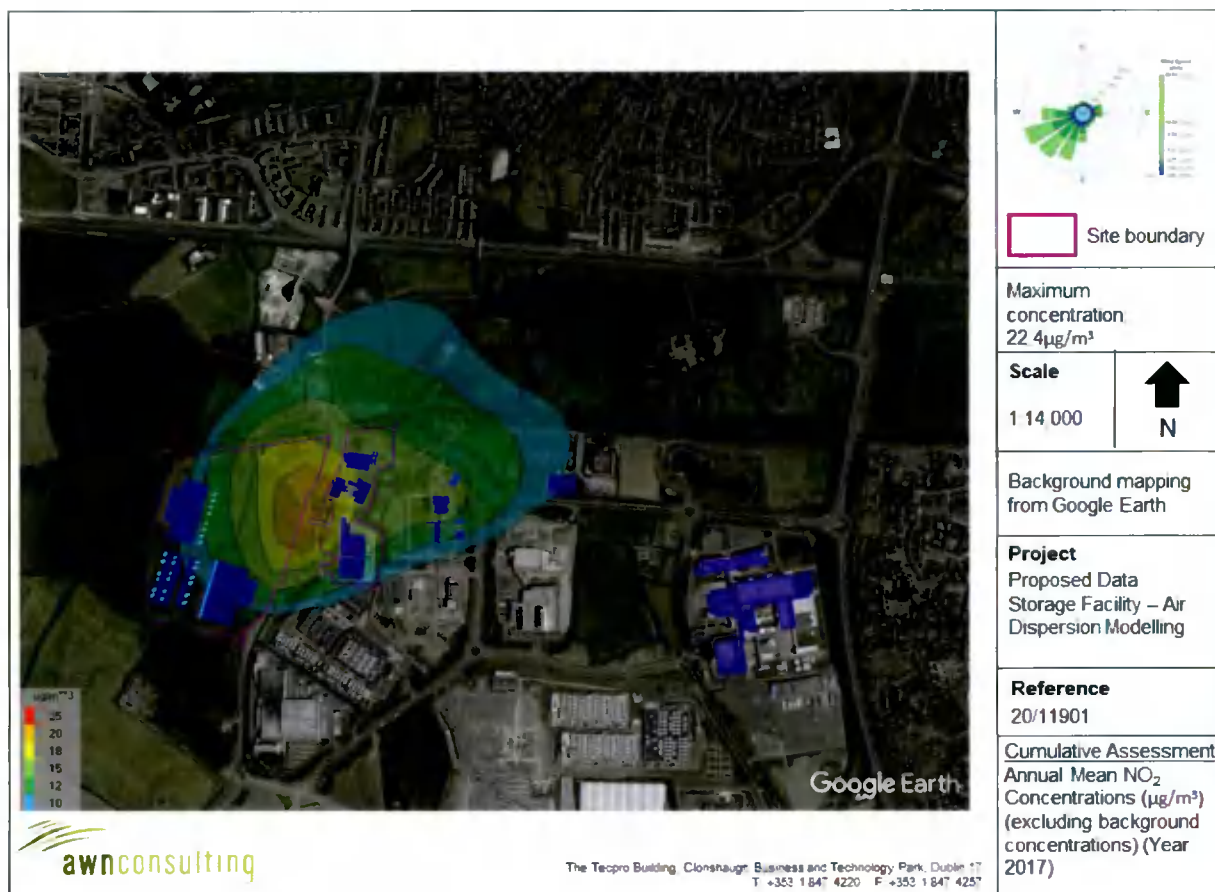


Figure 10.5 Scenario 2 Annual Mean NO₂ Concentrations (Year 2017)

DUB05 Only (UK EA Methodology)

10.72 The methodology, based on considering the statistical likelihood of an exceedance of the NO₂ 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) (98 th ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98 th 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 NO₂ Impact Assessment” (EA, 2016)

Cumulative Impacts (UK EA Methodology)

10.73 The methodology, based on considering the statistical likelihood of an exceedance of the NO₂ 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) (98 th ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98 th 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 NO₂ Impact Assessment" (EA, 2016)

