Planning & Development Act, 2000 - 2019,
European Communities (Environmental Impact Assessment) Regulations 1989 (as amended), Planning & Development Regulations, 2001 (as amended)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

NON-TECHNICAL SUMMARY

Data Centre Development
Grange Castle South Business Park

April 2020

MARSTON
PLANNING CONSULTANCY

NON-TECHNICAL SUMMARY

1.1 This Non-Technical Summary of the Environmental Impact Assessment Report (EIA Report) has been prepared on behalf of UBC Properties LLC to accompany an application to South Dublin County Council (SDCC) for permission for a new data centre facility on a site of 16.5 hectares that will be sited on a primarily greenfield site within the Grange Castle South Business Park and at the time of making this application is in the ownership of South Dublin County Council.

1.2 For detailed information and key mitigation and remedial measures please consult the full EIA Report document. Having regard to Article 3 of the 2014 EIA Directive, and the Circular Letter PL 1/2017 of the Department of Housing, Planning, Community and Local Government, this document has been titled an Environmental Impact Assessment Report (EIA Report).

Purpose of the EIA Report

1.3 The objective of this EIA Report is to identify and predict the likely environmental impacts of the Proposed Development; to describe the means and extent by which they can be reduced or ameliorated; to interpret and communicate information about the likely impacts; and to provide an input into the decision making and planning process. The EIA Report is the primary element of the Environmental Impact Assessment (EIA) process and is recognised as a key mechanism in promoting sustainable development, identifying environmental issues, and in ensuring that such issues are properly addressed within the capacity of the planning system.

The requirements for an EIA Report

1.4 Projects that require environmental impact assessment are listed in Schedule 5 of the Planning and Development Regulations 2001-2019. Schedule 5 (Part 2) of the Planning & Development Regulations 2001 (as amended) set mandatory thresholds for each project class. Sub-section 10(b) (iv) addresses 'Infrastructure Projects' and requires that the following class of project be subject to EIA:

- *industrial estate development projects, where the area would exceed 15 hectares.*

1.5 The development will be for a new data centre development on a site of 16.5 hectares within an established and expanding business park.

1.6 The following components are addressed in the EIAR:

- Introduction and Methodology
- Project Description and Alternatives Examined
- Population and Human Health
- Biodiversity
- Lands, Soils, Geology and Hydrogeology
- Hydrology
- Noise and vibration
- Air quality and climate
- Landscape and visual impact assessment
- Traffic and transportation
- Cultural heritage
- Waste management
- Material assets
- Cumulative impacts
- Interactions

1.7 It is necessary to examine each of these sections of the environment with respect to the impacts that the Proposed Development may have on them. In addition this planning application has examined flooding, and includes individual reports on Energy, Services, Mobility Management and Construction Management that have helped inform the contents of this EIA Report, and which are included as standalone reports with the planning application.

Characteristics of the Proposed Development

1.8 The Proposed Development is for a new data centre facility of three buildings on a site of 16.5 hectares on a primarily greenfield site within the Grange Castle South Business Park. The site includes the abandoned and unoccupied two storey farmhouse property known as Ballybane that is located on the Old Nangor Road, Dublin 22.

1.9 The site is bounded by the realigned Baldonnel Road to the west; by the old and new Nangor Road to the north; by agricultural fields and the Grange Castle Motor Company to the east; and by the Grange Castle South Access Road that provides access off the Baldonnel Road into Grange Castle South Business Park to the south.

1.10 The area is undergoing a land use transformation to a business campus in accordance with its zoning objective EE under the South Dublin County Development Plan 2016-2022. The aim of this zoning is to facilitate development such as the Proposed Development. Further land zoned for similar development is located to the north, south, west and east of the site.

1.11 Large areas of the surrounding lands to the south and north within the Grange Castle Business Park and Profile Park have been developed in the past 10-15 years and are occupied by industrial campuses including pharmaceutical, data centres and food manufacturing uses. The Google data centre campus is located to the south-east of the site and the Cyrus One data centre development is currently being constructed to the immediate south. The closest occupied residential properties are located c. 230m south of the proposed site boundary along the Baldonnel Road.

1.12 The Planning Application is to seek permission for a period of ten years for the Proposed Development (as described and defined below) of 80,269sqm that will consist of:

- Demolition of abandoned two storey dwelling and associated farm buildings (565sqm) known as Ballybane, Old Nangor Road, Clondalkin, Dublin 22;
- Construction of three no. two storey data centre facilities (Buildings A, B and C) with mezzanine floors at each level of each facility with a gross floor area of 78,871sqm;
- Building A will be constructed first and will be located to the south-west of the site and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data storage facility with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the northern end of each emergency generator that will measure 20m in height;
- Building B will be constructed second and will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data storage facility with associated flues that will be 25m in height. The flues will be located within the 18 no. ventilation shafts that will be located above the southern end of each emergency generator that will measure 20m in height. The flue and ventilation shaft arrangement is unique to Building B;
- Building C will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data storage facility with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height;
- Each of the three data centres will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators;
- The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level;
- Construction of internal road network and circulation areas, security hut (30sqm) at entrance; footpaths, provision of 150 no. car parking spaces, and 78 no. cycle parking spaces, with 50 no car parking spaces and 26 no. cycle parking spaces being provided for each building;
- single storey and temporary substation (29sqm);

- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity from the Substations to each data centre and are located to the immediate west of the generator compound within Buildings A and B, and to the south of the generator compound within Building C;
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation; and
- Ancillary site development works, that will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west.

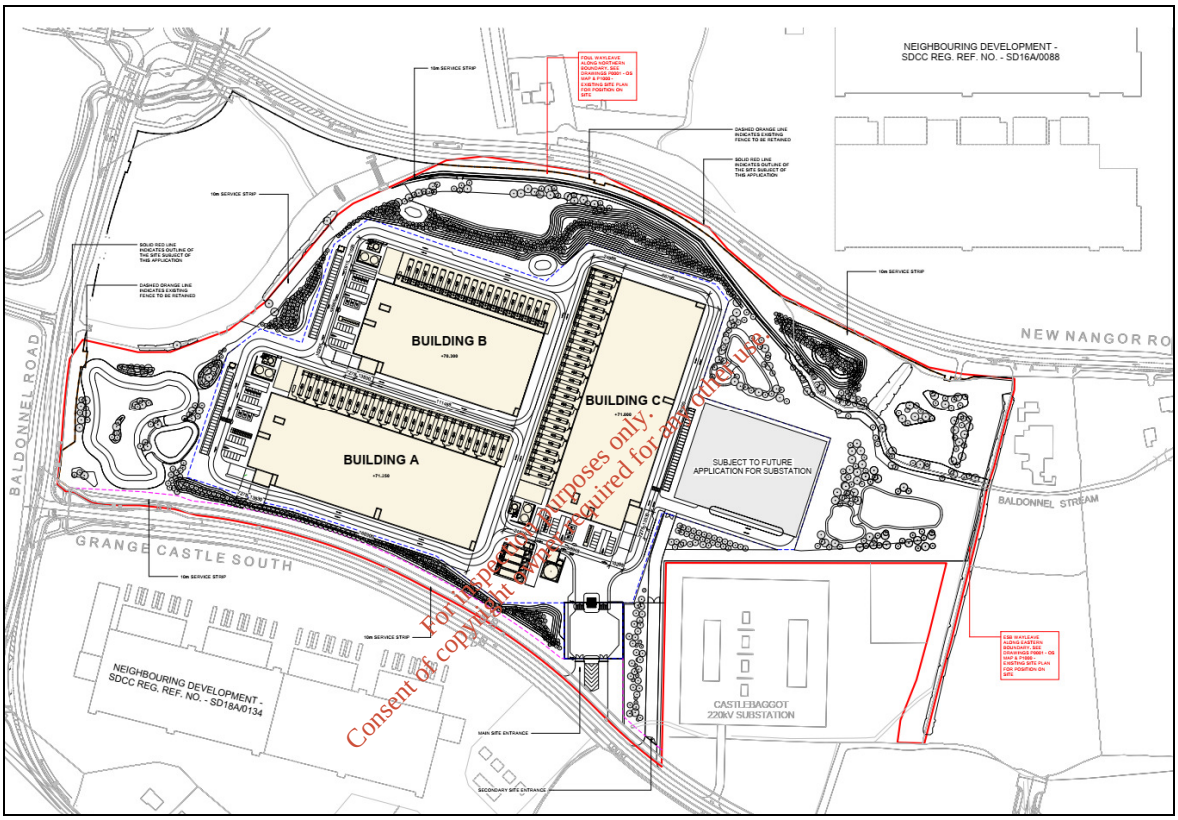

Figure 1 Proposed site layout plan

Alternatives considered

1.13 Chapter 4 of the EIA Report includes a summary of alternatives which were considered for the Proposed Development. This includes a detailed review of project design, technology, location, size and scale and mitigations. These options were considered as the scheme progressed and the key considerations and amendments to the design having regard to the key environmental issues pertaining to the lands are summarised in this chapter of the EIA Report.

Population and human health

1.14 Population (human beings) and Human Health is a broad ranging topic and addresses the existence, activities and well-being of people as groups or 'populations'. While most developments by people will affect other people, this EIA Report concentrates on those topics which are manifested in the environment, such as new land uses, more buildings or greater emissions.

Receiving environment

1.15 The Proposed Development will be located on the periphery of a largely built up urban area where industrial activities are the main land use. There is a low residential population within the immediate local area within 1km of the Proposed Development site. The nearest occupied residential

properties are located 230m to the south and 240m to the south-west of the site. A number of the residential properties close to the site are no longer in residential use due to the extension of the Grange Castle Business Park and road improvements in recent years.

1.16 Grange Castle Business Park and its extension to Grange Castle South Business Park and surrounding lands is already home to several industrial facilities and comprises a number of different land uses. The Proposed Development is situated on suitable EE zoned lands in an industrial area in south-west Dublin. Furthermore, the location will minimise the potential environmental impacts through careful design, master planning and mitigation measures as described in various chapters of this EIA Report.

1.17 There are a range of tourism amenities within the wider area although the only notable local amenities are the Grange Castle Golf Club that lies some 440m from the eastern boundary; and the Grand Canal corridor that is some 1.2kms north of the Proposed Development site.

1.18 A range of schools, healthcare and other services are located within the wider local area. The nearest facilities are the childcare facilities at Castlebaggot House that is set-back off the Baldonnel Road some 640m to the south; and the Peamount Healthcare facility sits some 1.2km to the west. The Casement Air base and its associated buildings bound the Baldonnel Road some 1.1km to the south-east of the application site.

1.19 Local and regional bus services connect the local and wider area with Dublin city centre. The Dublin to Cork mainline railway passes to the north of the canal. A new station at Adamstown and at Fonthill provide a new commuter service into the city centre. Details on public transport provision is provided under Chapter 12 of the EIA Report.

Mitigation measures

1.20 The Proposed Development does not have the potential to result in any significant negative impacts on population and community during the course of construction. No remedial or reductive measures are therefore required beyond normal landscaping, noise and construction mitigation that are outlined elsewhere within the EIA Report and should form a condition of permission.

1.21 In accordance with the Safety, Health and Welfare at Work (Construction) Regulations, a safety management system will be put in place on-site to minimise any risks to both construction personnel and site visitors. The site will not be accessible to the public and will have strict procedures in place for allowing entrance to visitors and contractors.

1.22 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. Impacts on employment during the construction phase will be positive if only slight within the immediate local area. Therefore no remedial or reductive measures are considered necessary.

1.23 No remedial or mitigation measures are considered necessary during the operational phase, beyond the landscaping proposed and detailed in chapter 12 of this EIA Report; as well as Traffic, Air Quality and Noise mitigation, as the Proposed Development will not give rise to any adverse impacts on population, and amenity nor human health during the operational phase of the Proposed Development. The development will result in the creation of a significant number of new jobs especially in service activities and creation of some local jobs. This is considered a slight permanent positive impact of the Proposed Development. No remedial or reductive measures are therefore required.

Impacts

1.24 The nearest residences at 230m and 240m away will have ongoing noise disturbance as a result of construction activity and traffic throughout the construction process. This has been mitigated by ensuring that all heavy construction traffic approaches the development site along the R120 and R134 (New Nangor Road).

1.25 The construction phase of the Proposed Development over 8 years will result in the creation of a large construction site that will have a ***short to medium term*** and ***slight*** negative impact on the immediate local environment and the amenity of existing residents as a result of noise and disturbance during construction.

1.26 The Proposed Development will not result in any material change to the permanent population of the area during the construction phase. There will be an increase in the temporary population of the area as a result of the employment of workers from outside the wider Dublin area that may need to reside in the immediate local area during the construction process. This will amount to only a small percentage of the workforce employed during the construction phases of the scheme but will result in some additional trade for local accommodation and services.

1.27 The total on-site construction phase of the development will be approximately 8 years. During the phased development of the construction of each data storage facility that will each be some 10-12 months in length, it is expected that up to 400 construction workers will be on site at the construction peak with an average of 250 during this main phase of construction. This is likely to benefit suitably qualified members of the local and wider community. The development will also support job creation in associated sectors such as building supply and local services.

1.28 Community facilities will be used more regularly as a result of the temporary working population resident in the local area. The construction phase therefore is predicted to have a ***slight short to medium term*** positive impact on the economy and employment of the area but a ***short to medium term slight*** negative impact on the local community and amenity of the area.

1.29 The operation of the proposed facility will be carried out in strict accordance with all Irish and European Regulations governing safety in the work place with specific regard to the regulations implemented under the Safety, Health & Welfare at Work Act, 2005.

1.30 The Proposed Development will facilitate the creation of a more intensive use for the lands that are within the Grange Castle South Business Park. The Proposed Development will upon completion sustain in the region of 300 workers. Based on the social class profile of the local community, a small number of the local population in the hinterland of the subject site are predicted to benefit from the new employment, which will be created. This is a ***slight and long-term*** positive impact. Some additional employment will also be created in support services including building maintenance, cleaning and catering services.

Biodiversity

Receiving environment

1.31 Desktop and field surveys were undertaken to establish the biodiversity baseline environment for the site. These are detailed in Chapter 6 of the EIA Report. The Proposed Development site is not designated as a SAC, SPA, NHA, or pNHA, however, it is located upstream of European designated sites in Dublin Bay. For this reason, European and nationally designated sites have been considered as Key Ecological Receptors for the Proposed Development.

1.32 The National Biodiversity Data Centre (NBDC) database search returned no records of protected flora species under the Flora (Protection) Order 2015 within 2km of the survey area.

1.33 The Proposed Development site is comprised primarily of agricultural land. The following habitat types, assigned using the Heritage Council classification system (Fossitt, 2000), were identified within the survey area and are:

- Improved agricultural grassland (GA1);
- Buildings and artificial surfaces (BL3);
- Recolonising bare ground (ED3);
- Hedgerows (WL1);
- Treelines (WL2);
- Hedgerows (WL1) and Ornamental/ non-native shrub (WS3) mosaic;

- Flower beds and borders (BC4);
- Spoil and bare ground (ED2);
- Depositing lowland rivers (FW2); and
- Drainage ditches (FW4).

1.34 The majority of the Proposed Development site is comprised of improved agricultural grassland (GA1) which is no longer managed. The ecological value of this habitat type within the Proposed Development site has been classified as being of local importance (lower value). However, this habitat provides food and shelter to a range of fauna including birds and rabbits. Bird species recorded in this habitat include snipe *Gallinago gallinago* and meadow pipit *Anthus pratensis*.

1.35 There are some areas of buildings and artificial surfaces (BL3) habitat within the Proposed Development site. This habitat is very common and has potential to support a limited range of fauna. The ecological value of this habitat type is considered to be of local importance (lower value). However, the farmhouse is considered to be of moderate suitability for roosting bats, and swallows were confirmed to be nesting within a shed onsite.

1.36 Recolonising bare ground (ED3) habitat is common within the Proposed Development site. This habitat is common and has the potential to provide food and shelter resources for local bird species. During breeding bird surveys in 2019 a range of bird species were recorded within recolonising bare ground habitat. The ecological value of this habitat type is considered to be of local importance (lower value).

1.37 There are several fragmented hedgerows (WL1) throughout the Proposed Development site. The hedgerows are comprised of a mix of native and non-native tree and shrub species. This habitat provides breeding, resting and feeding habitat for a range of fauna species including birds and mammals. The section of hedgerow bounding the stream to the east of the site is of particular value to fauna species. The ecological value of hedgerow habitat within the Proposed Development site has been classified as being of local importance (higher value).

1.38 There is one fragmented treeline (WL2) within the Proposed Development site. Although this habitat is unconnected to similar habitats in the surrounding landscape and is relatively sparse, it provides nesting and feeding habitat to breeding bird species, therefore the ecological value has been classified as being of local importance (higher value).

1.39 The garden of the farmhouse on the Proposed Development site is surrounded by a mosaic of hedgerow (WL1) and ornamental/ non-native shrub (WS3) habitat. This habitat has potential to support breeding birds and provide shelter to mammal species, therefore the ecological value has been classified as being of local importance (lower value).

1.40 The garden of the farmhouse on the Proposed Development site is comprised of a mosaic of flower beds and borders (BC4) and amenity grassland (GA2). Due to the habitat's limited potential to support fauna species and the presence of non-native invasive species, the ecological value of this habitat has been classified as being of local importance (lower value). Recent archaeological investigation works have disturbed areas within the Proposed Development site and resulted in areas of spoil and bare ground (ED2) habitat. Some bird species were recorded within this area during breeding bird surveys however this habitat is very common and has limited use in supporting local fauna. The ecological value has been classified as being of local importance (lower value).

1.41 The stream present within the Proposed Development site is a tributary of the Griffeen River and has been highly modified in recent times to allow for the construction of the new Nangor Road. It is classified as a depositing lowland river (FW2). A small portion of the natural stream remains along the north-eastern portion of the site. Despite recent modification to this habitat, it has the potential to support a wide range of fauna. Otter, kingfisher and grey wagtail were all recorded along the stream. The ecological value of this habitat has therefore been classified as being of county importance.

1.42 There are drainage ditches (FW4) present within the hedgerows on the Proposed Development site. Standing water in these ditches are suitable for breeding amphibians such as common frog and

smooth newt. The ecological value of this habitat has been classified as being of local importance (higher value) due to its potential to support amphibians.

Bats

1.43 The hedgerows and treelines within the Proposed Development site as well as woodland, hedgerows and treelines in the surrounding area are considered to be suitable foraging and commuting habitat for bats. No bat roosts were confirmed within the Proposed Development site however the farmhouse onsite is considered to be of moderate suitability for roosting bats as there is access to the attic space through the roof tiles. No signs of bats were recorded during internal building inspections of the farmhouse. There are three barns within the Proposed Development site which are considered to have low suitability for roosting bats.

1.44 One tree on the Proposed Development site was considered to be of low suitability for bats. This tree is broken and ivy clad and has the potential to possess potential roosting features for small numbers of bats.

1.45 Two species of bat were recorded during the emergence and re-entry survey at the farmhouse; Leisler's bat and common pipistrelle. These surveys recorded both species close to sunset and sunrise times. This indicates that their roosts are likely in the vicinity of the survey area however, no bats were recorded emerging from or entering any building onsite.

Other mammals

1.46 No signs of badger or other protected mammals were noted in the Proposed Development site. It is possible, however that the hedgerows could host populations of hedgehog and pygmy shrew. Rabbits and their burrows are present in the vicinity of the farmhouse.

Birds

1.47 A wide range of bird species were recorded within the Proposed Development site during breeding bird surveys carried out in June 2019. Species recorded included nine Amber-listed species- swallow, starling, house sparrow, skylark, goldcrest, house martin, swift, greenfinch and robin. Nesting swallows were confirmed using a barn in the farmyard. One Red-listed species was recorded; meadow pipit. Other species recorded included a range of common urban and farmland species such as wren, chaffinch and blackbird. It is possible that all of the above species were breeding either in hedgerows, treelines or buildings on the Proposed Development site. Of note was the presence of buzzards flying and calling overhead throughout ecological surveys, although no buzzard nest was recorded on the Proposed Development site. Ringed plover was also recorded feeding on an area of spoil and bare ground that had been cleared for archaeological surveys. It is not anticipated that this species was breeding here as they would have been subject to high levels of human disturbance.

1.48 The winter bird surveys were carried out from September to December 2019 and recorded an additional four Amber-listed and one Red-listed species. Additional Amber-listed birds included stonechat, snipe, wheatear and kingfisher. Flocks of up to fifty meadow pipit were recorded wintering on the lands and up to six snipe were flushed from the unmanaged grassland during transects. The presence of kingfisher is notable as it is a species listed on Annex I of the Birds Directive and is subject to special conservation measures. Up to two kingfisher were recorded along the stream on the Proposed Development site, most regularly encountered being flushed from the southern bank of the realigned section. This indicates that a kingfisher territory occurs here, and they may breed during the summer.

1.49 Grey wagtail, a Red-listed species was regularly recorded along the riverbank during the winter surveys. Juvenile grey wagtails were noted, which suggests that this species may be breeding in close proximity to the Proposed Development site. During a site visit on 14th January 2020, a flock of 150 lapwing, a Red-listed species were recorded feeding on the Proposed Development site. Yellowhammer, a Red-listed species was also recorded on the site during winter bird surveys.

Amphibians

1.50 No signs of amphibians were noted during the field survey however drainage ditches on the Proposed Development site represent suitable breeding habitat for these species.

Mitigation measures

1.51 A project environmental management plan will be developed prior to works commencing. This document will ensure that storm water and wastewater runoff are managed and will not cause an off-site environmental impact. A range of pollution prevention measures are outlined to be implemented in the Outline Construction Management Plan (CS Consulting, 2020). The mitigation measures outlined in the Hydrology chapter (Chapter 8) of this EIA Report will prevent pollution of the Baldonnel Stream and the receiving surface water network.