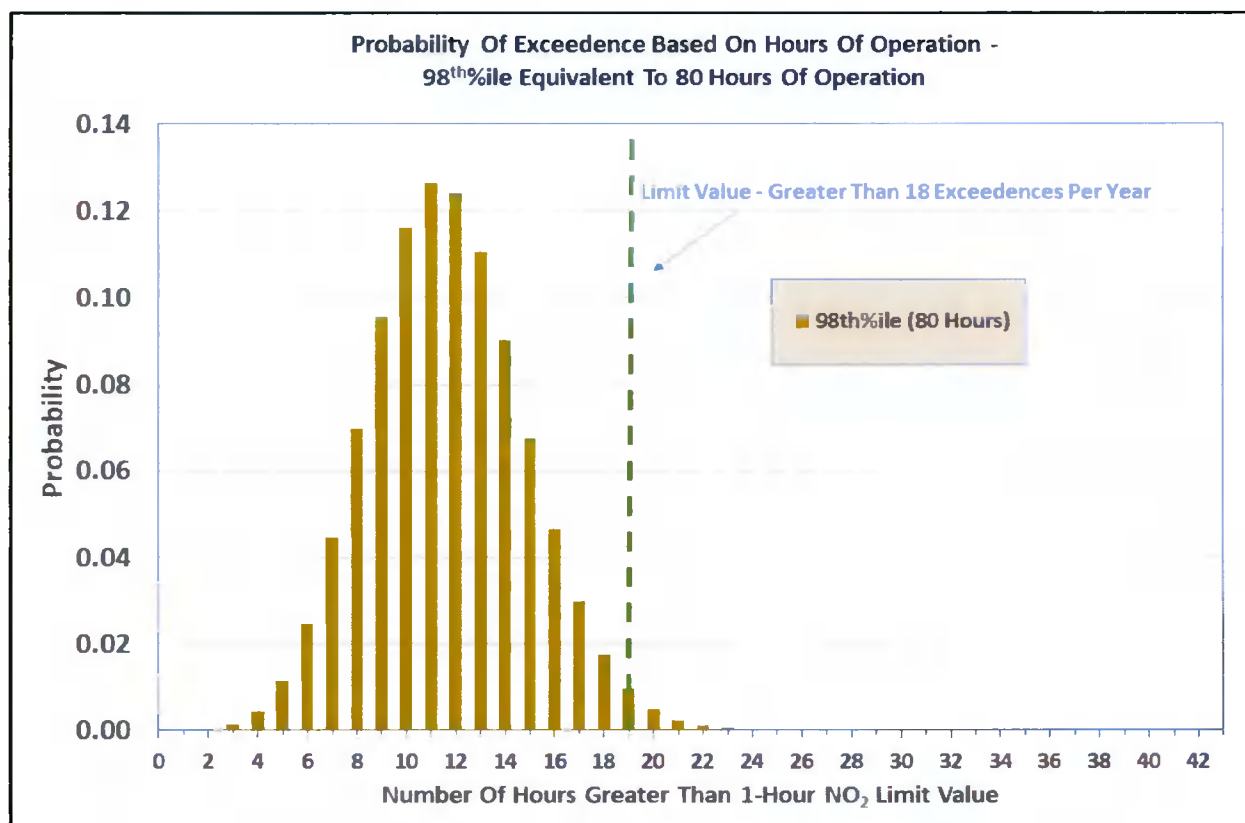


Figure 10.6 Probability of Exceedance of 1-Hour NO₂ Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Proposed Development – Cumulative Assessment

Summary of modelling assessment

10.74 The results of the modelling assessment based on the Proposed Development have found that ambient concentrations of NO₂, 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 NO₂ 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.