1.52 Full landscaping details are provided in the landscaping plan accompanying this planning application (Kevin Fitzpatrick Landscape Architecture, 2020). The landscape strategy will enhance the biodiversity value of the Proposed Development site and provide green infrastructure links to the surrounding area. It is proposed that landscaping works will be carried out in the first phase of the development and will be in place prior to the construction of Building B. Therefore, suitable breeding, foraging and roosting habitat will be available to a wide range of fauna prior to the completion of the development.

1.53 Existing hedgerows and other vegetation will be retained along the Baldonnel Stream and strengthened with native planting. This will create commuting and foraging corridors within the Proposed Development site for a range of fauna species. A woodland belt is proposed along the northern boundary of the site. Large, semi-mature tree planting has been proposed for this area and will provide an immediate ecological corridor within the site. Additional smaller areas of hedgerow, woodland and large tree planting will take place throughout the Proposed Development site and will provide suitable foraging, roosting and nesting habitat for fauna. Large areas of native wildflower meadow are also proposed within the site and will provide foraging and resting habitat for a range of fauna, particularly pollinators and birds.

1.54 A wetland / attenuation area and three attenuation ponds will be constructed as part of the Proposed Development. These areas will enhance the biodiversity value of the Proposed Development site. The wetland / attenuation area will be planted with native riparian flora and surrounded by wildflower meadows and small woodland berms. The range of proposed habitats in this area will provide a refuge for flora and fauna species. The wetland area has been designed with shallow, sloping areas which will provide suitable amphibian breeding habitat.

1.55 Two artificial otter holts will be installed in the banks of the Baldonnel Stream. These must have two or three entrances below, at, or above the water level. The tunnel should slope upwards from the entrance to avoid flooding of the chamber. One holt will be installed into the remaining natural section of the stream to the east of the site and the other in the realigned section of the stream prior the commencement of planting.

1.56 It is proposed to install bird boxes in appropriate locations within the Proposed Development site. Bird boxes have been selected to provide nesting habitat for birds of conservation concern that have been recorded on the site i.e. kingfisher, swallow and grey wagtail. Woodcrete bat boxes will be installed in areas with low light levels, in close proximity to suitable commuting and foraging features.

1.57 Construction lighting will be designed so as to be sensitive to the potential presence of bats and will adhere to the Guidelines as set out under Chapter 6 of the EIA Report.

1.58 Both trees and buildings will need to be resurveyed for bats prior to felling / demolition by a suitably qualified and experienced ecologist. Where bat roosts are encountered, all relevant works will cease and an application for a derogation licence must be submitted to the NPWS to permit removal of the roost.

1.59 Suitable woodcrete bat boxes will be installed on trees within the Proposed Development site. The boxes will be installed in areas that are in close proximity to suitable commuting and foraging habitat in areas not subject to light spill.

1.60 In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, all works involving the demolition of buildings and/or removal of trees or hedgerows will be undertaken outside of the nesting season (1st March to 31st August inclusive).

1.61 If vegetation removal must take place in the nesting season, then checks for breeding birds will be undertaken immediately prior to site clearance. Where active nests are found, works must cease until such a time that the nests are deemed inactive. It is proposed to provide alternative nesting habitat for birds of conservation concern that were recorded on the Proposed Development site.

1.62 Pollution of the Baldonnel Stream as a result of surface water run-off during the operation phase of the development will be prevented as outlined in the *'Engineering Services Report'* (CS Consulting, 2020). In summary, all surface waters from hardstanding areas within the Proposed Development site will pass through an oil interceptor and 'forebays' to remove detritus from the water. These waters will be retained onsite in one of the three attenuation areas prior to controlled release into the Baldonnel Stream.

1.63 The lighting plan for the Proposed Development 'External Lighting Design Report' (Thorlux Ireland, 2020) has been designed to reduce light spill and has been reviewed by an ecologist. Existing features of ecological interest and those proposed in the landscape plan (i.e. the Baldonnel Stream, the wetland area and the attenuation ponds) indicate as being not subject to any light spill and will be kept at 0 lux. As outlined in the plan, light spill modelling has not taken into account proposed tree planting and berms which will further mitigate the effects of light spill.

Impacts

1.64 There will be no likely significant effects of the Proposed Development on designated sites. The full and successful implementation of the mitigation measures, will result in no residual impacts on roosting/ foraging/ commuting bats, otters or other mammals at any geographical scale.

1.65 Residual impacts on breeding birds include temporary displacement from the Proposed Development site during the construction phase and vegetation clearance. However, assuming the full and successful implementation of the mitigation measures, no long-term significant impacts are predicted on breeding birds at any geographical scale. Residual impacts on wintering birds include permanent loss of agricultural grassland habitat. This is considered to be a permanent significant impact at the local scale.

1.66 The construction of the Proposed Development is phased such that the landscaping of wetland features will be carried out in tandem with the construction of Building A. As such, the duration of impacts resulting from habitat loss will be reduced to temporary/ short-term impacts.

1.67 Assuming the full and successful implementation of the mitigation measures, the area of hedgerow habitat within the Proposed Development site will be increased. Assuming the full and successful implementation of the mitigation measures, the Baldonnel stream will be ecologically enhanced as a result of proposed planting outlined in the landscape plan.

Land, soil, geology and hydrogeology

Receiving environment

1.68 The following ground conditions were encountered in the site-specific due diligence investigations undertaken in April and May 2019. There were 16 no. cable percussive boreholes (with rotary coring carried out at 8 of the locations) drilled and 6 no. trial pits excavated across the site (Figure 8.3 of the EIA Report shows the borehole/trial pit locations).

- The site is overlain by topsoil in most locations. However, a thin covering of Made Ground was encountered in boreholes BH01 and BH02 comprising granular fill and gravelly clay.
- The underlying deposits comprise sandy gravelly clay. Stiff and very stiff deposits were generally encountered within 1.0 to 1.5 metres below ground level (BGL). Limestone bedrock was confirmed to be present at depths of typically 2.0 to 2.6 m BGL, deepening to 3.6 m BGL towards the north of the site (RC07).
- Based on the results of the standard penetration (SPT) tests, bearing pressures of the order of 150 kPa could be assumed for the stiff gravelly clay soils, increasing to c. 250 to 300 kPa for the very stiff deposits.
- During the site investigations, water strikes were encountered in most boreholes at depths between 2.0m and 2.5m BGL. Moderate groundwater ingress was also observed in several trial pits. However, when the rotary core holes were drilled, there was no groundwater inflows in the bedrock. This would suggest that the water strikes found in the boreholes and trial pits were from perched water at the weathered interface of the overburden and bedrock.

Mitigation measures

1.69 In order to reduce impacts on the soils and geology environment a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of soil excavation and export from site;
- Sources of fill and aggregates for the Proposed Development;
- Fuel and chemical handling, transport and storage; and
- Control of water during construction.

1.70 A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractors during the construction and operational phases.

1.71 The project engineers, CS Consulting, have estimated that c. 55,814m^3 of spoil will be generated. It is envisaged that all of this material will be reused on site in the proposed preparatory levelling phase.

1.72 Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.

1.73 A range of fuel and chemical handling mitigation measures will be implemented during construction and will be included within the CEMP.

1.74 During the operational phase of the Proposed Development there is limited potential for site activities to impact on the geological and hydrogeological environment of the area. There will be no emissions to ground or the underlying aquifer from operational activities. There will be no impact on local or regional groundwater resources (abstraction) as a result of the Proposed Development.

1.75 The Operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to operation of the Proposed Development, a comprehensive set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures that address fuel storage; and the increase in hard standing area.

Impacts

1.76 The implementation of mitigation measures will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

1.77 The implementation of mitigation measures highlighted in Chapter 8 of the EIA Report will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral.*** Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Hydrology

Receiving environment

1.78 The Proposed Development is within the River Liffey catchment, which encompasses an area of approximately 1,369 km^2. The Proposed Development site is within the sub catchment of the Griffeen River and Baldonnel Stream which are tributaries of the River Liffey. The Baldonnel Stream runs roughly east to west along the north-eastern corner of the site.

1.79 With reference to the site setting, the nearest EPA monitoring stations are Griffeen, located at the first bridge East of Milltown, and Baldonnel Stream, located at Nangor Road. The status given from the Griffeen station by the EPA is from 1991 and classified as Q3- Poor. A more recent status, a station at the Lucan Bridge, which monitors the Liffey River, is classified as 'Good'. This monitoring was undertaken between 2004 and 2016 and is taken at a point approximately 400m downstream from where the Griffeen River enters the River Liffey.

1.80 As part of the River Basin Management Plan 2009-2015 the water quality of the Griffeen Lower was assessed. The overall water quality status obtained for the Griffeen Lower was 'Bad' primarily due to its fish status and overall chemical status which each obtained a 'Bad' classification.

1.81 The Flood Risk Assessment that accompanies this application states that the Proposed Development site is within 1% AEP floodplains. As a mitigation measure, it is recommended to incorporate compensatory flood storage within the Proposed Development site with a safe discharge route to the Baldonnel Stream.

Mitigation measures

1.82 The design of the Proposed Development has taken account of the potential impacts of the development and the risks to the water environment specific to the areas where construction is taking place.

1.83 A detailed CEMP will be prepared and maintained by the appointed contractors during the construction phase of the proposed project. The CEMP will cover all potentially polluting activities and include an emergency response procedure.

1.84 Silt reduction measures on site to control surface water runoff will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds). The temporary storage of soil will be carefully managed and stored away from existing drainage features to remove any potential impact.

1.85 Mitigation measures will be taken during the construction stage in order to prevent any spillages of fuels and prevent any resulting impacts to surface water systems.

1.86 Prior to operation of the Proposed Development, a set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures.

1.87 The proposed drainage system design will incorporate SuDS features throughout. The proposed surface water attenuation system will be released from the attenuation ponds via a hydrobrake to the Baldonnel Stream.

Impacts

1.88 The implementation of mitigation measures will ensure that the potential impacts on the surface water environment do not occur during the construction phase and that the predicted impact will be ***short to medium term, imperceptible and neutral***.

1.89 The implementation of mitigation measures highlighted in Chapter 9 of the EIA Report will ensure that the potential impacts on the surface water environment do not occur during the operational phase and that the predicted impact will be ***long-term-imperceptible- neutral.***

Noise and vibration

1.90 A series of noise surveys have been undertaken as part of the EIA Report preparation for the Proposed Development. Full details of the noise monitoring are presented in Chapter 9 of this EIA Report. Road traffic noise, both distant and local was noted as the most significant source of noise and typically dictated ambient noise levels at the nearest noise sensitive locations to the site during daytime and night-time periods.

1.91 Background noise levels at the various locations were typically dictated by local and distant road traffic noise. These levels fell as would be expected into the early hours of the morning when the volume of traffic on the local and wider road network reduced. Distant plant noise from existing commercial sites was noted at Location B and D, to the immediate south and north of the Proposed Development site.

1.92 These typical noise levels have been considered when discussing appropriate noise criteria in relation to the development. Traffic noise from the local road network and other roads in the study area dictated noise levels at all locations during the survey periods in question. It is considered that these conservative assumptions will ensure that appropriate noise criteria are applied to the Proposed Development.

Mitigation measures

1.93 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.

1.94 Various mitigation measures will be considered and applied during the construction of the Proposed Development in accordance with best practice and standards. These will include a variety of practicable noise and vibration control measures.

1.95 During the operational phase, noise from external plant will be minimised by the following measures:

- Purchasing low noise generating equipment, and;
- Incorporating appropriately specified in line attenuators for stacks and exhausts where necessary.

1.96 The noise impact assessment has demonstrated that mitigation measures for additional traffic noise is not required.

Impacts

1.97 During the construction phase of the Proposed Development 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 implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be ***slight, negative*** and ***short-term*** in nature. Also, it is considered that as the Proposed Development progresses from initial ground works that construction noise impacts will reduce from slight to ***not significant.***

1.98 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 ***negative***, ***not significant*** and ***long-term***.

1.99 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 ***neutral, imperceptible*** and ***long-term.***

Air quality and climate

Receiving environment

1.100 The modelling of air emissions from the site was carried out to assess the concentrations of nitrogen dioxide (NO_2), as well as particulate matter (PM_{10} and PM_{25}) beyond the site boundary and the consequent impact on human health and the environment. The assessment was undertaken in order to quantify the impact of the Proposed Development on ambient air quality concentrations. The study adopted a conservative approach which will lead to an over-estimation of the actual levels that will arise.

Mitigation measures

1.101 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. For example, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

1.102 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. 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. These are set out in detail within Chapter 10 of the EIAR and address haulage roads; land clearing / earth moving; storage piles; and site traffic on public roads. 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; and
- The specification of effective measures to deal with any complaints received.

1.103 The stack heights of the back-up diesel generators for the Proposed Development have been designed in a fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards beyond the site boundary (including background concentrations). No additional mitigation measures are proposed for the operational phase of the Proposed Development.

Impacts

1.104 When the dust mitigation measures detailed in the mitigation section of Chapter 10 of the EIA Report are implemented, fugitive emissions of dust and particulate matter from the site will be ***neutral***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

1.105 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 ***neutral, short to medium term*** and ***imperceptible*** with respect to human health.

1.106 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 to medium term, negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2020 target.

1.107 During the operational phase, the results indicate that in the worst-case year, the emergency generators for the Proposed Development can operate for up to 249 hours per year before there is a likelihood of an exceedance of the ambient air quality standard. However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

1.108 The modelling assessment has found that ambient NO_2 concentrations as a result of the Proposed Development Scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. The impacts to air quality from operation of the Proposed Development are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

1.109 The CO_2 emissions from electricity to operate buildings A, B and C will not be significant in relation to Ireland's national annual CO_2 emissions. On the basis that the Proposed Development will consume 128 MW of power, this equates to 1,121 GWh annually based on the assumption of the national fuel mix. This translates to approximately 420,480 tonnes of CO_2eq per year which will have a ***long-term, negative*** and ***slight*** impact on climate. The Proposed Development would contribute approximately 0.69% of Ireland's national annual CO_2 emissions assuming an electrical supply from a typical national grid source mix.

1.110 The NO_X, SO_2 and NMVOC indirect emissions associated with the operation of the Proposed Development are ***long-term, negative*** and ***slight*** with regards to regional air quality. The Electricity Supplier's fuel mix consists of energy from wind farms they own and operate, third party renewable energy projects that they have long term power purchase agreements in place with and Guarantees of Origin (GOs) as described in Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009.

1.111 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 back-up 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.

Landscape and visual impact

Receiving environment

1.112 In the wider landscape the Proposed Development site is in a generally flat landscape on the edge of two landscape types. The landscape to the east and north is characterised by very large built developments and new tree lined roads. Between these built developments are some 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 generally that of a rural landscape typical of the area with medium to large field patterns and individual residences. The local landscape to the south east is dominated by the Casement Aerodrome.

1.113 There is very little vegetation on the site and the tree cover on the site is primarily contained within the remnant garden boundaries in the north-eastern corner of the Proposed Development site. These are two semi-mature Ash trees growing out of an old field drainage ditch.

1.114 The hedgerows on site are from two different origins. The first is the thorn-based hedgerows which are remnants of the agricultural stock proof field boundaries such as along the eastern boundary of the Proposed Development site. The second type are the more managed and ornamental garden hedges that surround the vacant farmhouse and former house site along the northern boundary of

the Proposed Development site. The tree survey report finds that due to the lack of management and subsequent deterioration the original Hawthorn is now very sparse in the thorn-based hedgerows, with the majority now infested by Bramble. This has led to most of these hedgerows being in a dilapidated state. This is except for the eastern perimeter boundary hedgerow which still has some structure and form.

1.115 The character of the Proposed Development site and its environs has largely been determined by the following:

- flat topography in the site and its surrounding environs;
- the realigned stream on the northern perimeter of the site;
- landscape history of agricultural use with grassland and a traditional hedgerow field boundary;
- the remnants of former residences and associated gardens
- number of very large industrial buildings in the local landscape; and
- local roads and tree lined internal roads in the business park.

1.116 The Proposed Development site, has the character of an agricultural field, however without the traditional hedgerow field boundaries and patterns found in the local landscape. The flat ground levels are characteristic of the wider landscape.

1.117 The surrounding environment with its contrast of new built structures and historic field patterns would be considered a 'transitional landscape'.

1.118 The landscape of the Proposed Development site has no inherent aesthetic qualities of note. In the context of the surrounding landscape, landscape sensitivities and views, the northern and western sections of the site would be considered of no aesthetic value. The north eastern section of the Proposed Development site does hold some aesthetic value due to the trees, hedgerows and original alignment of the Baldonnel stream within this area. The aesthetic qualities provided are limited however as this landscape is small and degraded.

1.119 The location from which the Proposed Development site is most visually prominent is from the New Nangor Road directly to the north of the site where the road abuts the site boundary for 470m. From this section of road the Proposed Development site is fully visible in the foreground as there is currently no vegetation due to the road widening works. While the Proposed Development site is visible in the foreground it is the existing Google data centre and the Cyrus One data centre that is under construction to the south that dominates this view. This view is expansive but due to the very flat topography and vegetation little of the wider landscape is visible. The Proposed Development site is also visible from the Grange Castle South Access Road to the south of the site.

1.120 Views of the Proposed Development site are possible from the Baldonnel Road from the section of the road closest to the site. The section of this road that abuts the site is only 120m in length and as a result views of the Proposed Development site are more limited. The lands are also visible on the former Nangor Road that connects from the R120 to the Baldonnel Road. These are glimpse views in which the Proposed Development site are not prominent.

1.121 Along the Adamstown Road (R120) west of the junction with the New Nangor Road (R134) there are some distant views offered towards the Proposed Development site where the hedgerow is thinner. These are views towards the Dublin mountains in which the site is identifiable but it forms only a small section of the background of the view. In areas from the Adamstown Road closer to the Proposed Development site it is not visible due to the local topography (the Griffeen River valley), vegetation and buildings and structures.

1.122 The Proposed Development site is not visible from the Kilmactalway / Castlebaggot direction other than restricted views from the section of the road in close proximity to the site. The Proposed Development 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.

Mitigation measures

1.123 The mitigation of potential negative landscape and visual impacts has influenced the design and layout of the Proposed Development 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 colour palette chosen for the building aims to further reduce any visual impact of the building.

Impacts

1.124 The initial construction operations created by the clearance 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 Proposed Development site from an agricultural field landscape type to a building site, to build the data centre 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.

1.125 The construction compounds, temporary car parking and storage facilities etc. will be located sensitively to avoid any local visual sensitivities. Furthermore, as the Proposed Development site is located within and adjacent to the existing Grange Castle Business Park with recent built developments, including the large data centres directly to the south, the visual elements associated with construction would be considered part of the existing urban landscape.

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

1.127 The initial removal of an agricultural field landscape to be replaced with built development would be considered a negative impact on the landscape character. However, the landscape measures proposed in this section will significantly improve the quality of the landscape character in this area. The significant amount of native woodland, wetland and grassland habitats to be created would have a very positive impact on the landscape character of this area and the wider environment. 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 the level of this impact will continue to be reduced as the habitats establish and become integrated into the surrounding landscape.

1.128 The site is specifically zoned for this type of development and there have been recent built developments of a large scale in the local vicinity. Many of these built developments are dominant in views from the Proposed Development site. In this context the Proposed Development would be considered a continuation of existing trends in the local area and the visual impact of the Proposed Development on completion and on day one of operation from specific viewpoints is summarised below.

1.129 The landscape proposals include the establishment of a significant level of native woodland, hedgerows and native wetland and grassland meadows. This landscape treatment will contribute positively to the landscape character of the area.

1.130 The overall impact on the landscape character would therefore be considered slightly positive due to the level of landscape and ecological enhancement proposed and restricting the built development to an area of the site which has little value in terms of landscape character.

View 1 – From the Grange Castle South Access Road

1.131 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The proposed data centre buildings are visible in the centre of the view and it will alter the ridgeline of the view. The buildings are partially screened by the existing

hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. The level of the proposed screening will increase over time as the new trees mature. The level of the visual impact is mitigated due to the number of large buildings in the local landscape most notable the large data centres and substation immediately adjacent to the Proposed Development. This development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered ***moderate*** and ***long-term*** in duration.

View 2 – From the entrance of Grange Castle South Business Park

1.132 The proposed data centre buildings are prominent in the centre of the view, where it alters the ridgeline of the view. Buildings A and B are partially screened by the proposed earth berms and tree planting proposed as part of the scheme. However, the office section of the building is designed as a landmark elevation and it is intended that it will be viewed from this location. The building is set in a new feature landscape of wetland and tree copses visible on the left side of the view. The positive qualities of this view will mitigate the level of perceived negative impact from the alteration of an agricultural type landscape to a built development.

1.133 The level of the visual impact is also mitigated due to the number of large buildings in the local landscape most notable the large data hall immediately adjacent to this scheme and the localised nature of this view. This development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered ***moderate*** and ***long-term*** in duration.

View 3 – From the junction of the R120 and the New Nangor Road at Clutterstown

1.134 The proposed data centres are visible in the centre of the view and it will alter the ridgeline of the view. The buildings are partially screened by the existing hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. The level of the proposed screening will increase over time as the new trees, planted as part of this application, mature. The level of the visual impact is mitigated by the small scale of the visual intrusion caused, the number of large buildings in the local landscape and the distance from the view location to the scheme. With the above considered the magnitude of the negative visual impact on this view would be considered ***slight*** and ***long-term*** in duration.

View 4 – From the New Nangor Road on the southern edge of Profile Park, Business Park

1.135 The proposed data centre building is prominent in the centre of the view and it will alter the ridgeline of the view. The location and scale of the Proposed Development will result in a visual obstruction to the current open and expansive view. Most of the Proposed Development is screened by the proposed earth berms and tree planting proposed as part of the scheme. However partial or glimpsed views of Building B and A in the background are possible. The level of the proposed screening will increase over time as the new trees mature.

1.136 The Proposed Development is set in a new feature landscape of ponds, wildflower meadow and tree copses between the road and the large berm and woodland. The positive qualities of this view will mitigate the level of perceived negative impact from the alteration of an agricultural field to a built development.

1.137 The level of the visual impact is further mitigated due to the number of large buildings in the local landscape most notable the large data centres immediately adjacent to this scheme and in the centre of the existing view. There are also several large buildings in this vicinity and visible from this location to the left of this view (Microsoft Data Centres) and to the rear of this view (Cuisine de France). The impact is mitigated further by the close range and the localised nature of this view.

1.138 With the above considered the Proposed Development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered ***moderate*** and ***long-term*** in duration

View 5 – From the Baldonnel Road south of the Google Data Centre site.

1.139 Building C of the Proposed Development is visible at the end of the road. Building C is partially screened by the existing hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. Building C screens views of Buildings A and B from this location. The level of the proposed screening will increase over time as the new trees mature. The level of the visual impact is mitigated due to the number of large buildings in the local landscape most notably the large data centre immediately adjacent to this scheme. The impact is also mitigated by the wetland that will be created at the western end of the site providing a visually attractive landscape area. This development would be considered as consistent with existing and emerging trends in the area. None of the visual sensitivities of views from this location would be affected by the Proposed Development. The magnitude of the negative visual impact on this view would be considered moderate and long-term in duration.

View 6 – From the residential gateway on the Baldonnel Road on the southern perimeter of the Proposed Development site

1.140 The Proposed Development is partially visible in the centre of the view, however it is mostly screened by the existing trees and other vegetation. The level of this screening will increase over time as the new trees, planted as part of this application, mature. The level of the visual impact is mitigated by the small scale of the visual intrusion caused, the number of large buildings in the local landscape and the distance from the view location to the scheme. The magnitude of the negative visual impact on this view would therefore be considered ***not significant*** and ***long-term*** in duration.

Traffic and transportation

Receiving environment

1.141 The main entrance into the Grange Castle South Business Park is along the Grange Castle South Access Road which has a priority T-Junction with the Baldonnel Road, 140m south of the R134 Nangor Road. The R134 Nangor Road has a signal-controlled junction with the R136 some 2km east of its junction with the Baldonnel Road that links to the national road network.

1.142 There is a 1.5m cycle track and 1.5m footpath set back from the carriageway on either side along the Grange Castle South Access Road. These are continued on the Baldonnel Road to the north and south of the entrance into the business park. This new infrastructure link with the pathways along the R134. This provides connectivity between the proposed site and the pedestrian and cyclist infrastructure in the wider area.

1.143 A range of Dublin Bus services run in close proximity to the Proposed Development site. The number 68 bus serves Grange Castle South Business Park, with an hourly service running throughout the day. The bus stop is 500 m from the proposed entrance. The No. 13 bus and the No. 151 buses serve Grange Castle Business Park. The No. 13 operates at a frequency of 15 minutes and the No. 151 operates every 20 minutes. The nearest No. 13 and 151 bus stops are 2.2 km from the entrance.

1.144 The nearest railway line runs east-west approximately 3km north of the site. Intercity services to Cork and Limerick run on this line, as well as commuter railway services to Portlaoise. The nearest station is Adamstown, to the north-west of the site. These stations are served by around 20 suburban commuter trains in each direction during weekdays. 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.

Mitigation measures

1.145 During the construction phase of the Proposed Development, the following measures will be put in place to reduce the impact on the surrounding environment:

1. The contractor will be required to provide wheel cleaning facilities, and regular cleaning of the sites construction and main access road will be carried out;
2. Temporary car parking facilities for the construction workforce will be provided within the site and the surface of the car park will be prepared and finished to a standard sufficient to avoid mud spillage onto adjoining roads; and

3. Monitoring and control of construction traffic will be ongoing during construction works. Construction traffic will be managed to avoid unnecessary trips during peak hours.

1.146 The lead contractor appointed for the construction of the development shall be required to prepare a Construction Management Plan, including a plan for the scheduling and management of construction traffic that details the measures to be taken to mitigate the risk of such events. The lead contractor is also responsible for ensuring that all other subcontractors comply with the plan. Approved routes for construction vehicle traffic shall be agreed with South Dublin County Council.

1.147 As described in the Mobility Management Plan (MMP) Framework document prepared in support of this planning application, a Mobility Management Coordinator shall be appointed for the Proposed Development, with the remit to implement and oversee an ongoing MMP. This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys.

1.148 As also described in the accompanying MMP Framework, the Proposed Development site is situated within a 10-minute walk of an existing high-quality bus route linking Grange Castle with Dublin City. The site is also within a 12-minute bicycle journey of Adamstown railway station. As described in the Traffic Impact Assessment report prepared with this planning application, the development shall include a relatively high provision of bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors.

Impacts

1.149 The projected traffic flows for 2021 includes other committed development, as well as traffic related to the Proposed Development. These results show that the existing Grange Castle South Business Park access junction on Baldonnel Road will continue to operate within its effective capacity on all approaches, with vehicle queues and delays slightly higher than those currently occurring. Full results for all assessment years and scenarios are presented in the Traffic Impact Assessment report prepared in support of this planning application.

1.150 During the construction phase, the Proposed Development will result in a short to medium term slight adverse impact on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Baseline scenario. This impact will be fully reversible, as it will be confined to the duration of construction activity on the Proposed Development site.

1.151 During the development's construction phase, the worst-case scenario from a traffic and transport perspective would be an accumulation of inbound construction traffic (e.g. large deliveries or concrete mixer trucks) unable to enter the construction site and consequently obstructing traffic within the Grange Castle Business Park or along Baldonnel Road.

1.152 Based upon the projected traffic flows for 2043 that include both other committed development traffic and operational traffic related to the subject development. These show that the existing Grange Castle South Business Park access junction on Baldonnel Road shall continue to operate within its effective capacity on all approaches, with vehicle queues similar to those currently occurring and vehicle delays approximately 50% greater than those currently occurring. Full results for all assessment years and scenarios are presented in the Traffic Impact Assessment report prepared in support of this planning application and in Chapter 12 of the EIA Report.

1.153 Vehicular traffic related to the development in its operational phase will have an overall slight impact upon the operation of the existing junction assessed. Development traffic shall result in an increase of at most 14 percentage points in the degree of saturation on any junction approach during the peak hour periods, and shall not be the cause of any junction approach exceeding either effective capacity or ultimate capacity. Mean maximum vehicle queues will not be measurably increased on any junction approach.

1.154 When compared to the Do-Nothing scenario, vehicular traffic related to the development in its operational phase shall have an overall slight impact upon the operation of the existing junction assessed. Development traffic shall result in an increase of at most 17 percentage points in the degree of saturation on any junction approach during the peak hour periods, and shall not be the cause of any junction approach exceeding either effective capacity or ultimate capacity. Mean maximum vehicle queues shall not be measurably increased on any junction approach, and mean vehicle delays shall be increased by at most 4 seconds.

1.155 During the operational phase, the Proposed Development will result in a long-term slight adverse impact on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Do-Nothing scenario. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, traffic signalling redesign, or changes in general traffic flow restrictions) have the potential to improve the operational efficiency of these junctions generally, as well as to reduce vehicle trips to/from the Proposed Development.

1.156 The vehicular traffic flows that shall be generated by the Proposed Development may result in corresponding changes to noise and air quality levels in the vicinity of the surrounding road network. The natures and extents of these changes, and their potential to impact upon human health, are examined in Chapters 9 and 10 of this EIA Report.

1.157 In its operational phase, the Proposed Development is forecast to result in the following increases in 2-way Average Annual Daily Traffic (AADT) flows on the above road links, compared to the surveyed 2019 flows:

- 1.8% AADT increase on Peamount Road;
- 4.0% AADT increase on Aylmer Road; and
- 3.8% AADT increase on Baldonnell Road.

1.158 Applying these increases to the existing collision risks on these road links, it may be estimated that the subject development shall result in approximate annual collision risk increases of:

- 0.3 percentage points on Peamount Road (from 16.7% risk annually to 17.0%);
- 0.7 percentage points on Aylmer Road (from 16.7% risk annually to 17.4%); and
- 0.3 percentage points on Baldonnell Road (from 8.3% risk annually to 8.6%).

1.159 The above represents a simplified risk calculation; other mechanisms besides traffic volumes also influence the risk of collisions, and these are highly specific to immediate road conditions. As an indicative estimate of wider influence, however, this is sufficient to demonstrate generally that the subject development shall not significantly increase the risk of road traffic collisions on the surrounding road network.

Cultural heritage

Receiving environment

1.160 The Proposed Development site is located in the townlands of Milltown, Ballybane and Aungierstown and Ballybane, County Dublin. There is one recorded monument within the Proposed Development site, an enclosure (DU021-108). A second enclosure (DU021-109) is located to the immediate south of the Proposed Development site and a third enclosure (DU021-112) is located c. 500m southwest of the site. Both DU021-108 and 109 have been subject to full archaeological excavation (preservation by record).

1.161 There is one protected structure in the environs of the Proposed Development site, a farm house (RPS 155/ NIAH Reg. No. 11208015), and located c. 357m west of the Proposed Development site. A total of three structures are included in the NIAH in the vicinity of the Proposed Development site, including the protected structure. No specific cultural heritage sites have been identified, with the townland boundaries that formerly traversed the site having been removed in the recent past.

1.162 Extensive archaeological investigations have taken place within the Proposed Development site and the surrounding environs in recent years. The enclosure (DU021-108) within the site was defined using geophysical survey and targeted test trenching and designated AH1. It was subsequently subject to pre- excavation works and later fully excavated and recorded, under licence 17E0590 in 2019. It consisted of a double-ditched enclosure and associated features with post-excavation works currently ongoing. Two additional areas within the Proposed Development area have been subject to excavation. AH2 consisted of an enclosure or ring-ditch, a number of internal features and a figure-of-eight kiln (excavated under licence 17E0591), and AH5 which consisted of a number of disturbed linear features of possible medieval date, based on the retrieval of medieval pottery from some of the features, excavated under licence 17E0578.

1.163 The enclosure (DU021-109) to the immediate south of the Proposed Development area was also identified in geophysical survey and archaeological testing. The site consisted of a multivallate enclosure of probable early medieval date based on the discovery of 10th century finds and was fully excavated in 2018.

1.164 Cartographic analysis and aerial photographic coverage suggest the Proposed Development site was formerly in use as agricultural land. A small structure is shown in the south of the Proposed Development site in the first edition OS map of 1843. Aerial photography shows the enclosures DU021-108 and DU021-109 as well as the AH2 enclosure or ring-ditch. No specific cultural heritage sites were identified in the vicinity of the Proposed Development site, with the townland boundaries which ran through the site, removed in the recent past.

Mitigation measures

1.165 It is recommended that archaeological monitoring of topsoil stripping associated with the construction of the Proposed Development be carried out in all areas outside the footprint of the previously excavated areas. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

1.166 As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary in relation to architecture.

1.167 As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.

1.168 There are no mitigation measures required for the operational phase of the Proposed Development in relation to the archaeological, architectural and cultural heritage resource.

Impacts

1.169 Should the mitigation measures, recommended above, be carried out fully and successfully there will be no predicted residual impact to the archaeological, architectural and cultural heritage resource by the Proposed Development. The implementation of mitigation measures detailed in this chapter, will ensure that the effect is ***neutral*** and ***imperceptible***.

1.170 There are no predicted impacts for the operational phase of the Proposed Development upon the archaeological, architectural and cultural heritage resource.

Waste management

1.171 In terms of waste management, the receiving environment is largely defined by South Dublin County Council (SDCC) - as the local authority responsible for administering waste management activities in the area in which the Proposed Development is located. This is governed by the requirements set out in the *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021*. This plan replaces the previous plan for the Dublin region due to changing National policy as set out in *A Resource Opportunity: Waste Management Policy in Ireland* and changes being enacted by the *Waste Framework Directive (WFD) (2008/98/EC)*.

Mitigation measures

1.172 An outline *Construction and Demolition Waste Management Plan* (C&D WMP) has been prepared for 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.

1.173 The project engineers, CS Consulting, have estimated that c. 55,814m^3 of soil/stones will be generated from the excavations required to facilitate construction. It is not anticipated that there will be surplus material that will require removal from site and will be used for landscaping purposes within the Proposed Development site.

1.174 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 areas of the site during the operation phase. A number of other mitigation measures are proposed with the aim of reducing waste being generated during the operation phase of development.

1.175 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 during both the construction and operational phase of development.

Impacts

1.176 A carefully planned approach to waste management and adherence to the outline C&D WMP during the construction and demolition phase and provided the mitigation measures are implemented will ensure that the impact on the environment during the construction phase will be ***medium-term, neutral*** and ***imperceptible***.

1.177 During the operational phase, a structured approach to waste management will promote resource efficiency and waste minimisation. Provided a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, neutral*** and ***imperceptible***.

Material assets

1.178 Material Assets considers physical resources in the environment which may be of human or natural origin. The objective of the assessment is to ensure that these assets are used in a sustainable manner, so that they will be available for future generations, after the delivery of the Proposed Development.

1.179 In accordance with the 2017 Draft EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, "*Material assets can now be taken to mean built services and infrastructure*". Material assets of a natural origin are dealt with comprehensively within the other chapters of the Environmental Impact Assessment Report.

1.180 This chapter considers the key aspects relating to material assets of a human origin of the Proposed Development site and the surrounding area, namely power and electricity supply; telecommunications; surface water infrastructure; foul drainage infrastructure; and water resources.

1.181 The Material Assets chapter describes existing services to the application site and describes the predicted impacts which the development may have on these services and recommends mitigation measures. The Proposed Development will have a ***short to medium term***, ***neutral*** and ***imperceptible*** impact on the power and electricity supply; telecommunications; surface water infrastructure; foul drainage infrastructure; and water resources during the construction phase.

1.182 The Proposed Development will have a ***long-term***, ***neutral*** and ***imperceptible*** for the operational phase on the material assets apart from telecommunications that is predicted to have no impact.

Cumulative effects

1.183 This chapter of the EIA Report considers the potential cumulative effects on the environment of the Proposed Development with other developments on the site (i.e. the proposed substation) and the cumulative effects with developments in the locality (including planned and permitted developments). These are set out under Chapter 16 of the EIA Report.

Interactions between environmental factors

1.184 The purpose of this chapter of the EIA Report is to draw attention to significant interaction and interdependencies in the existing environment. Marston Planning Consultancy in preparing and co-ordinating this EIA Report ensured that each of the specialist consultants liaised with each other and dealt with the likely interactions between effects predicted as a result of the Proposed Development during the preparation of the proposals for the Proposed Development site and this ensures that

mitigation measures are incorporated into the design process. This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000, as amended, and Part 10, and schedules 5, 6 and 7 of the Planning and Development Regulations 2001-2019. The detail in relation to interactions between environmental factors is covered in each chapter of the EIAR.

Summary of EIA Mitigation and Monitoring Measures

1.185 A summary of all the mitigation and monitoring measures proposed throughout the EIA Report document for ease of reference for the consent authority and all other interested parties is provided in Appendix K of the Appendices to the EIA Report.

Planning & Development Act, 2000 - 2019,
European Communities (Environmental Impact Assessment) Regulations 1989 (as amended), Planning & Development Regulations, 2001 (as amended)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Data Centre Development
Grange Castle South Business Park

April 2020

MARSTON
PLANNING CONSULTANCY

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NON-TECHNICAL SUMMARY (see separate document)

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1. INTRODUCTION

1.1 This Environmental Impact Assessment Report (EIA Report) has been prepared on behalf of UBC Properties LLC (herein referred to as the 'applicant') to accompany an application to South Dublin County Council (SDCC) for three new data centres. The development will be operated by Amazon Data Services Ireland Ltd. (herein referred to as 'the Operator').

1.2 The application is located on primarily greenfield lands to the south of the New Nangor Road; to the east of the realigned Baldonnel Road; and to the north of the Grange Castle South Access Road that provides access off the Baldonnel Road into Grange Castle South Business Park. The application site includes one abandoned and unoccupied residential property and associated farm buildings that will be demolished as part of the Proposed Development.

1.3 The Grange Castle South Business Park is owned by South Dublin County Council, and promoted in association with IDA Ireland, to attract overseas investment to the area. Located to the west of Clondalkin, Grange Castle has been the focus of significant international investment over the last several years.

1.4 The Proposed Development site of 16.5ha. is approximately 5km west of the M50 Orbital Motorway, and is close to the strategic road and mainline rail connections to the west and south of Ireland. The site is within 15 kilometres of the city centre and enjoys easy access to Dublin Airport and Dublin Port.

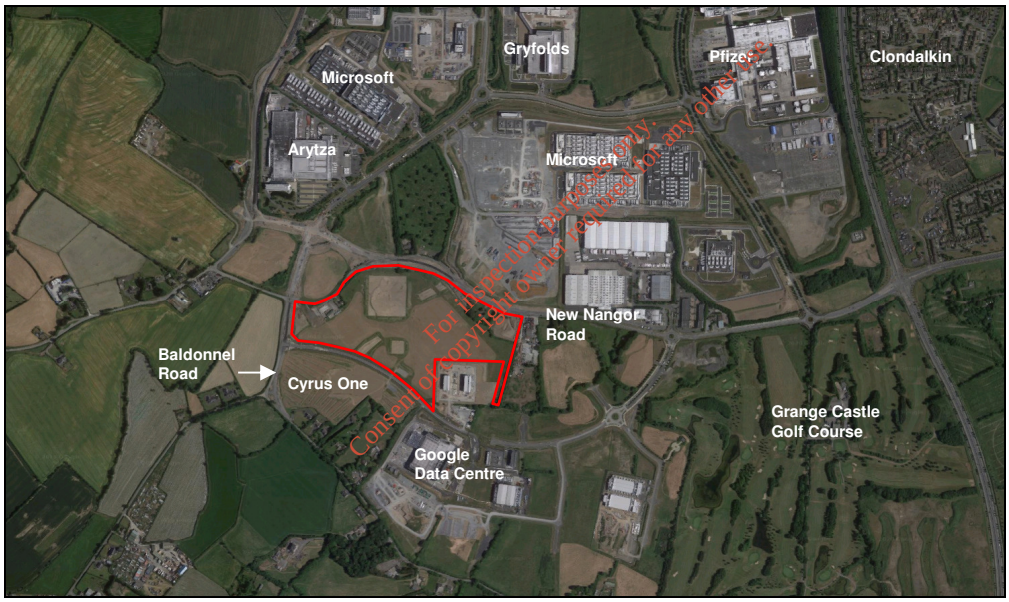

Figure 1.1 Site location map

1.5 This EIA Report is prepared in respect of the 3 no. two storey data centres and ancillary elements with a total gross floor area of 80,269sqm. The associated structures include water tanks, sprinkler tanks, pump house and prefabricated containerised electrical rooms that are located within the centre of the site; as well as a temporary substation and utility connections to the boundary of the site. The EIA Report has also cumulatively assessed with these works the HV substation and associated grid connection works that will be located to the east of the site and will be subject to a separate Strategic Infrastructure Development (SID) application and EIA Report as well as other surrounding existing and permitted developments. The EIA Report has also cumulatively assessed the works required for the MV connection from the site to the east which will form a separate planning application. The applicant has responded in this EIA Report to the aspects of the environment as well as specific issues raised in consultation with the Planning Authority.

Nature and extent of proposed and permitted development

1.6 The proposal is to seek permission for a period of ten years for a development with a gross floor area of 80,269sqm that consists of various works that can be summarised as follows:

- Demolition of abandoned dwelling and associated buildings known as Ballybane, Old Nangor Road, Clondalkin, Dublin 22;
- Construction of three no. two storey data centre buildings (Buildings A, B and C) with mezzanine floors at each level with a gross floor area of 78,871sqm;
- 1 no. two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the northern end of each emergency generator that will measure 20m in height;
- 1 no. two storey data centre (Building B) that will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 no. ventilation shafts that will be located above the southern end of each emergency generator that will measure 20m in height;
- 1 no. two storey data centre (Building C) that will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height;
- Each of the three data centres will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators;
- The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level;
- Construction of internal road network and circulation areas, security hut (30sqm) at entrance; footpaths, provision of 150 no. car parking spaces, and 78 no. cycle parking spaces, with 50 no car parking spaces and 26 no. cycle parking spaces being provided for each building;
- single storey and temporary substation (29sqm);
- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity from the Substations to each data centre and are located to the immediate west of the generator compound within Buildings A and B, and to the south of the generator compound within Building C;
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation; and
- Ancillary site development works, that will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west.

1.7 A full description and details of the Proposed Development is provided in Chapter 2 (Description of the Proposed Development).

1.8 It is proposed to provide permanent power supply to the site via a new two storey 110kV GIS Substation with associated transformer compound to the east of the overall site. These works and its HV connection to the existing Castlebaggot Substation to the immediate south-east and the Kilmahud Substation to the north will be applied for under a separate Strategic Infrastructure Development (SID) application accompanied by an EIA Report.