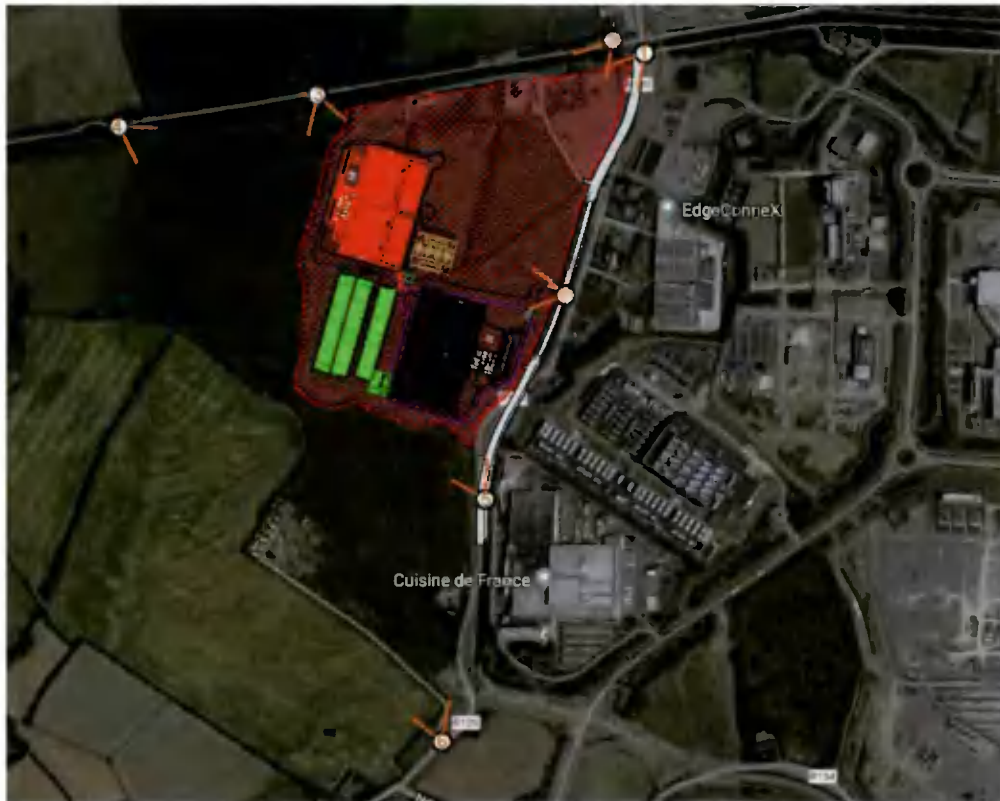


Figure 11.2 Visual impact assessment locations

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 is considered the overall visual impact on views from 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 from 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 construction 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.

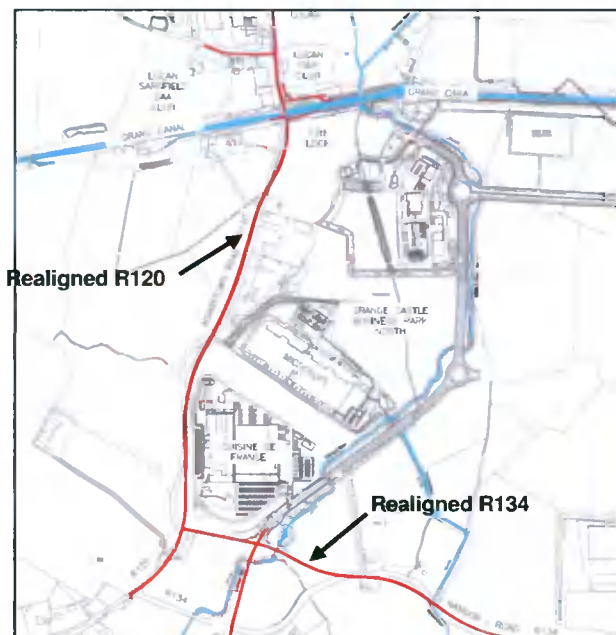


Figure 12.3 Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme (Source: SDCC)

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.