1.9 It is proposed to create a campus level of finish as opposed to an industrial form of development with heavy landscaping throughout and particularly to the north, south and west of the overall site and data centres. The approach is to provide a landscape master plan that will be phased in two parts. The first phase will provide for all landscaping and attenuation to the north, south and west of the

three main buildings; with the landscaping around the future substation that will be subject to a separate SID application to be implemented on completion of the Substation that will subject to the SID application. The full landscaping and attenuation of the site will therefore be in place prior to the commencement of construction on Building B. Where appropriate, this phasing will be addressed in the planning application and accompanying EIA Report.

1.10 Over the past 10 years, a wide variety of service providers including the Operator have begun offering IT infrastructure services to businesses in the form of web services - now commonly known as “cloud computing”. Cloud computing is a network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers. One of the key benefits of cloud computing is the opportunity to replace up-front capital infrastructure expenses with low variable costs that scale with each business’s requirement. With the Cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly access hundreds or thousands of servers in minutes and deliver results faster.

Purpose of the Environmental Impact Assessment Report

1.11 The EIA Report sets out a description of the Proposed Development, an outline of the main alternatives studied by the developer (and an indication of the main reasons for this choice); a description of aspects of the environment which could be potentially affected by the Proposed Development; a description of the potential effects of the Proposed Development on the environment; a description of the forecasting methods used to assess the potential effects on the environment referred to above; a description of the measures envisaged to prevent, reduce and offset any potential adverse effects on the environment; and residual impacts. A non-technical summary of this information is provided in Chapter 2 of this EIA Report.

1.12 The potential impacts of the operation and construction phases of the Proposed Development have been assessed and summarised under the following environmental topics:

- Population and human health;
- Biodiversity;
- Land, soils, geology and hydrogeology;
- Hydrology;
- Noise and vibration;
- Air quality and Climate;
- Landscape and visual impact;
- Cultural heritage;
- Material assets to include traffic and transportation and waste management;
- Cumulative effects;
- Direct and indirect effects; and
- Interactions.

1.13 Mitigation measures have been integrated into the project with a preference given to measures that avoid potential environmental effects over measures that reduce and remedy potential environmental effects. Assessments were carried out on the basis of available access and information, i.e. on the basis of conditions that could be reasonably viewed or inferred from aerial photography, published reports and direct observation during site visits.

Reason for this Environmental Impact Assessment Report

1.14 The requirement for EIA for certain types and scales of development is set out in the EIA Directives (2011/92/EU and 2014/52/EU), European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (the bulk of which came into operation in September 2018), the European Communities (Environmental Impact Assessment) Regulations 1989-2006, Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001-2019. It should be noted that this EIA Report is prepared in accordance with the 2011 EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive.

1.15 The EIA Directives list those projects for which an EIA is mandatory (Annex I) and those projects for which an EIA may be required (Annex II). With regard to Annex II projects, Member States can choose to apply thresholds or use case by case examination or a combination of both to assess where EIA is required. In Ireland, a combination of both has been applied.

1.16 The project proposed is not listed under Annex I EIA Directives but it is above the relevant threshold as set out in the Planning and Development Regulations 2001-2019 for Annex II projects. The threshold for "*industrial estate development projects, where the area would exceed 15 hectares"* as set out in Part 2 of Schedule 5 of the Regulations was considered to be most relevant threshold in the context of the Proposed Development in the subject location. The Proposed Development site area exceeds this threshold and therefore an EIA Report is required for the Proposed Development.

1.17 A full description of the Proposed Development is provided in Chapter 3 (Characteristics of the proposal). The main objective of an EIA, as set out in Article 3(1) of the 2014 EIA Directive, is to identify, describe and assess the direct and indirect significant impacts of a project on population and human health, biodiversity, land, soils, water, air & climate (including noise), material assets, cultural heritage and the landscape and the interaction between the aforementioned factors. The EIA Report reports on the findings of the EIA process and informs the Planning Authority, statutory consultees, other interested parties and the public in general about the likely effects of the project on the environment.

Format of the Environmental Impact Assessment Report

1.18 This Environmental Impact Assessment Report (EIA Report) has been prepared in accordance with the requirements of the following:

- EU Directive /337/EEC; 2011/92/EU and 2014/52/EU;
- Planning and Development Act 2000 (as amended);
- Planning and Development Regulations 2001 (as amended);
- *Guidelines on the Information to be Contained in Environmental Impact Statements* 2002 (Environmental Protection Agency);
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* 2003 (Environmental Protection Agency);
- *Revised Guidelines on the Information to be Contained in Environmental Impact Statements* Draft September 2017 (Environmental Protection Agency);
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* Draft September 2015 (Environmental Protection Agency).

1.19 It is prepared in the Grouped Format Structure following the guideline structure set down in the Environmental Protection Agency (EPA) Draft "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (*2017). The "*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment"* (August 2018) and the European Commission *Guidance on the preparation of the Environmental Impact Assessment Report* have been considered in the preparation of the EIA Report.

1.20 Using the Grouped Format Structure, the EIA Report examines each environmental aspect in a separate chapter. Each chapter generally covers the following:

- Receiving Environment;
- Description of the Proposed Development;
- Potential Impacts of the Proposed Development;
- Do-Nothing Scenario;
- Remedial and Mitigation Measures;
- Predicted Impacts of the Development; and
- Residual Impacts.

1.21 A Schedule of Mitigation measures to be implemented as part of the Proposed Development is included in Appendix K.

1.22 Cumulative effects for each environmental topic are assessed in Chapter 16 of this EIA Report. Interactions i.e. the interrelationship between each environmental aspect, are assessed as they occur in each chapter. Chapter 17 shows where interactions have been identified and how they have been addressed.

Need for the development

1.23 The Operator has a number of existing data centres within the wider Dublin area which support the Applicant's increasing data server requirements. Similar data centres are located at Blanchardstown Business and Technology Park, Clonshaugh Business & Technology Park and in Tallaght. The extent and scale of the Operators Irish facilities have increased in recent years to cater for the growing demand for online services across the globe and it is expected that this will continue to grow in the coming years.

Company background

1.24 The Operator provides data storage, management and dissemination. To date, the Applicant has developed a number of data facilities in Ireland and are a significant Irish employer. The Operator is committed to running its business in the most environmentally friendly way possible. In addition to the environmental benefits of running applications in the cloud the company and its parent company has a long-term commitment to achieve 100% renewable energy usage for its infrastructure footprint (globally). Please refer to Chapter 3 (Characteristics of the proposal) for additional details.

Consultation

1.25 Marston Planning Consultancy (MPC), the Operator and the project team have liaised with the relevant departments of South Dublin County Council (SDCC) in advance of lodgement of this application. An initial exploratory meeting was held with SDCC on the 15th of January 2020; a second, formal pre-planning meeting was held with SDCC on the 28th of January 2020 and representatives of the Planning, and Roads/Transportation, Parks, Sanitary Services and Heritage Departments attended.

1.26 In addition, the relevant environmental sub-consultants have liaised directly and independently with statutory bodies (including the Water Services and Parks departments of SDCC, Irish Water, Eirgrid, ESB, NPWS, and the Department of Defence etc.) by correspondence during the course of the EIA Report preparation. Other consultees are referred to in individual chapters. All EIA contributors/authors have incorporated advice and comments received from consultees into the relevant chapters of this EIA Report.

Regulatory control

1.27 The proposed data centre activity is not an EPA regulated activity in terms of the Industrial Emissions Directive 2010/75/EU (which replaced the IPPC directive). In accordance with the recent legislation relating to the Medium Combustion Directive (EU 2015/2193), the back-up generators will be registered as required with the EPA.

1.28 However, the generators are exempt from complying with the emission limit values set out in the Directive, as they will not operate for more than 500 hours per annum. The proposed data centre will require an EPA Greenhouse Gas (GHG) Emissions permit in accordance with the Environmental Protection Agency Act 1992, as amended. It is anticipated that the proposed data centre development, Building A, will apply for a GHG Permit first and that this permit will be amended to incorporate the proposed additional back-up generators associated with Buildings B and C phases of the Proposed Development. This will be applied for by the Operator in due course prior to commencement of the scheduled activity.

Description of effects

1.29 The quality, magnitude and duration of potential effects are defined in accordance with the criteria provided in the EPA Draft *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (2017) as outlined in Table 1.1.

Table 1.1 Description of Effects as per EPA Guidelines (Draft, 2017)

Effect Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
Neutral	A change which does not affect the quality of the environment	
Negative	A change which reduces the quality of the environment	
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences
Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences	
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities	
Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends	
Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment	
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.	
Profound	An impact which obliterates sensitive characteristics	
Duration of Effects	Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day	
Temporary Effects	Effects lasting less than a year	
Short-term Effects	Effects lasting one to seven years	
Medium-term Effects	Effects lasting seven to fifteen years	
Long-term Effects	Effects lasting fifteen to sixty years	
Permanent Effects	Effects lasting over sixty years	
Reversible Effects	Effects that can be undone, for example through remediation or restoration	
Probability of Effects	Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.	
Type of Effects	Indirect Effects	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.	
'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out	
`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail	
Indeterminable	When the full consequences of a change in the environment cannot be described	
Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost	
Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect	
Synergistic	Where the resultant impact is of greater significance than the sum of its constituents	

Additional assessments required

1.30 This section addresses the additional approvals and assessments required under other EU Directives and legislation.

Appropriate Assessment Screening Report

1.31 A screening report has been completed for the Proposed Development, as required under the Habitats and Birds Directive (92/43/EEC and 79/409/EEC) and is included as a stand-alone report undertaken by Scott Cawley, Consulting Ecologists. This document forms part of the application. The AA screening process has identified that four European sites lie within 15km of the Proposed Development; with another four hydrologically connected to the Proposed Development site via the River Liffey.

1.32 Following an examination, analysis and evaluation of the relevant information, including in particular, the nature of the project and its potential relationship with European sites and their conservation objectives, as well as considering other plans and projects, and applying the precautionary principle, it is the professional opinion of the authors of the report that there is no potential for likely significant effects on any European sites.

Flood Risk Assessment

1.33 A Stage 1 Flood Risk Assessment has been undertaken for the site and forms a stand-alone report that forms part of this application.

Forecasting methods and difficulties in compiling the specified information

1.34 Forecasting methods and evidence used to identify and assess the significant effects on the environment for each environmental aspect are set out in each chapter. There were no significant difficulties in compiling the specified information for this EIA Report. Any issues encountered during the assessment of individual factors are noted within the relevant chapters.

EIA Report study team

1.35 This EIA Report was prepared by a study team led by Marston Planning Consultancy, who were responsible for the overall study management and co-ordination as well as for socio-economic, statutory planning and development context, transportation and physical planning inputs.

Table 1.2 EIA Report study team

EIA Report Section	EIA Report Specialists
Description of the Proposed Development; Nature and Quantity of Materials to be Used; Traffic and transportation; Alternatives Considered.	Marston Planning Consultancy
Population and Human Health	Marston Planning Consultancy
Biodiversity	Scott Cawley
Land, Soil, Geology and Hydrogeology	AWN Consulting
Water	AWN Consulting
Noise and Vibration	AWN Consulting
Air Quality and Climate	AWN Consulting
Visual and Landscape Impact Assessment	Kevin Fitzpatrick, Landscape Architecture
Traffic and transportation	CS Consulting Engineers
Cultural heritage – Archaeology	IAC Archaeology
Waste Management	AWN Consulting

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 As described in Chapter 1 (Introduction), the Applicant is applying to SDCC for 3 no. two storey data centres and associated ancillary development on a primarily greenfield site at Grange Castle South Business Park, Dublin 22.

2.2 The following chapter presents a description of the Proposed Development, as defined below, as required by the relevant planning legislation, 2011 EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive (2014/52/EU) (herein referred to as the EIA Directive) and the current Draft EPA "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports"* (2017) (herein referred to the as the EPA Draft EIA Report Guidelines 2017) and with reference to the EPA Draft "*Advice Notes for Preparing Environmental Impact Statements"* (2015).

Description of the site

2.3 The Proposed Development is to be located on a site of c. 16.5 hectares that consists of a primarily greenfield site within the Grange Castle South Business Park and at the time of making this application is in the ownership of South Dublin County Council. This includes the abandoned and unoccupied two storey farmhouse property known as Ballybane that is located on the Old Nangor Road, Dublin 22. This property and associated buildings are proposed to be demolished as part of the Proposed Development.

2.4 The site is bounded by the realigned Baldonnel Road to the west; by the old and new Nangor Road to the north; by agricultural fields and the Grange Castle Motor Company to the east; and by the Grange Castle South Access Road that provides access off the Baldonnel Road into Grange Castle South Business Park to the south.

2.5 The western part of the site is relatively featureless apart from the abandoned farmhouse and its associated buildings and structures that includes a large barn that are located bounding the now gated Old Nangor Road to the north-west of the site. There are small pockets of hedgerow and planting either side and bounding the curtilage of this abandoned property. A further hedgerow bounds the northern side of the Baldonnel Stream where it transects across the site at the north-eastern corner of the site. A hedgerow bounds the entire eastern boundary of the site.

Figure 2.1 Site location map as viewed from East

2.6 An existing foul line wayleave bounds the stream on its southern side as well as along the eastern boundary of the site to the corner of the Castlebaggot Substation. A 15m ESB wayleave bounds the eastern boundary of the site from the New Nangor Road to the Grange Castle South Access Road. A 3m wide wayleave belonging to the 3M mobile network to facilitate access to a mobile phone mast is located within this ESB wayleave.

2.7 The lands have been subject to now completed archaeological investigation work on behalf of South Dublin County Council under licence from the National Monuments Service, Department of Culture, Heritage and the Gaeltacht.

2.8 Large areas of the surrounding lands to the south and north within the Grange Castle Business Park and Profile Park have been developed in the past 10-15 years and are occupied by industrial campuses including pharmaceutical, data centres and food manufacturing uses. The Google data centre campus is located to the south-east of the site and the Cyrus One development is currently being constructed to the immediate south. The closest occupied residential properties are located c. 230m south of the proposed site boundary along the Baldonnel Road.

2.9 The overall site is located between the N4 and N7 national primary roads and is served by a good road network that has recently undergone an upgrade as well as the new Business Park road (Grange Castle South Access Road) that provides access into this part of the Grange Castle Business Park from the Baldonnel Road.

Proposed Development description

2.10 The Proposed Development is to develop 3 no. two-storey data centres with a gross floor area of 80,269sqm. The proposed data centres are referred to as Buildings A, B and C. Figure 2.2 presents a site layout plan of the Proposed Development.

2.11 The Proposed Development with a gross floor area of 80,269sqm (as described and defined below) is to seek permission for a period of ten years for a development that will consist of the following various works, as follows:

- Demolition of abandoned dwelling and associated buildings known as Ballybane, Old Nangor Road, Clondalkin, Dublin 22;
- Construction of three no. two storey data centre buildings with mezzanine floors at each level (Buildings A, B and C) with a gross floor area of 78,871sqm;
- 1 no. two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the northern end of each emergency generator that will measure 20m in height;
- 1 no. two storey data centre (Building B) that will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 no. ventilation shafts that will be located above the southern end of each emergency generator that will measure 20m in height;
- 1 no. two storey data centre (Building C) that will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height;
- Each of the three data centres will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators;
- The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level;

- Construction of internal road network and circulation areas, security hut (30sqm) at entrance; footpaths, provision of 150 no. car parking spaces, and 78 no. cycle parking spaces, with 50 no car parking spaces and 26 no. cycle parking spaces being provided for each building;
- single storey and temporary substation (29sqm);
- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity to each data centre and are located to the immediate west of the generator compound within Buildings A and B, and to the south of the generator compound within Building C;
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation; and
- Ancillary site development works, that will include 4 no. attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west.

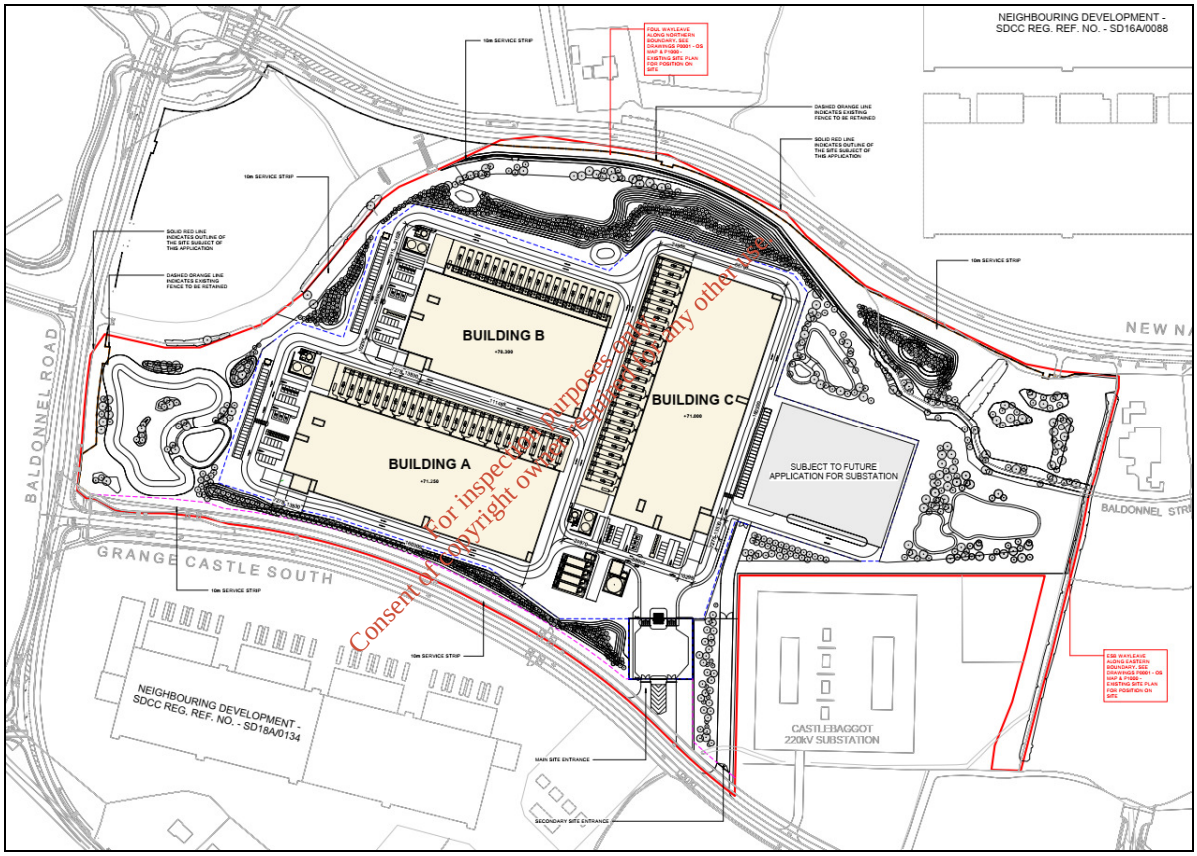

Figure 2.2 Proposed site layout plan

Proposed Data Centre Processes

2.12 Data centres are centralised computer server systems on a large scale. A typical data centre (typically involving systemised racks of hundreds/thousands of server units), offers significant advantages (and economies of scale) over traditional in-house data storage systems. The primary advantages are:

- Higher reliability and redundancy of systems;
- 24/7 monitoring and maintenance of storage by staff;
- Higher security and data protection; and
- Flexibility – ability to increase or decrease storage requirements at short notice in line with specific business needs.

2.13 It has been well publicised in recent years, that Ireland's climate is highly suited to data centre operations. The relatively cool steady Irish climate means that data centres here can be cooled primarily using outside air (via roof mounted air handling units). This reduces the need for additional more expensive forms of cooling, often required elsewhere around the world. The demand for cloud computing and data storage continues to be high and the Proposed Development is intended to help meet this need.

Phasing of development

2.14 The construction of the Proposed Development will be phased as part of the development of the masterplan. Phase 1 of the Proposed Development will include the construction of Building A and temporary substation, as well as 2 no. attenuation ponds and landscaping to the south, west and north of the site. This will be constructed over a three and a half year period.

2.15 Prior to the commencement of the second phase of the Proposed Development it is proposed to make separate applications for a 110kV GIS Substation within the east of the application site and its High Voltage (HV) connection to the Castlebaggot Substation; and the HV connection to the Kilmahud Substation. These two applications may be determined as Strategic Infrastructure Development (SID) through the pre-application consultations with the Board.

2.16 A separate planning application for the installation of the MV distribution cable will be designed to support interim power demand to the first Data Centre (Building A). Subject to a grant of planning permission, the temporary ESB substation and MV connection works are proposed to commence in the first quarter of 2021, and with a construction period of three months.

2.17 The proposed 110kV GIS Substation and its HV connections would be constructed during the second year of construction landscaping and two further attenuation ponds that form part of the Proposed Development will be completed following completion of the 110kV GIS Substation and its HV connections. This will ensure that the entire landscape and attenuation master plan for the site is in place within the first two years following the commencement of construction of the Proposed Development.

2.18 Phase 2 of the Proposed Development will be the construction of the data centre (Building B) located to the north-west of the site; and Phase 3 of the Proposed Development will comprise the construction of the final data centre on the site (Building C) to the east of Buildings A and B. The full phasing of the Proposed Development is set out under paragraphs 2.64 and 2.65 of this Chapter.

Proposed Site Infrastructure and Secondary Facilities

Surface Water Drainage

2.19 In accordance with the requirements of South Dublin County Council and the Design Guidelines of the Regional Code of Practice for Drainage Works and the Greater Dublin Strategic Drainage Study any new development must adhere to the overall design requirements of these documents. The proposed drainage network has been designed to convey the captured storm water on site and to direct it to the proposed 4 no. attenuation areas (with a capacity of 10,385m^3) to be located along the western, northern and eastern boundary of the site. The storm water system has been modelled to ensure no physical clashes with other utilities, notably the proposed foul system.

2.20 The drainage design requirements state that any development must restrict post development run-off rates to the pre-development, greenfield rates. This requires any new development to restrict storm water flows leaving the site to pre-developed rates. In practice, to accommodate this requirement, on-site storage must be provided to temporarily store rainwater generated on site. These 4 no. attenuation areas have been sized to accommodate all storm water generated from runoff from building roofs, yards and the internal road network. In total due to the size of the Proposed Development four attenuation areas are being proposed. The ponds have been sized to accommodate the predicted storm water volumes generated during a 1-in-100 year storm event, increased by 10% for the predicted effects of climate change. Three of the proposed attenuation ponds will drain to the north and outfall into the Baldonnel stream, while one of the ponds will drain to the west and into an existing storm sewer.

2.21 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, and, where practical, to discharge this water into the groundwater table, to aid in the recharging of same. The proposed attenuation ponds will receive storm water which has passed through gully's (to aid in the removal of debris) and a suitably sized oil separator to ensure any hydrocarbon pollution is removed prior to storm water entering the attenuation zones. A further stage to improve overall storm water quality is the construction of 'forebays' through which storm water will pass to further aid in the removal of deleterious material in line with best practice. All four attenuation ponds have suitably sized forebays to achieve this requirement.

2.22 To further enhance the ecological nature of the proposed scheme the attenuation areas have been designed to operate as detention ponds, so the attenuation areas will retain water all year round. This will allow for greater biodiversity gains within the Proposed Development site. Full details are provided within the *Engineering Services Report*, prepared by CS Consulting Engineers.

Foul Drainage

2.23 Domestic effluent arising from occupation of the data centre buildings will be collected in foul drains within the site and discharged to the existing foul drainage network. The proposed layout of the various buildings requires that a number of connections to the existing foul infrastructure are proposed. (refer to CS Consulting Drawings for details of same.) The proposed foul network has been designed in accordance with the requirements of the Building Regulations, Part H and the Irish Waters Code of Practice for Wastewater Infrastructure. The effluent from the Proposed Development discharges into the business sparks network and then is ultimately discharge to the municipal Waste Water Treatment Plant (WWTP), which has permission to expand its capacity, at Ringsend.

2.24 In addition, occasional discharge of water vapour from the data centre buildings cooling system will be required during hot/dry weather when temperatures exceed 22℃ (Approximately 5% of the year). Residual cooling water, associated with the evaporative cooling process, is to be discharged from the air handling units into the foul network.

2.25 Based on the nature and extent of the Proposed Development, the expected daily dry weather flow (DWF), for domestic effluent has been calculated as 7.776m^3/day. The peak design flow is 0.54l/s. As noted the occasional additional water vapour run off would contribute an additional 6.0l/sec as a peak flow.

2.26 The overall wastewater discharge associated with the Proposed Development is in accordance with the discharge rates of 2.0l/s outlined in the PCE and as confirmed in the CoF. Further detail in relation to waste water emissions is presented in the CS Consulting Engineers *Engineering Services Report*. Further reference is made to the sewerage and waste water treatment system in Chapter 9 Hydrology.

Water Supply

2.27 Water is required for cooling equipment, cleaning, general potable supply for drinking and sanitary facilities, in addition to fire-fighting requirements. This will be sourced from mains water supply. The design requires a peak water demand of up to 0.5 litres per second (l/s). As noted in the previous section and in the *Engineering Service Report*, a PCE was submitted to IW which addressed water and wastewater demand for the development of the indicative masterplan for the overall landholding. The overall water demand associated with the Proposed Development is in accordance the water demand outlined in the PCE that amounts to 300m^3 per day in. Further detail in relation to water supply is presented in the CS Consulting Engineers *Engineering Services Report*, Chapter 8 Hydrology and Chapter 15 Material Assets.

Electricity

2.28 The Proposed Development includes the construction of a single storey and temporary MV 20kV substation (22sqm) that will be operated by ESB and will be located to the south-east of Building A and to north-west of the security hut at the entrance to the Proposed Development site.

2.29 The permanent power supply to the overall development of the entire site will be provided via a new two storey 110kV GIS Substation with associated transformer compound to the east of the overall site and to the immediate east of Building C and do not form part of the Proposed Development. This will be connected via an 110kV transmission line from Kilmahud substation to the north; and via a 110kV transmission line from the Castlebaggot substation to the immediate south-east of the application site. The applications for the provision of the substation and 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.

2.30 It is planned to construct the GIS Substation and transmission lines during the construction of Building A of the Proposed Development. Subject to a grant of planning permission for the GIS Substation and transmission lines the construction work for this element, whilst not forming part of the Proposed Development, is targeted to commence in the first quarter of 2021 with a construction period of c. 12 months.

2.31 The GIS Substation and transmission line will be designed to support power demand for the entire site that includes Buildings A, B and C. The Proposed Development will have a maximum operational electrical demand of 128MW. Further details on the power supply for the Proposed Development are provided in Chapter 16 Material Assets.

Telecommunications

2.32 A fibre optic cable distribution network will be installed within the site for the entire Proposed Development to serve Buildings A, B and C. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

Generators and diesel storage

2.33 In the event of a loss of power supply i.e. temporary grid blackout, diesel powered back-up generators will be provided to maintain power supply. These generators are designed to automatically activate and provide power to the plant pending restoration of mains power. (An uninterruptible power source or UPS system is also provided for the short-term transition from mains power to diesel generators).

2.34 Building A and Building C will each have 26 no. and Building B will have 18 no. back-up diesel generators. Bulk diesel will be supplied to generators from three no. 40,000 litre bulk storage tanks located adjacent to each data centre. The tank will be filled by tankers via a designated bunded unloading area. Diesel will be piped from the bulk storage tank to double skinned tanks at each of the back-up generator units. It is anticipated, based on the Operator's experience, that back-up generators will rarely be used. They will be tested periodically to maintain operational readiness (See Chapter 9 – Noise and Vibration for testing regime). The assessment of the impact of these emissions in presented in Chapter 10 - Air Quality and Climate.

Fire water system

2.35 A fire water ring main will be installed for the Proposed Development to provide firefighting water to hydrants in the event of a fire.

Security and lighting

2.36 All traffic intending on accessing the facility will approach and access the site through the new Grange Castle South access road via the Baldonnel Road and the R120 / R134 to the north and east of the application site. A maximum speed limit of 30km/hour will be in place on the Grange Castle South Business Park access road.

2.37 A pair of access gates will be manned and maintained by security personnel 24/7. (The access gates have been designed to act as a vehicle trap as and when required). An additional entrance, which will remain in place following completion of the development, will be utilised to the east of this access during the construction period. Security will ensure that the procedure for accessing the facility is

followed at all times. A record will be maintained of all personnel visiting the site (including deliveries etc.).

2.38 All visitors to site will be monitored and supervised at all times. A 2.4m high security fence will be constructed around the perimeter of the Proposed Development site that will sit 2m inside the base of the proposed berms that will bound the application site. The Proposed Development will be partly screened from the R134 and Baldonnel Road by the berms and planting. The intention is that boundary berms and planting will be significant as set out under the landscape master plan (refer to Chapter 11 Landscape and Visual Impact). CCTV cameras will be installed at strategic locations around the site to ensure all boundaries and approaches to the site are adequately monitored.

2.39 An Intruder Detection System (IDS) combined with CCTV and security lighting will be utilised. The lighting design (both security and environmental lighting) has been assessed and optimised for the site, to ensure no obtrusive glare, light spillage or other light nuisance on neighbouring residential receptors or business users.

2.40 Bat Conservation Ireland (www.batconservationireland.org) has produced a set of guidance notes for consideration in the design of bat sensitive lighting schemes. Further and more recent guidance has been provided by Bat Conservation Trust in the UK in relation to bats and artificial lighting. The main items to consider for both types of bat habitat are listed below.

Table 2.1 Lighting mitigation design for bats

Bat Roosts	Foraging & Commuting
No direct illumination at exist points	Avoid lighting along river, lakes and canals
Position lights to avoid sensitive areas	Avoid lighting along important commuting routes
Use low pressure or high pressure sodium lights	Avoid the use of mercury or metal halide lamps
Avoid the use of mercury or metal halide lamps	Minimise light spills using shields masking and louvres
Restrict lights and the timing of such to avoid bat activity	Keep lighting columns as low as possible
Restrict lighting to ensure there are dark areas	Restrict lighting to ensure there are dark areas

2.41 The design as proposed and shown on Figure 2.3 below has been modelled to ensure the solution achieves the twin aims of having safe circulation routes external to the proposed facility but whilst not having a long term impact on foraging, commuting and bat roosts. The lighting model, which is reciprocated in the figures below indicates that the illumination levels fall off to 0.5 lux within 2m of the roadways etc. (1 lux is accepted as being equivalent to a moon lit night). This is further detailed and assessed within Chapter 7 – Biodiversity.

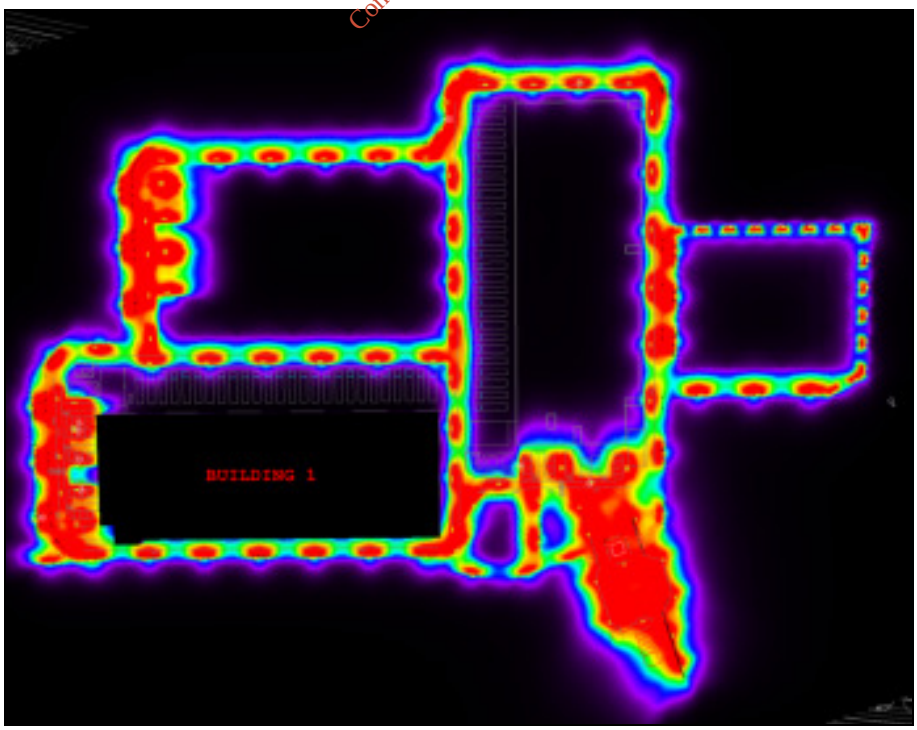

Figure 2.3 Site lighting isolux plot models for the Proposed Development

Site roads and parking

2.42 As above, the main access to the site will be via the Grange Castle South Business Park access road that extends from the Baldonnel Road to the west. Access arrangements and potential traffic safety impacts are considered in Chapter 13 Traffic and Transportation. Car parking (150 no. spaces with 50 spaces provided to serve each data centre) and bicycle parking (78 no. spaces) will be provided in designated areas as illustrated on the proposed site layout plan submitted with the application. This is to allow for parking for full time staff as well as external staff, maintenance contractors and visitors attending the site and each data centre.

Existence of the project

2.43 Under the *EPA Draft EIA Report Guidelines 2017*, the description of the existence of the project is required to define all aspects of the proposed lifecycle of the Proposed Development under the following headings:

- Construction phase land use requirements;
- Proposed works and construction methods;
- Duration and timing including any phasing proposals;
- Environmental protection measures; and
- Construction Management Plan.

2.44 The following sections present a description of each of these aspects.

Construction phase land use requirement

2.45 All construction works will be within the Proposed Development boundary during the construction of Buildings A and B. It is proposed that initially the access and haul roads for vehicles, the construction compound and fencing will be established for the construction of Building A to its immediate east on the future footprint of Building C. This construction compound will form the construction compound for Building B and also for the permanent Substation.

2.46 As a result of the implementation of the full landscaping scheme and the unavailability of other land within the Proposed Development boundary to accommodate it, the construction compound will be relocated off site for the construction of Building C. The compound is proposed to be located at a site to the immediate north-west of the Proposed Development site. If this site becomes unavailable during the construction process then another suitable site will be provided by SDCC on land in their ownership as close as possible to the Proposed Development site. A letter from SDCC confirming this accompanies this application. Due to the timing of the commencement of this phase in circa six years the exact location of the compound cannot be definitively confirmed. This will result in an increase in local traffic movements that are addressed in Chapter 13 – Traffic and Transportation

2.47 The construction compound will facilitate office, portable sanitary facilities, equipment storage, waste storage, parking etc. for contractors. It will be used for the duration of the works. The primary activities that will be required during the site preparation phase for the Proposed Development will be site clearance, excavations and levelling of the site to the necessary base level for construction, surveying and setting out for structures. A combination of bulldozer, excavators, trucks and other soil shifting plant will commence the main site clearance and levelling aspects

Proposed works and construction methods

2.48 The construction of the data centres will comprise four main stages, namely:

- Site preparation works;
- Building structure construction;
- Building envelope construction; and
- Internal fit out (including mechanical & electrical (M&E)) and commissioning.

Site preparation works

2.49 Construction of the Proposed Development is due to commence, subject to grant of planning permission, in August 2020. Site Preparation works will include site clearance, soil excavation and levelling; demolition of the abandoned farmhouse and agricultural buildings as well as the removal of hedgerow along the north-west boundary adjacent to the farmhouse.

2.50 The site has already been subject to detailed archaeological investigations under licence nos. 17E0590 and 17E0578. The findings of these investigations are detailed within Chapter 13 of this EIAR.

Building structure construction

Foundations and structure

2.51 Following the completion of site preparation, all structures will require foundations to structural engineer specifications. Building structures will comprise standard structural steel frames. The foundations will require moderate scale excavations. Local minor dewatering may be required during excavation works and groundworks dependent on the weather conditions at the time of works.

Levelling/Cut and Fill

2.52 It is proposed that some of the spoil generated will be reused under landscaped areas and/or in the formation level for roads and/or the construction compound. Any temporary storage of spoil required will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

2.53 Any excess spoil not suitable and/or required for reuse on site will be removed offsite for appropriate reuse, recovery and/or disposal as required (see Chapter 14 – Waste Management). The importation of fill will be required from various locations within the Greater Dublin Area to facilitate construction. This fill material will be sourced by suppliers available as close as possible to the site CS Consulting Engineers, have estimated that the importation of up to 41,500m^3 of fill material will be required. The impact of this has been assessed within Chapter 12 – Traffic and Transportation.

2.54 Contractors for the Proposed Development will be required to submit and adhere to a method statement (including the necessary risk assessments) indicating the extent of the areas likely to be affected and demonstrating that they will achieve the minimum disturbance necessary to achieve the required works. Any temporary storage of spoil will be managed, as set out under the Outline Construction Management Plan (CMP) to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

Building envelopes and finishes

2.55 The construction of the walls and roofs of the buildings will closely follow the completion of structures. Typically, the contractors will start by building from the centre of each building and begin fitting out the 1st data storage room of the 12 proposed within each building as early as possible in the process. The construction of the rest of the building will continue around it.

Roads, services and landscaping

2.56 The internal road system will initially be composed of hard-core material, rolled and compacted sufficiently to support initial construction including civil/structural sub grade works. Each data centre will have their own and independent access road and car parking. Most of the soft landscaping will be undertaken to the north, west and south of Buildings A, B and C with further landscaping to the north of the Baldonnel Stream and to the east of the permanent Substation. The majority of these landscaping works, to the south, west and north of the site, will be in place within the first planting season following the use of the first data storage room of Building A. The remaining landscaping that will be to the north, east and south of the permanent Substation will be in place within the first planting season following the completion of this Substation in summer 2023.

Material sourcing, transportation and storage materials

2.57 Key materials will include steel, concrete, composite cladding, piping, electrical cabling, process equipment and architectural finishes. A 'Just in Time' delivery system will operate to minimise storage of materials on site.

Sourcing

2.58 Where possible it is proposed to source general construction materials from the Dublin area to minimize transportation distances.

Storage

2.59 Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure area in the construction compound to prevent contamination. Liquid materials will be stored within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications – BS EN 1992-3:2006) to prevent spillage.

Transportation

2.60 Construction materials will be brought to site by road along the R134 and R120. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape material along the public roadway.

Description of commissioning

2.61 Once the first data storage room is built, specialist contractors will be mobilised to complete the commissioning of the first data storage room and related plant within each data centre. Commissioning will be carried out on a phased basis as each data storage room is completed, over a period of several months. This commissioning process will be repeated across each of the three Data Centres. Any hard landscaping will be completed following completion of the construction of the core of each of the facilities.

Duration and timing including any phasing proposals

2.62 Subject to a grant of a ten year planning permission, construction work will be undertaken on a phased basis for the Proposed Development over a circa eight year period. A summary of the proposed target dates (earliest possible dates) for the construction of Building A, B and C are set out below:

- Application for planning permission – Q2 2020;
- Commence site construction works for Building A (subject to grant of planning permission) – Q3 2020;
- Commence operation of first data room in Building A – Q3 2021;
- Complete construction works of Building A with all data rooms in operation – Q1 2024;

- Commence site construction works for Building B (subject to grant of planning permission) – Q2 2023;
- Commence operation of first data room in Building B – Q2 2024;
- Complete construction works of Building B with all data rooms in operation – Q4 2026;

- Commence site construction works for Building C (subject to grant of planning permission) – Q1 2026;
- Commence operation of first data room in Building C – Q1 2027;
- Complete construction works of Building C with all data rooms in operation – Q3 2028;

2.63 In general, the impact of the construction period will be short to medium term in nature. Construction work for the separate MV planning application is anticipated to take approximately eight weeks. The permanent Substation and HV connections, which will be subject to a separate application, and

subject to pre-planning consultations with An Bord Pleanála may be considered as Strategic Infrastructure Development, are proposed to be completed within a year.

Working hours

2.64 The construction of the Proposed Development will be completed during normal construction hours i.e. 7am to 7pm Monday to Friday with a half day working on Saturday (8am -2pm). However, it is possible that the appointed contractors may wish to carry out certain operations, such as concrete pouring, outside these hours i.e. evening hours during long summer days etc. Such occurrences will be notified to the local authority, where required and generally kept to a minimum. Where they do occur, contractors will ensure they take place over as short a timeframe as possible and as such they will not cause disturbance that would impact local residential amenity.

Staffing

2.65 The total peak construction population on site is estimated to be of the order of c. 400 staff (average 250). Site staff will include management, engineers, construction crews, supervisors and others during the eight year construction process.

Environmental protection measures

Waste management

2.66 Chapter 14 contains a detailed description of waste management relating to construction of the Proposed Development. A site-specific Construction and Demolition Waste Management Plan is submitted with this application (see Appendix J). This Construction and Demolition Waste Management Plan will be refined and updated by the contractor in advance of the works to ensure best practice is followed in the management of waste from the Proposed Development.

Noise, vibration and dust nuisance prevention

2.67 With regard to construction activities, reference will be made to BS 5228 (i.e. BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014) *Code of practice for noise and vibration control on construction and open sites*, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures have been considered and will be implemented during the construction of the Proposed Development, such as:

- Limiting the hours during which site activities which are likely to create high levels of noise are permitted, e.g. soil levelling/excavations;
- Establishing channels of communication between the contractor/developer, local authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration, and;
- Monitoring typical levels of noise during critical periods and at sensitive locations.

2.68 Furthermore, it is proposed that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise;
- Erection of acoustic barriers as necessary around items such as generators or high duty compressors; and
- Siting of noisy plant as far away from sensitive receptors as permitted by site constraints.

2.69 Noise and vibration control measures are discussed in detail in Chapter 9 - Noise and Vibration.

2.70 The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of dust produced will be deposited close to the generated source.

2.71 In order to ensure that no dust nuisance occurs, a series of measures will be implemented including:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential site traffic only;
- If required, any area/road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20km/hour, and on hard surfaced roads as site management dictates;
- In all conditions vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- Wheel washing facilities will be provided for vehicles exiting the site to ensure that mud and other wastes are not tracked onto public roads;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary; and
- At all times, these procedures will be strictly monitored and assessed. In the event of dust emissions occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

2.72 Dust nuisance control measures are discussed in further detail in Chapter 10 (Air Quality and Climate).

Water discharges

2.73 Welfare facilities will be provided for the contractors on site during the construction works. Portable sanitary facilities will be provided. Any surface water run-off will be adequately contained and treated prior to being discharged into the SDCC drainage network. See Chapter 7 - Hydrology for a full description of mitigation measures proposed.

Construction management plan

2.74 Each of the following EIA Report chapters (Chapters 6-17) includes an assessment of the potential impact of construction works on their individual environmental aspect and set out the relevant mitigation measures relating to that aspect. A Construction Environmental Management Plan (CEMP) will be put in place by contractors to minimise the impact of all aspects of the construction works on the local environment. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. A Draft CEMP is submitted with this application.

2.75 The primary potential effects from construction are short to medium term and will include:

- Potential effects in terms of nuisances relating to the air quality of the environs due to dust and other particulate matter generated from excavation works and effects on the noise environment due to plant and equipment involved in construction;
- Potential effects on the land, soils, geology & hydrogeology of the site during construction i.e. some loss of protection of the underlying aquifer to contaminants during site clearance, levelling and excavations etc.; and
- Potential effects on the local road network and its environs due to construction workers and other staff attending site during preparation, construction and commissioning phases.