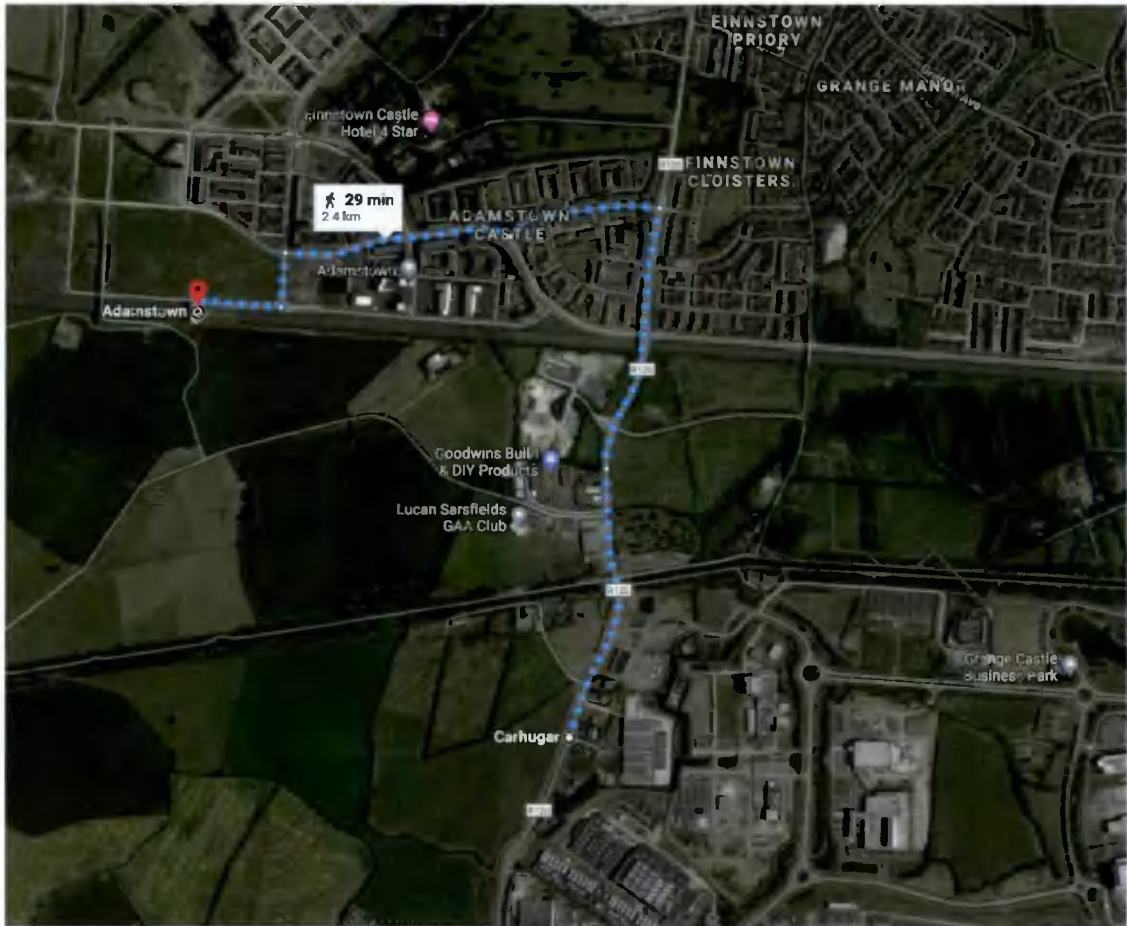


Figure 12.5 Route to Adamstown Rail Station (Source: Google Earth)

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 expected to generate c. 16,200m³ 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.