2.76 Mitigation measures to address each of these potential short to medium term effects are presented in each individual EIA Report chapter.

Operation of the project

Data Centre Operation

2.77 Once operational, each data centre will “go live” and serve data customers on an ongoing basis. The server systems and the supporting infrastructure will be monitored by site staff and faults identified

and remedied as required. Staff are primarily required onsite for security, ongoing monitoring and maintenance of plant and equipment.

Staffing

2.78 Once operational, c. 50 full time employees will be present on site daily in each data centre facility (Buildings A, B and C) meaning that 150 people will be on site at any one time, including external staff, maintenance contractors and visitors, as required. The number of external staff, maintenance contractors and visitors will typically be c. 30 staff per day. (Staff will be present on a shift basis, so numbers will vary throughout the day with up to 7 no. of the staff on night shifts each day). Traffic relating to staff movements has been assessed as part of the traffic and transportation chapter of this EIA Report (Chapter 12).

Decommissioning of the project

2.79 The lifespan of the Proposed Development is not defined but it is anticipated that it will be at least 20 years from full completion. It is likely that regular maintenance and periodic upgrading of the facility over time will enable it to continue to meet future demands. Upon closure all buildings, plant, equipment, drainage networks etc. at the site will be fully decontaminated and decommissioned in accordance with prevailing best practice. The buildings once rendered environmentally safe will more than likely be retained or sold on for future use following closure.

Description of other developments

2.80 A list of the other developments in the vicinity of the Proposed Development is provided in Chapter 4 (Planning and Development Context) of this EIA Report.

Sustainability energy efficiency & resource use

2.81 The Operator is committed to running its business in the most environmentally friendly way possible. In addition to the environmental benefits inherently associated with running applications in the cloud, the Operator has a long-term commitment to achieve 100% renewable energy usage. The Operator has committed to buying two renewable energy projects in Ireland located in Donegal and Cork. This is part of the Operator's long-term commitment to achieve 100% renewable energy for its global infrastructure. These projects will support Ireland meeting its energy policy targets out to 2030.

2.82 The Operator's current electricity supplier in Ireland sources and retires renewable Guarantees of Origin (GOs) for every megawatt-hour (MWh) the Operator uses. For every MWh a renewable project generates, it produces a GO, which is used to track renewable production and guarantee its origin (these GOs are subsequently retired to ensure each is only used once).

2.83 The operator of the temporary substation (ESB) is committed to running its business in the most environmentally friendly way possible.

Energy efficiency benefits

2.84 A typical data centre achieves approximately 65% server utilization rates versus 15% at on-premises servers. This typically means companies moving their data storage to the cloud require less than a quarter of the server infrastructure they would need if provided on-premises. A typical on-premises data centre is 29% less efficient in their use of power compared to a typical large-scale data centre that uses world-class facility designs, cooling systems, and workload-optimized equipment. Adding these together (fewer servers used plus better power efficiency), cloud customers need 16% of the power required by those on-premises infrastructure. This represents an 84% reduction in the amount of power required.

Sustainability

2.85 In preparation for this application, the Operator and their design team have undertaken an assessment of a variety of sustainable design measures to assist with achieving its overall sustainability and energy efficiency targets. The energy strategy for the Proposed Development is

set out in an *Energy Statement* which forms a stand-alone document that accompanies the planning application. Some of the key measures incorporated into the design as set out in the Energy Statement have been summarised below.

2.86 The location of the facility in Ireland allows for the use of free-cooling media without the need for mechanical cooling, to take advantage of this, the air handling equipment will be fitted with airside condensers to utilise this outdoor air to cool the space. Additional cooling to this is by evaporative means with water recycling utilised.

2.87 Airside heat recovery systems with air to air heat pumps will be installed in the office areas in the building. These systems are to accommodate the fresh air and heating/cooling requirements for the space. Energy efficient electrically commutated (EC) fans and motors shall be utilised where possible and variable speed drives (VSD's) will be utilised when EC fans are not viable. Premium efficiency motors will be specified on all equipment.

2.88 It is also proposed to install an array of photovoltaic panels on the roof of the proposed data centre building to generate electricity to feed back into the electrical supply for the building, serving lighting, office area general services and office IT equipment. All other data storage engineering services installations proposed have been considered in detail from an energy inspective (e.g. intelligent lighting systems etc.).

2.89 The Energy Statement also describes how waste heat associated with the facility could be utilised with a future district heating scheme developed by others.

Health & safety

Design and Construction Health and Safety

2.90 The Proposed Development has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. 299 of 2007) as amended and associated regulations.

2.91 The Proposed Development has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar existing facilities operated by the Operator.

General operational health and safety

2.92 The Operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to start up a comprehensive set of operational procedures will be established (based on those used at other similar facilities) to ensure a smooth roll out of operations at each facility.

Potential impacts of the Proposed Development

2.93 The Proposed Development is to be located on EE zoned lands with the objective "*To provide for enterprise and employment related uses" under the South Dublin County Development Plan 2016-2022 and located* adjacent to extensive industrial development. The development, when operational, will generate limited additional traffic, air, noise and water emissions and waste generation from activities etc.

2.94 During construction, there is the potential for short to medium term nuisance impacts from traffic, dust, noise and construction waste, if not carefully managed. The Operator will require contractors to implement a CEMP to ensure each of these potential impacts are minimised.

2.95 Each chapter of this EIA Report assesses the potential impact of the construction and operation of the Proposed Development on the receiving environment. Please refer to each specialist chapter respectively.

Major accidents / disasters

2.96 The 2014 EIA Directive and associated EPA Draft EIA Report Guidelines 2017 requires that the vulnerability of the project to major accidents, and/or natural disasters (such as earthquakes,

landslides, flooding, sea level rise etc.) is considered in the EIA Report. The site has been assessed in relation to the following external natural disasters; landslides, seismic activity and volcanic activity and sea level rise/flooding as outlined below. The potential for major accidents to occur at the data centre has also been considered with reference to Seveso/COMAH.

Landslides, Seismic Activity and Volcanic Activity

2.97 There is a negligible risk of landslides occurring at the site and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the site. There are no active volcanoes in Ireland so there is no risk of volcanic activity. Further detail is provided in Chapter 7 Land, Soils, Geology & Hydrogeology.

Flooding/Sea Level Rise

2.98 The potential risk of flooding on the site was also assessed. A Stage 1 Flood Risk Assessment was carried out and it was concluded that the development is not at risk of flooding. The assessment indicates that the Proposed Development would not adversely impact on the flood risk for other neighbouring properties. Further detail is provided in Chapter 8 - Hydrology and the accompanying Stage 1 Flood Risk Assessment that forms a stand-alone document as part of the planning application. Given the inland location of the site, it is not at risk from sea level rise.

Seveso/COMAH

2.99 The Proposed Development will not be a Seveso/COMAH facility. The only substance stored on site controlled under Seveso/COMAH will be c. 40m^3 of diesel in a 40m^3 bulk storage tank plus some within the generator belly tanks (i.e. c. 32 tonnes of diesel) for each building – c. 120m^3 overall. The quantity of diesel which qualifies a given establishment for the application of lower-tier and upper-tier requirements under Directive 2012/18/EU is 2,500tonnes and 25,000tonnes respectively. The amounts proposed do not exceed the relevant thresholds of the Seveso directive.

2.100 The Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) define the "consultation distance" as a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment, including potentially significant consequences for developments such as residential areas, buildings and areas of public use, recreational areas and major transport routes.

2.101 Establishments are either lower tier establishments or upper-tier COMAH sites with above threshold quantities of dangerous substances present, and to which the provisions of the 2015 COMAH regulations apply. Table 2.2 lists the nearest sites that are notified to the Health and Safety Authority (HSA) as COMAH establishments under the 2015 COMAH Regulations. Table 2.2 also lists the distance to the establishments.

Table 2.2 Nearest Seveso/COMAH site, consultation distance and distance to Proposed Development site

Seveso / COMAH site	*Distance to Proposed Development site*
Irish Distillers Ltd., Robinhood Road, Fox & Geese, Clondalkin, Dublin 22	6kms
Brenntag Chemicals Distribution (Ireland) Ltd, Unit 405, Greenogue Business Park, Rathcoole, Dublin 24	2.6kms
Kayfoam Woolfson Bluebell Industrial Estate, Naas Road, Dublin 12	6.8kms
Johnston Logistics Limited (Rathcoole) Blackchurch Business Park, Rathcoole, Dublin	6.5kms

2.102 It is concluded that the Proposed Development site is not located within the consultation distance of any COMAH establishment that is notified to the HSA. Therefore, there are no implications for major accident hazards at the Proposed Development site.

Minor accidents/leaks

2.103 There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapters 7 and 8 will ensure the risk of a minor accident/leak is low and that the residual effect on the environment is imperceptible.

Related development and cumulative effects

2.104 The Proposed Development is for 3 no. two storey data centre buildings (Building A, B and C) and associated ancillary development on a site that will be built on a phased basis to meet customer demand.

2.105 It is unlikely, as set out under the phasing of construction under paragraph 2.65 that more than two data centre buildings would ever be under construction concurrently. In such an unlikely scenario in the future, due to the phased nature of the works, it is likely that one of the buildings would be at the superstructure stage of construction whilst the other would be in the earlier stages of construction.

2.106 The cumulative effect of the Proposed Development together with other relevant developments, has been considered in Chapter 16 - Cumulative effect.

2.107 It is proposed to construct a Medium Voltage (MV) connection that will include works to install new underground ducting and cable within a new trench to meet the existing distribution network. An MV connection will be subject to a separate planning application.

2.108 It is also proposed to construct a permanent 110kV GIS Substation and two 110kV underground transmission lines from the proposed permanent substation to the existing Castlebaggot and Kilmahud substations. The provision of the permanent substation and transmission lines will be subject to their own applications. Subject to pre-planning consultations with An Bord Pleanála they may be determined as being Strategic Infrastructure Development.

2.109 As part of the assessment of the impact of the Proposed Development, the cumulative effects of the Proposed Development with the MV connection; permanent 110kV GIS Substation and two 110kV underground transmission lines and other developments that are currently built, permitted or under construction within the vicinity of the site, neighbouring industrial parks and surrounding areas have been assessed. A list of the other developments considered is provided in Chapter 4 (Planning and Development Context). The cumulative effect assessment of the Proposed Development with these other developments is provided in Chapter 16 of this EIA Report.

EIA Report scoping

2.110 A scoping report outlining the information proposed to be included in the Environmental Impact Assessment Report (EIA Report) for this project setting out the main elements of the Environmental Impact Assessment (EIA) process and methodology in respect of alternatives and interactions for the EIA Report was submitted to the Planning Authority for their consideration and comment. This scoping was undertaken as a decision had been made by South Dublin County Council that an EIA is required in respect of the project (the screening process). Scoping is an integral part of the EIA process, the aim of which is to identify matters that should be covered in the EIA Report.

2.111 The scoping study identified environmental issues that may arise during the construction and operation of the development and which should therefore be addressed in more detail as part of the EIA Report. This included assessing the cumulative effects of this project in relation to other projects previously assessed in terms of green infrastructure and biodiversity. In this context we have examined the potential environmental issues and determined whether any may be partially or wholly omitted from the EIA (scoped out). The EIA Report undertakes a full assessment of the key environmental issues and their interactions as part of this process. No element of the environment or environmental issues were scoped out from the EIA Report.

3. PLANNING AND DEVELOPMENT CONTEXT

3.1 The following section details compliance of the Proposed Development, as described in Chapter 3, with regard to national policies and objectives as well as local planning policy under the South Dublin County Development Plan 2016-2022.

National Planning Framework

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

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

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

3.4 The Proposed Development comprises the provision of three new data centres and associated ancillary development, in a location which is well suited and serviced to accommodate such a use. The NPF also states under National Strategic Outcome 6:

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

3.5 The NPF is favourably disposed to the location of ICT infrastructure in Ireland, and the Proposed Development, which comprises of such ICT infrastructure, is therefore considered to be wholly in accordance with this key body of national planning policy.

Draft Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly

3.6 The Draft Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA) includes Regional Policy Objective (RPO) 8.23 which states the following:

"Local Authorities shall:
- *Support and facilitate delivery of the National Broadband Plan.*
- *Facilitate enhanced international fibre communications links, including full interconnection between the fibre networks in Northern Ireland and the Republic of Ireland.*
- *Promote and facilitate the sustainable development of a high-quality ICT network throughout the Region in order to achieve balanced social and economic development, whilst protecting the amenities of urban and rural areas.*
- *Support the national objective to promote Ireland as a sustainable international destination for ICT infrastructures such as data storage facilitys and associated economic activities at appropriate locations.*
- *Promote Dublin as a demonstrator of 5G information and communication technology."*

3.7 The site is therefore considered to be an appropriate location for the development of data centres under this Strategy.

Regional Planning Guidelines – Greater Dublin Area, 2010-2022

3.8 The Regional Planning Guidelines (RPGs) sets out a strategic planned direction for growth in the Greater Dublin Area encompassing Dublin City, Dún Laoghaire-Rathdown, South Dublin, Fingal,

Meath, Kildare and Wicklow. A number of policies and recommendations support the economic development of this region by developments similar to the subject proposal on sites such as this. These include Strategic Policies EP2, ER9 and ER10.

3.9 The RPGs identify the prevalence of converging sectors in particular the connection between Information and Communications Technology (ICT) and Green Technology. This convergence of sectors has led to new emerging sectors such as the prevalence of data centres in Ireland and on strategic sites such as this. The current proposal is considered to be in compliance with regional planning policies as they are strategically zoned employment land in South Dublin County Council.

South Dublin County Development Plan 2016-2022

3.10 The South Dublin County Development Plan is the statutory planning document that covers the entire South Dublin administrative area. The Plan was adopted in June 2016. The Proposed Development is to be located within an area zoned EE (Enterprise and Employment) under the County Development Plan with the stated aim:

"*To provide for enterprise and employment related uses."*

3.11 The proposed use is a permitted use under this zoning. Significant precedent exists for the establishment of this use on other EE zoned lands in the area. EE zoned areas are established economic industrial areas running essentially in an arc northwards from City West to Grange and Grange Castle.

3.12 It is the policy of the Council to support sustainable enterprise and employment growth in South Dublin and in the Greater Dublin Area, whilst maintaining environmental quality. A number of objectives relate to EE zoned lands that include ET3 Objective 2 that states:

"To prioritise high tech manufacturing, research and development and associated uses in the established Business and Technology Cluster to the west of the County (Grange Castle and Citywest areas) to maximise the value of higher order infrastructure and services that are required to support large scale strategic investment."

3.13 Policy ET3 Objective 5 requires that "*all business parks and industrial areas are designed to the highest architectural and landscaping standards and that natural site features, such as watercourses, trees and hedgerows are retained and enhanced as an integral part of the scheme*". The proposal retains and enhances natural site features by the use of the highest architectural and landscaping design standards.

3.14 Policy ET3 Specific Local Objective 1 supports the conducting of a review of the zoning of lands south of the Grand Canal and west and north of the R120, with a view to preparing a long term plan for the expansion of the Grange Castle Economic and Enterprise Zone, to accommodate strategic investment in the future, while also seeking to provide public open space along the Canal, including a natural heritage area in the vicinity of the historic canal quarries at Gollierstown. This rezoning has formed Variation no. 1 of the County Development Plan and does not relate to these lands.

3.15 Section 11.7.6 of the Plan sets out that development proposals for new industrial and commercial developments and large extensions to existing premises, where the processes associated with the primary operation of the proposal generates significant waste heat must carry out an energy analysis of the proposal and identify the details of potential waste heat generated and suitability for waste heat recovery and utilisation on site and with adjoining sites. This is required to include heat recovery and re-use technology on site, and include heat distribution infrastructure above or below ground (include future proofing of the building fabric to facilitate future connection). This is detailed in the submitted Energy report and architectural drawings that accompany the planning application.

3.16 The nature of the overall design has been informed by a site analysis of environmental issues. This has included noise and air quality objectives. The enhancement and creation of new bio-diversity corridors to fully integrate the scheme into the surrounding environment to ensure that direct and cumulative effects on biodiversity are addressed in the overall design. Suitable attenuation and sustainable drainage systems have also informed the design. This mitigation of design also

increases native tree planting within the site from its current position. The design incorporates SUDS fully in accordance with policies of the Plan.

3.17 In conclusion it is considered that the proposal is in accordance with the policies and objectives of local, regional and national land use planning policy.

Planning history

3.18 The application site has no planning history relevant to this application beyond a Part 8 application for various road works under Reg. Ref. SD088/0010 and a refused application for the change of use of lands and property, since demolished, within the north-east quadrant of the Proposed Development site to an Irish Cultural and Language Institute in 2002 under Reg. Ref. S02A/0097. The reasons for refusal were based on traffic concerns and a reduction in the housing stock. The land was zoned for residential purposes at the time. This application was located to the north-east of the Baldonnel Stream that is not proposed to be subject to any development under this application apart from landscape and flood mitigation. Neither of these applications impact upon the ability to develop the Proposed Development site. The wayleaves required by SDCC, Irish Water and ESB as part of the sale around the boundaries and infrastructure crossing the site have been respected when designing the current scheme.

3.19 Several planning permissions have been granted in the Grange Castle area for data centres in recent years. The following is just a synopsis of these.

Nearby sites

CyrusOne

Reg. Ref. SD18A/0134 / ABP Ref. ABP-302813-18

3.20 Permission was granted by South Dublin County Council, which was upheld following a third party appeal, by An Bord Pleanála, for a two storey data centre with associated three storey office block and services that had a gross floor area of 35,426sqm on an overall site of 9.2 hectares on the lands to the immediate south of the application site. The data centre and office has a general dimension of being 292.2m in length by some 65.2m in width. The development had an overall height of 15.9m to the top of the parapet level and contained 64 exhaust flues (two per generator), grouped into 16 towers of four flues that are each 20m in height from the proposed ground floor level. This site is currently under construction for the first building and offices of this permitted development.

Google

Reg. Ref. SD14A/0023

3.21 A decision to grant planning permission for a two storey data centre (30,361sqm) and associated facilities including 83 car parking spaces was made on the 14th April 2014. Google were the applicant and operate the data centre that has now been constructed to the immediate south-east of the subject site. The highest point of any of the buildings is within 20m of the original ground level with the 25 no. stacks at 25m.

Microsoft campus

Reg. Ref. SD07A/0632

3.22 Permission was granted on the 26th October 2007 for a two storey data centre with plant at roof level with a gross floor area of 51,155sqm to the north-west of the application site. Permission was granted for a ten year period to be developed over two phases with an overall height of 24.275m to parapet and flues that are 27.25m in height.

Reg. Ref. SD11A/0211

3.23 Permission was granted in November 2011 for a single storey data centre of 11,090sqm adjoining the permitted two storey data centre granted under the 2007 application to the north-west of the application site.

Reg. Ref. SD13A/0015

3.24 Permission granted for a single storey data centre (15,609sqm) with plant at roof level to the west of permissions granted under the 2007 and 2011 applications and with flues that were 25m in height.

Reg. Ref. SD13A/0143

3.25 Permission granted for DUB06 on the 23rd October 2013 for a single storey data centre with plant at roof level with a total gross floorspace of 35,000sqm with flues that were 24.85m in height. This data centre is located to the north-east of the Kilcarbury Business Park.

Reg. Ref. SD13A/0265

3.26 Permission granted for DUB06 and modified by Reg. Ref. SD14A/0194 (below) that established permission for alternative DUB06 of 35,000sqm.

Reg. Ref. SD14A/0194

3.27 Planning permission was granted to Microsoft Ireland in November 2014 for revisions to and extension of the data centre complex DUB06 granted under SD13A/0265. Revisions included the overall reduction in floor area of permitted DUB06 from 35,000sqm to 21,350sqm and provision of an additional 6 buildings providing data centres totalling 31,828sqm in total and located to the immediate north of the Kilcarbury Business Park.

Reg. Ref. SD15A/0133

3.28 Planning permission was granted to Microsoft Ireland in November 2015 for the construction of a single storey data centre (DUB011) with a total gross floor area of 7,609sqm to be located to the south of DUB06, 07 and 08.

Reg. Ref. SD15A/0343

3.29 Planning permission was granted to Microsoft Ireland on the 23rd February 2016 for the development of two data centres (DUB07 and DUB 08) to the immediate west of the existing data centre (DUB06). Each data centre contained five no. flues each 25m high, with each data centre having an overall height of up to 13m high and with an overall gross floor area of 33,800sqm.

Reg. Ref. SD16A/0088

3.30 Planning permission was granted to Microsoft Ireland on the 6th May 2016 for a development of four single storey data centres (DUB09, DUB10, DUB12 and DUB13) located west of DUB06, 07 and 08, and located to the north of the subject site and the New Nangor Road. The gross floor area of each data centre and accompanying offices etc. was 17,598sqm with an overall gross floor area of 70,392sqm in total. The height of each data centre will range from 6.1m to 13.3m with five flues per data centre and being 25m in height.

Wider local area

Reg. Ref. SD16A/0214

3.31 A decision to grant planning permission for phase 1 of the development of an Edgeconnex data centre was made on the 11th August 2016. The proposed data centre and associated elements had a gross floor area of 5,839sqm. The overall height of the development is dictated by the parapet screen to the roof plant of the data hall which will be circa 10.5m above finished ground level. The generator flues extend circa. 15m above ground level over each generator.

Reg. Ref. SD16A/0345

3.32 Permission was granted on the 10th January 2017 to extend the Edgeconnex data centre by the construction of a new data hall of 4,176sqm to the immediate south of the data hall of 4,435sqm and single storey office of 1,341sqm permitted under Reg. Ref. SD16A/0214. The permission also included the construction of a temporary gas generation plant within walled yard measuring

2,811sqm and containing 12 no. 1.875 MVA sized container units to be located within the Takeda lands to the east of the site.

Reg. Ref. SD17A/0141

3.33 Permission was granted on the 14th August 2017 for a new stand-alone single storey data hall of 1,515sqm to the immediate north of the data hall, and its extension, permitted under Reg. Ref. SD16A/0214 and SD16A/0345. The attenuation pond was permitted to be enlarged under this permission.

Consultation with South Dublin County Council

3.34 The project team have liaised with the relevant departments of South Dublin County Council (SDCC) in advance of lodgement of this application. A pre-planning meeting was held with SDCC on the 28th January 2020 and representatives of the SDCC Planning, Engineering and Roads/Transportation Departments as well as the Heritage Officer attended. In addition, the relevant project team specialists have liaised with the Water Services and Parks departments of SDCC by correspondence during the course of the EIA Report preparation. EIA contributors/authors have incorporated advice and comments received from SDCC into the relevant chapters of this EIA Report.

Conclusions

3.35 The Proposed Development, described in Chapter 2 of this EIA Report is fully in accordance with local, regional and national land use planning policy. The application is suitably zoned for enterprise and employment purposes and the precedent for data centre development on such zoned lands is well established and clearly set on the adjacent lands to the south, north and south-east. A construction car park and compound will need to be located to the east of Building A to facilitate the construction of the data centres of Building A and B, as well as the permanent Substation to the east of the site. The construction compound for Building C will be located outside of the application site, in close proximity, due to the lack of land available within the site to facilitate the compound on completion of Buildings A, B and the permanent Substation.The construction compound is temporary in nature and again allowable under the zoning objective with precedent for similar temporary compound arrangements on EE zoned lands both within and outside the Grange Castle Business Park.

3.36 The content of this EIA Report identifies potential environmental risks and how they will be addressed and mitigated in the design, during construction and during the operational phases of development. Details of the various environmental topics are identified and discussed in the following chapters of the EIA Report.

4. CONSIDERATION OF ALTERNATIVES

4.1 EIA legislation and the prevailing Guidelines and best practice require that Environmental Impact Assessment Reports (EIS Reports) consider reasonable alternatives, for example in terms of project design, technology, location, size and scale; that have been considered by the Operator. The Consideration of Alternatives under each of these aspects is considered below, and chapter describes the alternatives that were considered for the Proposed Development, where applicable, under each of these headings and the main reasons for the selection of the preferred options including considerations and comparisons of environmental effects of the alternatives. These are detailed within Appendix B of the Appendix document and as set out under the project location part of this chapter.

Project design

4.2 The team under the direction of the Proposed Development Architects have carried out a number of studies for the overall utilization of the site. A number of alternative layouts for the site were considered based on the current Proposed Developmentl. However, two key design starting points informed the design that related to the pinch points of the site to the west, where the site was at its narrowest; and to the east; where the site further narrows and is further constrained by the Baldonnel Stream and Castlebaggot Substation.

4.3 The design process for the Proposed Development has included a master planning exercise for the entire site. Various alternative arrangement layouts were considered for the masterplan that included locating the permanent 110kV GIS Substation to the west at the entrance into the Grange Castle South Business Park; and orientating the three proposed data centres in various different arrangements.

4.4 Each arrangement considered the environmental sensitivities associated with each surrounding land use i.e. the proximity to the Baldonnel Stream; landscaping and attenuation required; surrounding hedgerows; nearest residential properties; as well as other data centres located directly to the north, south-east and south of the application site. The design and configuration of the Proposed Development was also made having regard to accommodating the future application for the permanent 110kV GIS Substation to the east of the site. The location and arrangement of the three no. data centres allows the Operator to achieve the balance between minimal environmental effects, and an appropriate level of development on the site.

4.5 The location of the back-up generators has been optimised for each Building of the Proposed Development. This has enabled the generators and associated flues serving Buildings A and C to be sited centrally within the site thus providing main elevations to the public domain and within the business park itself. However, an alternative design arrangement had to be achieved for Building B due to air quality concerns within the facilities with respect to the siting of the generators, flues and ventilation shafts of Buildings A and B adjacent to each other.

4.6 The only alternative was to flip the alignment of Building B so that its generators, flues and ventilation shafts were to its north. This arrangement meant that, despite the more significant landscaping along the northern boundary a more industrial elevation would be visible. In order to mitigate this, the arrangement of the generators to the north of Building B were also flipped 180° so that the vents and flues were adjacent to the building itself with a screen at their upper level so that all these elements would be screened from the public road.

4.7 Subsequent chapters of the EIA Report (including Air Quality, Noise & Vibration and Landscape and Visual Impact) include mitigation proposals to address the location of the back-up generators for the Proposed Development.

4.8 Site layout considerations as well as considering the orientation of the data centre buildings to optimise the use of the space available, were primarily made based on the following factors:

- Location of the development too far north or east would impact on the Baldonnel Stream wayleave and other infrastructure wayleaves. The proposed layout enables at least a 10m biodiversity corridor along the southern edge of the stream to the nearest element of the

development (security fence);

- Location of the data centres further to the east would also require the location of the substation to the south-west of the site at the entrance into the business park;
- The architectural aspect of being able to place the office / admin area of each data centre facing the realigned Baldonnel Road and the new entrance into the Grange Castle South Business Park in terms of Building A; the Baldonnel Road / New Nangor Road in terms of Building B; and the business park access road, and access into the Proposed Development site; in terms of Building C will create an attractive feature to each data centre;
- Location of diesel tanks proximal to area of usage and therefore minimise risk of accidental loss to ground;
- Location of the proposed new substation and its proximity to the new Castlebaggot Substation;
- By not utilising the furthest west element of the site it enables a wetland to be created that will have clear ecological benefits and biodiversity linkage to the wetland to the south;
- By not utilising the north-east of the site it enables an area that will be retained as having biodiversity benefits with linkages to existing biodiversity resources and with the landscaping proposed to the south of the stream will create a significantly enhanced biodiversity corridor;
- Location of the wastewater and stormwater systems (including attenuation) and proximity to the existing drainage services available;
- Ease of site access and minimizing impact on traffic movements along the R120 and R134; and
- Set-back from all boundaries enables a significant level of landscaping around its northern, western and southern perimeter. This ensures that it visually integrates with the permitted developments in this area.

4.9 In addition, the stack heights for the back-up generators have been modelled in an iterative fashion (i.e. with incremental increases in stack heights modelled) to ensure that an adequate stack height was selected to aid dispersion of the emissions.

4.10 Several arrangements were considered in the development of the preferred site design/layout, however the configuration shown in Figure 4.1 below, represents the most practical configuration for reasons of the Proposed Development and indicative future development in relation to the environmental sensitivity of the site's surroundings for the reasons described above.

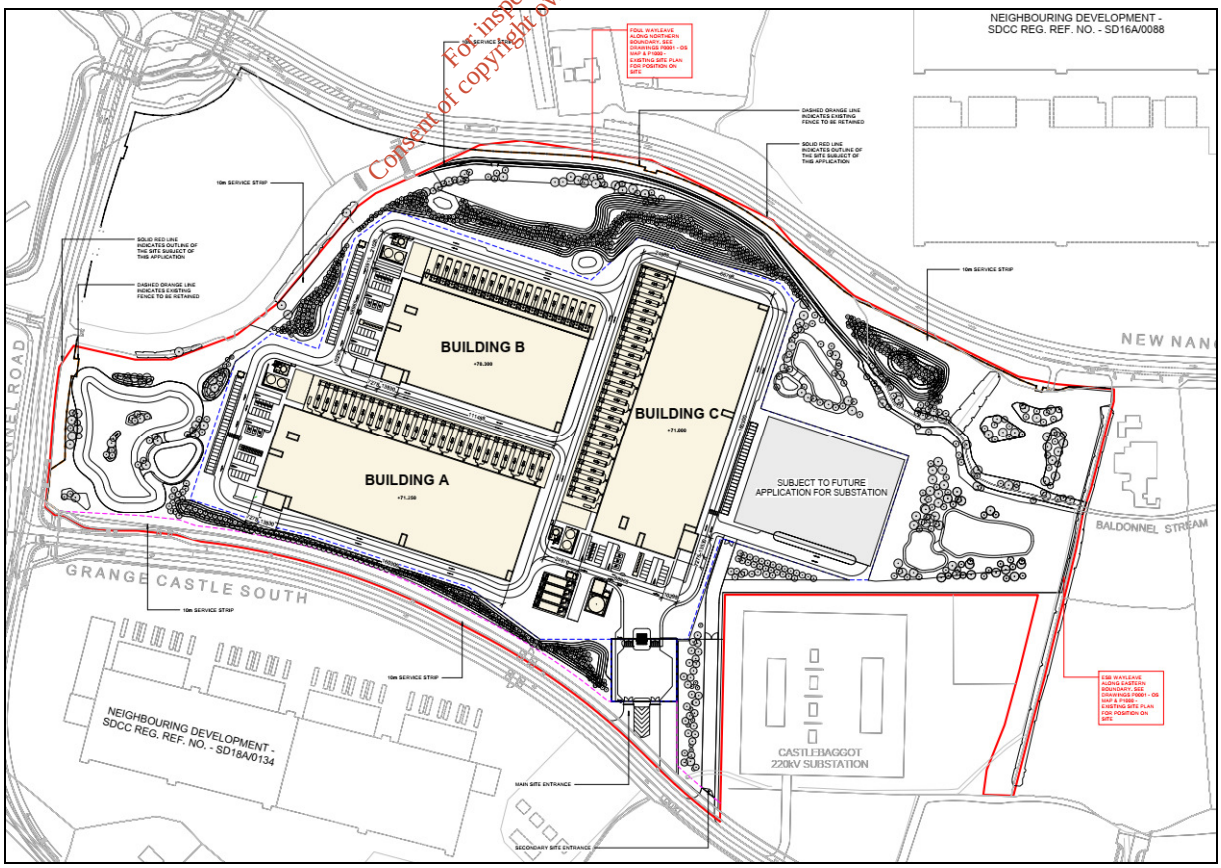

Figure 4.1 Proposed site layout plan

4.11 A temporary power connection to the site will be facilitated via a proposed temporary substation and underground 20KV connection and cables from the east with the underground cabling outside of the site forming a separate planning application. Alternative routes for this via the west out of the site, and to the south-east of the site were considered but raised a number of other environmental issues, or increased the works required that do not apply to the proposed connection.

Project technology

4.12 Alternative technologies are considered on an ongoing basis by the Operator as a part of each of its designs based on many factors including technical feasibility, environmental impact, efficiency, security, reliability and cost. The operator is committed to continually assessing and improving this technology particularly with respect to minimising power and water consumption, in accordance with the goals of Irelands Framework for Sustainable Development *'Our Sustainable Future'*. The operator's designs are constantly evolving, and hardware is chosen with energy efficiency central to the decision-making process. The Energy Statement which accompanies the planning application explains the reasoning for the selection of certain mechanical and electrical technologies to demonstrate that the Proposed Development represents a low energy solution whilst operating as a functional, critical data centre development.

4.13 In terms of the proposed technology the Proposed Development will employ the same data server technology that is used by the Operator at their other facilities in the wider Dublin area, and around the world that represents state of the art technology.

Project location

4.14 At the outset of this project, the applicant undertook an assessment of a number of sites towards determining the most appropriate location to establish the Proposed Development. This evaluation was conducted on two levels:

- Selection of preferred country location; and
- Selection of preferred site location.

Selection of preferred country location

4.15 The selection of Ireland as the preferred country location for this form of development was based largely on climatic conditions, the highly skilled local workforce, and the need for additional capacity at the Operator's existing data centre network in the region. As has been well documented, due to the relatively cool climate in Ireland, data centre equipment requires significantly less cooling in this type of environment compared with many other countries. As a result, data centres in Ireland require far less air conditioning and temperature control systems which means substantially less power and water demand requirements. This has the effect of reduced air and noise emissions compared with countries in Europe with a warmer climate and less demand on the water and power supply networks that help to reduce the environmental effects of the Proposed Development.

Selection of preferred site location

4.16 Having selected Ireland as the preferred country location for the data centres, a process of site selection was undertaken on a number of sites throughout Ireland but primarily within the wider Greater Dublin Area. The choosing of the Greater Dublin Area was due to the location of the Operator's other facilities in this region and the greater availability of power and other infrastructure.

4.17 Three alternative sites, including the proposed site, were considered within business parks and industrial estates in the region that were on suitably zoned lands that would facilitate the size and scale of data centre development that the Operator required. The sites considered were all greenfield and vacant industrial sites located within the following areas: Orbital Park, Newbridge, Co. Kildare and Navan, Co. Meath as well as the proposed site in Grange Castle South, Clondalkin. The consideration and comparison of these sites relative to each environmental topic is set out in detail within Appendix B of this EIA Report.

4.18 In addition to size and zoning the sites were assessed based on a wide range of environmental, infrastructural and development considerations, such as:

- availability of suitable power supply and infrastructure;
- natural heritage;
- environmental considerations such as noise, air quality, visual impact and traffic;
- flooding;
- proximity to the Operator's existing facilities allowing for greater efficiency for the management and maintenance of its sites; and
- site specifically designed for large scale industrial activities with good water, wastewater and road access.

4.19 The Orbital Park site, whilst having all of the necessary power supply and infrastructure, has a number of nearby residential properties that would require a higher degree of noise attenuation, and there is no planning history for granting permission for data centres in the area. The Navan site lacked a local 110kV power supply and also was located adjacent to a number of local residential properties requiring a higher degree of noise attenuation. All of the sites have a low local ecological value. Both the Navan and Orbital Park sites are also further from the Operator's existing facilities that would result in a greater inefficiency of the operation and management of its sites. The site in Grange Castle however, has the benefit of being located in a location proximate to the Operator's existing facilities whilst also being located within an established business park where a number of data centres have been permitted.

4.20 It was concluded therefore that the Grange Castle South Business Park site met the highest proportion of the necessary criteria of the candidate sites with particular advantages including:

- Suitable and long standing zoning;
- Permitted and existing data centres in the immediate area;
- Low environmental sensitivity being within a predominantly industrial area;
- Site specifically designed for large scale industrial activities with good water, wastewater and road access;
- Proximity to and availability of suitable power supply via the existing Castlebaggot Substation; and
- Synergistic benefits of locating the proposed facility in relatively close proximity to the Operator's existing data centres around the north and western periphery of Dublin.

4.21 As detailed above, the Proposed Development is a logical addition to the land use pattern of Grange Castle South Business Park as it met the highest proportion of the necessary criteria of the various sites. The site has the required infrastructure available or close to the development site. As detailed in Chapter 2, the proposed temporary substation will require a new temporary MV power connection to the site, which will be subject to a separate planning application.

4.22 A proposed 110kV GIS Substation and 110kv connection from both Kilmahud and from the Castlebaggot substation will be subject to future applications. These applications will be subject to pre-planning application consultations with An Bord Pleanála (ABP), who may consider the works to be Strategic Infrastructure Development requiring their own EIA Report to be made to ABP.

Project size and scale

4.23 A number of alternatives were considered for the scale and size of the Proposed Development. These included a consideration of accommodating three data centre facilities on the site of the same size as Buildings A and C. However, the need to achieve suitable wayleaves along all boundaries; suitable landscape treatment and bunding outside of these wayleaves; and services and facilities required to serve each building, plus the requirement to provide a strong architectural elevation to the Business Park entrance to the south-west led to the need to reduce the scale and size of Building B, and the overall scale and size of the Proposed Development.

Alternatives mitigation

4.24 For each aspect of the environment within Chapters 6 – 16 of this EIA Report, each specialist has considered the existing environment, likely impacts of the Proposed Development and reviewed feasible mitigation measures to identify the most suitable measure appropriate to the environmental setting of the Proposed Development. In making a decision on the most suitable mitigation measure each specialist has considered relevant guidance and legislation (these are identified in the table of mitigation measures in Appendix K). In each case, the specialist has reviewed the possible mitigation measures available and considered the mitigation in terms of the likely residual impact on the environment.

4.25 The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability and significance of effects.

Do-nothing alternative

4.26 The Proposed Development site is not subject to any planning permissions, and given the EE zoning the objective of which is "*To provide for enterprise and employment related uses"* on the site under the South Dublin County Development Plan 2016-2022; and surrounding land uses it is reasonable to assume that if the Proposed Development were not to go ahead that the land would be subject to future development that complied with the zoning.

Table 4.1 Summary of do-nothing environmental impacts

Environmental topic	Summary
Population and human health	No resulting local employment from support services or direct employment. Its zoning means that another form of development is likely to occur on the site that would generate new employment. The population and amenity of the area remains unchanged.
Biodiversity	The site would continue to offer suitable habitat for roosting, commuting and foraging bats, breeding amphibians, nesting birds, wintering birds, feeding and resting mammals and feeding/ commuting otter. The habitats on the Proposed Development site are not currently under any management regime. Rank grassland habitat on the Proposed Development site may become encroached by scrub over time. The spoil and bare ground and artificial surfaces may become recolonised by plant species present in the surrounding landscape. Storm damage may create new PRFs for bats in trees located across the Proposed Development site.
Land, soil, geology and Hydrogeology	The land, soils, geological and hydrogeological environment would not be subject to changes with no soil removal or hardstand cover. The site would remain greenfield, until such time as a similar or alternative development consistent with the land use zoning is granted permission and constructed.
Hydrology	Should the Proposed Development not take place, the site will remain undeveloped and there will be no change to the onsite drainage characteristic and surface water. The site would remain greenfield, until such time as a similar or alternative development consistent with the land use zoning is granted permission and constructed.
Noise and vibration	The existing noise climate will remain unchanged on site and at nearby noise sensitive locations.
Air quality and climate	The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments in the surrounding industrial estates, changes in road traffic, etc).
Landscape and visual impact	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 fields 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.
Traffic and transportation	Background traffic growth and the addition of vehicular traffic related to committed developments (excluding the Proposed Development) are therefore likely to have a long-term slight adverse impact on the operational efficiency of the existing junction assessed.
Cultural heritage	If the Proposed Development were not to proceed, there would be no impact on the archaeological, architectural or cultural heritage resource.
Waste management	There would be no additional construction or operational waste generation at the site until such time as an alternative development consistent with the land use zoning is granted permission and constructed.

4.27 However, the do-nothing alternative in this instance is to leave the site in its predominantly greenfield state with the unoccupied farm buildings that are more fully described in Chapter 3 of this EIA Report. The Do-Nothing scenario has been considered in each chapter of the EIA Report. A summary of this is provided below:

4.28 Should the Proposed Development not take place the land, soils, geological and hydrogeological environment would not be subject to changes with no soil removal or hardstand cover. The site would remain greenfield, until such time as a similar or alternative development consistent with the land use zoning is granted permission and constructed.

Conclusions

4.29 Having undertaken a comprehensive review of all environmental effects on the three sites it was concluded that the Grange Castle provides the most appropriate site for the Proposed Development. Other sites had restrictions in terms of noise, power and precedent for permitting data centre development.

4.30 The Project Design as proposed provides the most appropriate design and layout that maintains boundary wayleaves as well as achieving the required landscaping to boundaries and high quality elevation treatment that faces towards the Grange Castle South Business Park.

4.31 The project technology utilised also provides the most appropriate technology for the Proposed Development. This is an excellent location for the Proposed Development from both an environmental and a planning perspective. The site has all of the required infrastructure readily available resulting in minimal disruption to adjacent site users and nearby sensitive receptors. The site is currently zoned to facilitate enterprise and employment related uses and is therefore in keeping with the policies and objectives of the South Dublin County Development Plan (see Chapter 2 and 4).

4.32 The assessment of the design and location of the stacks and back-up generators in the project design have been considered to minimise environmental effects. The site has the required infrastructure readily available or in close proximity for the development in comparison to alternative sites. This includes the provision of a 110kV GIS Substation within the east of the site to be applied for under a separate application as well as connections to required power supply. As detailed in Chapter 2, a temporary power connection to the site will be facilitated via a proposed temporary substation and underground 20KV connection and cables from the east with the underground cabling outside of the site forming a separate planning application. Alternative routes for this via the west out of the site, and to the south-east of the site were considered but raised a number of other environmental issues, or increased the works required that do not apply to the proposed connection.

4.33 The siting and design of the Proposed Development at an existing greenfield site in Grange Castle South Business Park has been carefully selected based on a consideration of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) and having undertaken a comparison of environmental effects. The Proposed Development will considerably enhance the utilisation of the site. In conclusion it is considered that the proposed site has significant capacity for development and is highly suitable for a data centre use.

5. POPULATION AND HUMAN HEALTH

5.1 This chapter of the EIA Report considers and assesses the *"existence, activities and health of people"* with respect to *"topics which are manifested in the environment such as employment and housing areas, amenities, extended infrastructure or resource utilisation and associated emissions" as set out under the* EPA Draft EIA Report Guidelines 2017. In addition, this chapter assess more broadly the impact of the Proposed Development on the land use of the area, recent trends in population, employment and economic performance, and the community. The assessment also considers the mitigation measures necessary to reduce, and if possible remedy, significant adverse effects on these elements of the environment.

5.2 Population and human health comprise one of the most important elements of the *"environment"*. Any potential impact on the status of the population or human health by the Proposed Development must therefore be assessed. The principal concern is to ensure that human beings experience no significant unacceptable diminution in aspects of *"quality of life"* as a consequence of the construction and operation of the Proposed Development. Relevant components in this section of the EIA Report, include land use, population, employment, and amenity aspects.