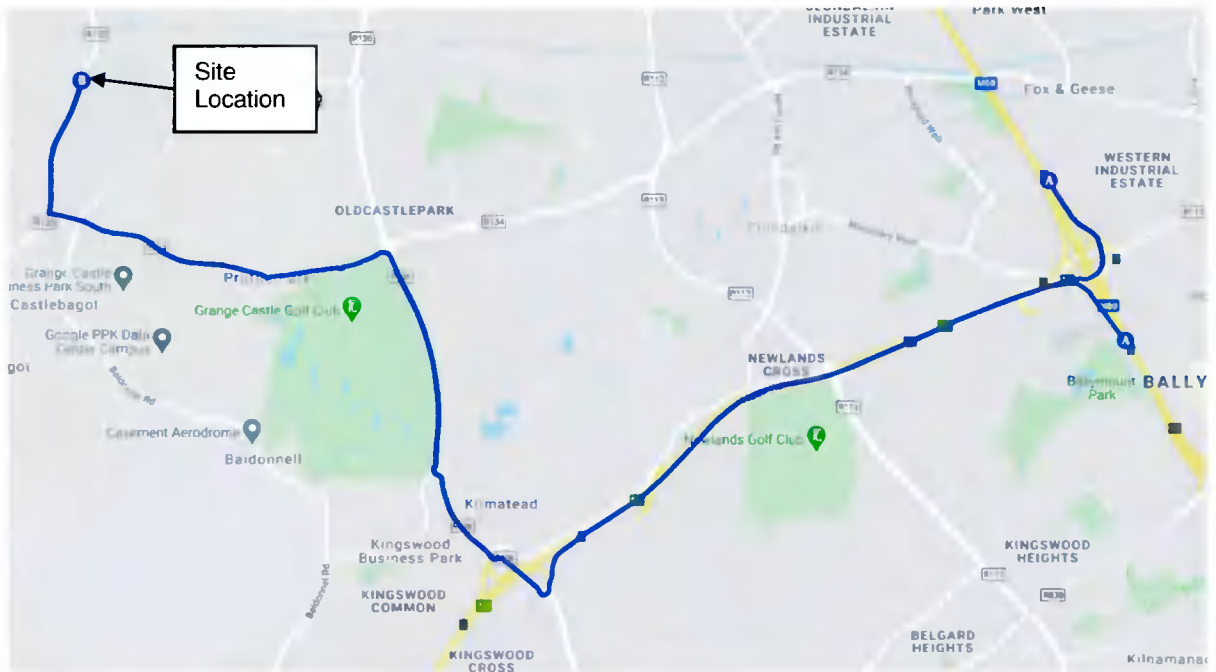


Figure 12.6 Haul route to site from M50

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/N7 Continue to follow N7 -> Merge onto M50

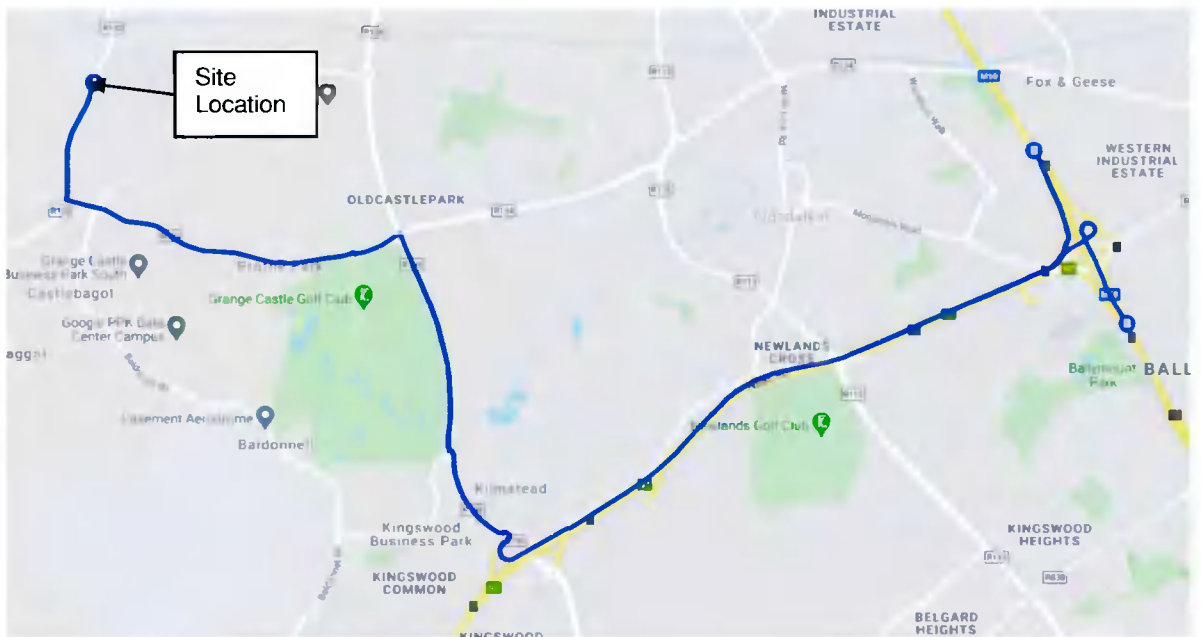


Figure 12.7 Haul route from site to M50

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 contractor 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 Ballymakailly, 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 Ballymakailly and Grange runs along the southern boundary of the site and the townland boundary between Ballymakailly 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-barrow 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 Kilmacodyrke' 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 kilmacodyrke' 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 Ballymakailly. 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 Ballymakailly 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 Ballymakailly 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 Ballymakailly 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 form 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 Gaeltacht.

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 Ballymakailly, 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. 15,034m³ of soil, subsoil and stones will be excavated, with c. 9,159 m³ reused on site. The remaining c. 5,875m³ soil, subsoil and stones will require removal from the site. In addition c. 16,117 m³ 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 undertaken 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 m³ soil, subsoil and stones and up to c. 16,117 m³ 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 m³ soil, subsoil, and stones and up to c. 16,117 m³ 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. 4,000m³. An addition 304m³ 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, valves 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.

Telecommunications

- 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. 16,200m³ 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 **neutral**.

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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