5.3 In addition to the impacts on population and human health dealt with under this chapter, the impacts on human beings are also considered in Chapter 9 – Noise and Vibration; Chapter 10 – Air Quality and Climate; and Chapter 11 – Landscape and Visual. The impacts on property are considered in Chapter 16 - Material Assets. The cumulative effect is addressed in Chapter 16 of this EIA Report. Interactions are addressed in Chapter 17 of this EIA Report.

Methodology

5.4 This assessment was undertaken in accordance with the EPA Draft EIA Report Guidelines 2017; and Draft Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA 2015).

5.5 An examination of the following information was undertaken in order to establish the existing land use pattern, location of residences and services. A desktop survey of the west Dublin area as well as an analysis of the local area and its facilities was undertaken. The desktop analysis included a review of background studies and reports; maps and aerial photography of the area; and review of demographic characteristics of the area as ascertained from Census of Population data and other statistics released by the Central Statistics Office (CSO).

Impact assessment rating

5.6 In undertaking the assessment of the impact of the Proposed Development on population and human health the following impact criteria was employed. Both positive and negative impacts are considered and the significance of the impacts rated as imperceptible, slight, moderate, significant and profound as per the EPA Draft EIA Report Guidelines 2017. Table 1.2 in Chapter 1 presents definitions for the impact levels used in this study, as defined by the EPA.

Receiving environment

5.7 This section describes the existing environment with regard to employment, human health and amenity.

Land use

5.8 Land use can have a key impact on population, health and amenity. The Proposed Development is to be located on a site of 16.5 hectares that consists of an unoccupied farmhouse and associated buildings of 0.5ha; a large open field with no sub-division of 15hectares that sits within the Grange Castle South Business Park and at the time of making this application is in the ownership of South Dublin County Council; and a site of c. 1hectare that forms a triangular plot of land to the north-east of the site and is sub-divided from the main part of the site by the Baldonnel Stream.

5.9 The majority of the residential properties bounding the site are no longer in residential use due to the extension of the Grange Castle Business Park and road improvements in recent years. The nearest occupied residential properties are located 230m to the south and 240m to the south-west of the site.

5.10 The area in which the proposed site is located lies within the functional area of South Dublin County Council. Under the Councils Development Plan, a variety of land use objectives are established for the area including specific location objectives for Grange Castle Business Park. Policy ET3 Objective supports the development of high tech development within the Grange Castle Business Park.

5.11 Economic clusters and corridors are geographic concentrations of competing, complementary or interdependent firms and industries that may do business with each other and/or have common needs for talent, technology and infrastructure and rely on the services of other cluster firms in the operation of their business. The areas of Grange Castle and City West (existing established industrial areas) and surrounding areas are cited under section 4.3.3 of the County Development Plan as two particularly important areas for the creation of a cluster of high end economic development based around Foreign Direct Investment manufacturing and support industries. The positive characteristics of these areas is the availability of large plot sizes, infrastructure and heavily landscape corporate park models.

5.12 Grange Castle Business Park and its extension to Grange Castle South Business Park and surrounding lands is already home to several industrial facilities and comprises a number of different land uses (See Figure 5.1). These include the Google data centre and its adjacent predecessor further to the east that are located to the immediate south-east of the site; the under construction CyrusOne data centre that lies on the opposite side of the Grange Castle South access road to the south; and the Microsoft data centre campus within the business park to the immediate north of the Proposed Development site and to the north of the New Nangor Road. Other data centres are located within Grange Castle Business Park (Edgecomnex and Interxion) further to the north and within Profile Park to the east.

5.13 In addition the business park includes two large biotechnology facility campuses – Pfizer Ireland and Takeda Pharma Ireland Ltd.; as well as the Aryzta AG (Cuisine de France) purpose built food facility located some distance to the north-west of the application site.

5.14 The new Castlebaggot Substation lies on lands to the immediate south-east of the application site. Further agricultural lands that are also zoned EE are located to the west of the site and to the east where there is an existing and historical light industrial use abounding the eastern boundary of the site.

5.15 To the north of the application site is the recently realigned New Nangor Road (R134) that connects from the R136 to the east with the R120 to the west and subdivides the Grange Castle Business Park and Grange Castle Business Park South. A small length of the old Nangor Road bounds the site to the north-west and it provided vehicular access to the former farm complex but has now been closed off at both ends.

5.16 The area has excellent transport infrastructure due to its strategic location on the outskirts of the Greater Dublin Area. The Proposed Development site and Business Park lie between the N4 and N7 National Primary Routes and approximately 7km to the west of the M50 motorway.

5.17 The N7 can be accessed by way of the R136 from the New Nangor Road as well as via the Baldonnel Road. The site is also close to the mainline rail connections to the West and South of Ireland, including the new Adamstown commuter railway station (7kms), and planned others, and enjoys easy access to Dublin city centre, Airport and Dublin Port.

5.18 The Proposed Development is situated on suitably EE zoned lands in an industrial area in south-west Dublin. Furthermore, the location will minimise the potential environmental impacts through careful design, master planning and mitigation measures as described in various chapters of this EIA Report. Various other objectives of the County Development Plan as outlined throughout this EIA Report (see Chapter 11) relate to the protection of amenity and townland boundaries.

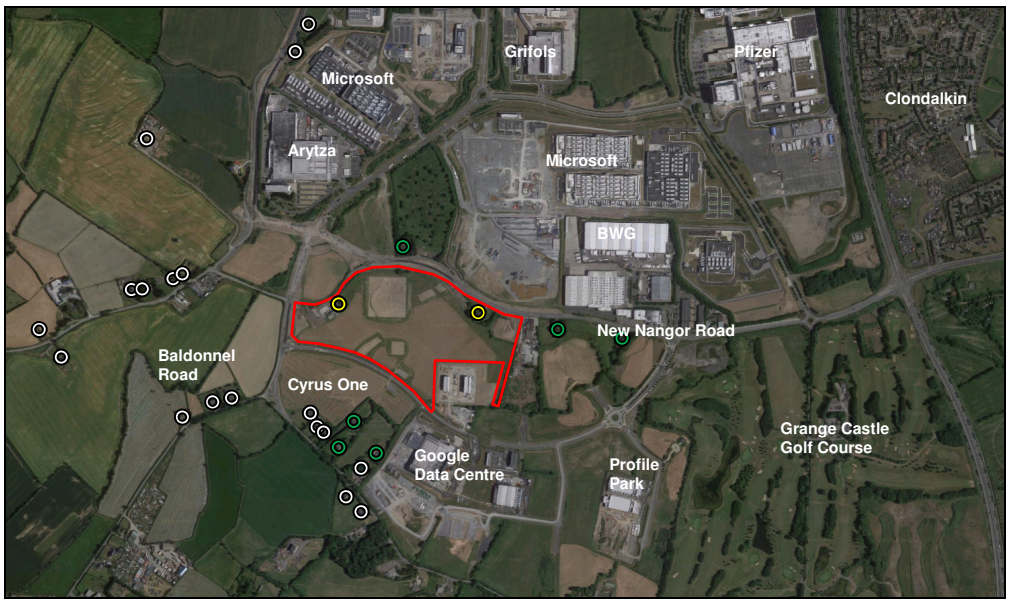

Figure 5.1 Existing land use in vicinity and outside of the subject site (Nearest existing residential properties outlined by white ring; those subject to demolition under this application or already demolished outlined in yellow; and existing properties that have been abandoned outlined in green)

5.19 Specific details of potential impacts in relation to these resources are dealt with in the relevant chapters within this EIA Report. In conclusion it can be stated that the Proposed Development complies fully with the stated requirements of SDCC and will be a strategic asset in the continued economic development and growth of the Dublin area.

Population

5.20 The Proposed Development site is located at the western end of the Clondalkin-Village Electoral Division (ED) which extends from the centre of Clondalkin and is bounded at its western end by the New Nangor Road to the north, and the Baldonnel Road to the west and south. The Clondalkin-Village Electoral Division had a population of 9,152 at the time of the 2016 Census (Central Statistics Office (CSO). This represents a 7.8% increase in population between 2011 and 2016. This followed a small decrease but primarily static population level change between 2006 and 2011 and therefore the population increased by 5.6% over the 2006 to 2016 period. It is notable that there was a lack of substantial new housing development in this area during this period and that the change in population relates more to changes to household composition during this period.

5.21 Electoral Divisions are broken down into smaller areas in 2011 and 2016 to provide a more detailed understanding of local population trends for this immediate area. The Proposed Development site is located within Small Area 2677053001 that had a population of only 257 at the time of the 2016 Census a decline in population of 13 from the 2011 Census. This Small Area excludes almost all of the residential areas of Clondalkin, with the exception of part of the estate of St. Johns off the Fonthill Road South, and primarily covers the employment zoning and wider area to the west of Clondalkin extending from the Fonthill Road South down to the N7 and up to the New Nangor Road and bounded by the Baldonnel Road to the immediate west of the site. The small level of population within this immediate local area makes any conclusions in relation to local population trends to be uncertain.

5.22 The total housing stock in this Small Area was 132, of which vacant households (excluding holiday homes) numbered 17. Apart from part of the St. Johns estate the population in this area is primarily one-off housing. The declining population of this Small Area is indicative of the focus in this area over the last 20 years on employment and enterprise and the increasing policy focus on housing being located on serviced and zoned land within urban areas. A less detailed assessment of population has been undertaken in accordance with the Draft Guidelines (2017).

5.23 The population of the administrative area of South Dublin increased by 12.9% between 2006 and 2016, which is a significantly higher rate in comparison to the population of the Small Area and

Clondalkin Village ED. This broadly reflects population growth that was experienced in Leinster and the State.

Table 5.1 Population levels in the study area in 2006, 2011 and 2016

	2006	2011	2016	% change 2006 - 2016
Small Area 2677053001	n/a	270	257	n/a
Clondalkin-Village ED	8,718	8,492	9,152	+5.6%
South Dublin CC	246,935	265,205	278,767	+12.9%
Leinster	2,295,123	2,504,814	2,634,403	+14.8%
State	4,239,848	4,588,252	4,761,865	+12.3%

5.24 The West Dublin area underwent very high levels of population growth during the early 2000s, although this happened primarily outside of the immediate environs of the application site. This growth, which is more similar to County and Regional levels, is evident in new suburban areas to the north and south that were constructed around the western fringes of Dublin during this period. The very small population increase within the ED is indicative of the fact that there is very little undeveloped residentially zoned land within the ED and that the western part of the ED is covered by the Grange Castle Business Park and similarly zoned land for employment based development.

Employment

5.25 The economic conditions in Ireland that stemmed from 2008 resulted in higher unemployment levels over the following six years although this has decreased subsequently, up until the recent Coronavirus outbreak. The number of persons on the Live Register of unemployment fell in the State from 428,876 in February 2013 to 356,112 in December 2014 and has subsequently dropped to 119,900 in February 2020. The Coronavirus pandemic has resulted in a significant and sudden increase in unemployment. The long term implications on employment across the State and in Dublin at the time of making the application are unclear.

Table 5.2 At work by industry type 2006, 2011 and 2016 (source: CSO, 2006, 2011 and 2016)

	Year	Clondalkin-Village ED	Clondalkin Local Electoral Area
Agriculture	2006	18	58
	2011	8	78
	2016	4	65
Construction	2006	408	1,677
	2011	177	1,034
	2016	235	1,283
Manufacturing	2006	659	2,513
	2011	418	2,343
	2016	434	2,280
Commerce	2006	1,488	6,234
	2011	1,099	6,144
	2016	1,133	6,065
Transport	2006	396	1,295
	2011	450	2,383
	2016	481	2,434
Public administration	2006	263	1,050
	2011	251	1,316
	2016	257	1,184
Professional services	2006	500	2,334
	2011	751	4,552
	2016	831	4,778
Other	2006	790	3,508
	2011	588	3,949
	2016	909	5,064
Total at work	**2006**	**4,523**	**18,669**
	2011	**3,742**	**21,799**
	2016	**4,289**	**23,153**

Note: The Clondalkin Local Electoral Area extends across a far wider area that includes Saggart, Rathcoole to the south; and all of Clondalkin, Ronanstown and part of Lucan to the north and east.

5.26 The number of persons on the Live Register of unemployment fell in Dublin from 102,591 in February 2013, and has continued to decrease since then, with some seasonal fluctuations, and was 57,284 in February 2018; and had dropped to 44,218 in February 2020. The 2016 Census figures demonstrate that a similar decrease in unemployment has occurred within the Clondalkin-Village ED and Clondalkin Local Electoral Area.

5.27 The changes in persons in work, labour force and unemployed within the wider study area as outlined in Table 5.2 is indicative of the change in the economic circumstance that has been experienced across the State since 2008, and the significant improvements over the last seven years. It is notable however that the increase in unemployment was significantly more marked within the wider local area, although this may have been rectified in the three and a half years since the most recent Census although the Coronavirus pandemic will have significantly altered this.

5.28 In relation to employment type the CSO Clondalkin-Village ED figures for 2006, 2011 and 2016 indicate that employment particularly in construction, manufacturing, and commerce (which includes retailing) have significantly reduced during the Census period 2006 to 2011 but had begun to increase or stabilise since prior to the Coronavirus pandemic. It is also notable that employment in transport related activities have increased during each Censal period; and that professional services increased during the same period to 2011 and have continues to rise. It is notable that the numbers in work within the wider local area decreased between 2006 and 2011 and have subsequently increased again to 2016. This trend continued since the last Census of 2016, based on the continuing decrease in the number of people on the Live Register up until March 2020, but is likely to have increased subsequently as a result of the pandemic.

Community facilities and amenity

5.29 The Proposed Development will be located on the periphery of a largely built up urban area where industrial activities are the main land use. Tourism is not a major industry in the immediate environs of the site. The wider area does contain a small number of hotels and other tourist accommodation (B&B's etc.) which generally increases towards the east in the direction of Dublin city and its many tourist sites. The Grange Castle Golf Club lies to the east of the Google data centre off the New Nangor Road (R134) and some 440m from the eastern boundary of the application site. The Newcastle Golf Centre lies some 830m to the west.

5.30 In terms of landscape amenity, SDCC recognise that the landscape, natural heritage and amenities of South Dublin have an important role to play in contributing to a high quality of life for residents and a positive experience for visitors. The primary area of landscape amenity is the Grand Canal that is located some 1.2km to the north of the site. This is both recognised by SDCC and Waterways Ireland and other organisations in that it provides a key amenity link between the city centre and the suburbs and beyond. The impact on this tourism and amenity resource has been considered as part of the assessment under this chapter. Further discussion of impact on landscape amenity is presented in Chapter 11 Landscape and Visual.

5.31 Residential development is primarily located to the west and south of the site (see Figure 5.1). There is one existing but now unoccupied / vacant dwelling within the site, a farmhouse that is proposed to be demolished as part of the development and sits at the north-western periphery of the site. A further dwelling was located in the north-eastern part of the site but has already been demolished as part of the road improvements to the R134. Former residential properties that are vacant and abandoned lie to the immediate north, south and east of the site. An abandoned property is the closest property to the site some 40m to the north of the New Nangor Road. Two further abandoned properties lie 126m and 315m to the east of the site on the southern side of the New Nangor Road. These properties have become abandoned as a result of the expansion of the Grange Castle Business Park and the sale of the properties and their surrounding lands to facilitate future development.

5.32 The nearest three occupied residential properties are located due south and bounding the north side of the Baldonnel Road, and to the immediate south of the Cyrus One development. The nearest of these properties is located some 230m from the southern boundary of the site. Four other residential properties to the east of these are within the Cyrus One site of which one is to be demolished as part of the permission granted to Cyrus One for the development of the land (Erganagh). Two of the

others are unoccupied and the residential use abandoned. One other property (Weston House) remains occupied. There is further residential development in the form of ribbon development along the Baldonnel Road to the south with the nearest property being 370m from the southern boundary of the site.

5.33 A group of three occupied residential properties are located on Aylmer Road to the south-west of the main data centre development. The nearest of these properties is located some 240m from the south-west corner of the site.

5.34 A further 4 no. occupied residential properties are located to the north-west on the R120 with the nearest being 380m away from the Proposed Development. Further residential properties in the form of ribbon development is located to the west of these. A travellers site is located to the north of these some 760m away from the Proposed Development site, and set well back to the west of the R120. Further residential properties lie to the east of the R120 as it heads towards the Grand Canal. The nearest occupied property to the east lies beyond the R136 some 1.25km away from the Proposed Development. The nearest occupied property to the north of the Proposed Development lies adjacent to the Grand Canal some 1.2kms away.

5.35 The western edges of Clondalkin are located some 1.3kms to the east. The extended Clonburris SDZ and other residentially zoned land extend down to the immediate north of the Grand Canal a significant distance some 1.3kms to the north.

5.36 The population in the surrounding areas of Clondalkin, Newcastle, Lucan, Tallaght and Rathcoole is serviced by junior and secondary schools. The nearest schools are located in Newcastle some 4kms to the south-west; in Adamstown some 2kms to the north; and to the east of the R136 in Clondalkin some 1.6kms to the east. Childcare facilities are similarly distribute with the exception of a crèche at Castlebaggot House that is set-back off the Baldonnel Road some 640m to the south.

5.37 The nearest hospital to the facility is located some 5.9kms away at the Adelaide and Meath Hospital incorporating the National Children's Hospital, Tallaght, Dublin 24. The Peamount Healthcare facility sits some 1.2km to the west. The nearest Garda station is 3.8kms away in Rathcoole and nearest fire station is 4.3kms at Belgard Road, Tallaght, Dublin 24.

5.38 Local and regional bus services connect the local and wider area with Dublin city centre. The Dublin to Cork mainline railway passes to the north of the canal. A new station at Adamstown and at Fonthill provide a new commuter service into the city centre. Details on public transport provision is provided under Chapter 13 of the EIA Report.

5.39 Land use outside of the developing employment zones to the wider north, and immediate east and south is primarily in agricultural use despite its EE zoning. Land zoned RU that provides for the protection of rural amenity is located further to the south and south-west. The Casement Air base and its associated buildings bound the Baldonnel Road some 1.1km to the south-east of the application site.

Description of the Proposed Development

5.40 The Proposed Development is to develop 3 no. two-storey data centres with associated other prefabricated containerised electrical rooms, MV room, security hut, sprinkler room and temporary substation with a gross floor area of 80,269sqm. The proposed data centres are referred to as Buildings A, B and C.

5.41 The Proposed Development is to seek permission for a period of ten years for a development that consists of various works that can be summarised as follows:

- Demolition of abandoned dwelling and associated buildings known as Ballybane, Old Nangor Road, Clondalkin, Dublin 22;
- Construction of three no. two storey data centre buildings (Buildings A, B and C) with mezzanine floors at each level with a gross floor area of 78,871sqm;
- 1 no. two storey data centre (Building A) that will be located to the south-west of the site and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues

that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the northern end of each emergency generator that will measure 20m in height;

- 1 no. two storey data centre (Building B) that will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. The facility will also include 18 no. ventilation shafts that will be located above the southern end of each emergency generator that will measure 20m in height;
- 1 no. two storey data centre (Building C) that will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 25m in height. The facility will also include 26 no. ventilation shafts that will be located above the western end of each emergency generator that will measure 20m in height;
- Each of the three data centres will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each data centre will also include a diesel tank and a refuelling area to serve the proposed emergency generators;
- The overall height of each data centre apart from the flues and plant at roof level is c. 19.85m above the finished floor level;
- 1 no. temporary and single storey substation (29sqm);
- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity from the Substations to each data centre and are located to the immediate west of the generator compound within Buildings A and B, and to the south of the generator compound within Building C;
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation.
- Ancillary site development works, that will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces, and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west; and
- The development will be accessed from the Grange Castle South Access Road from the south via the Baldonnel Road.

5.42 It is proposed to provide temporary power supply to the site via a new MV connection, which will be subject to a separate planning application. It is proposed to provide permanent power supply to the site via a new two storey 110kV GIS Substation with associated transformer compound to the east of the overall site. These works and its cable connections to the existing Castlebaggot Substation to the immediate south-east and the Kilmahud Substation to the north will be subject to separate applications.

Potential impacts of the Proposed Development

Construction phase

5.43 The construction of the Proposed Development will be phased over several years. It will result in the creation of a construction site in a single stand-alone site that will have a potential short to medium term negative impact on the immediate local environment, the amenity of existing residents, the amenity of recreational / sport facilities, and workers within nearby facilities. This will primarily occur during the main 10-12 month construction periods of each data centre.

5.44 The construction of Building A will occur over an initial 10-12 month construction period between Q3 2020 to Q2 2021. Subsequent works will be internal and phased over two years from Q2 2021 to Q1 2024. The construction of Building B will occur over an initial 10-12 month construction period from

Q2 2023 to Q1 2024 as Building A data rooms near completion in circa. Q2 2023 and will last. Subsequent works within Building B will be internal and phased over two years.

5.45 The construction of Building C will occur over an initial 10-12 month construction period from Q1 2026 to Q4 2026 as Building B data rooms near completion in circa. Q4 2026. Subsequent works within Building C will be internal and phased over two years.

5.46 The following temporary local impacts during the construction phase have the potential to affect the local population and amenity:

- increased vehicular traffic;
- increased noise, dirt and dust generation; and
- increased employment opportunities.

5.47 While temporary inconvenience may be caused to the existing population and amenity in the area, these impacts will be limited to the construction period. The population with greatest potential for impact are those to the immediate south and south-west. The impact will be less where there is no construction traffic utilising the road such as along the Baldonnel Road and the Aylmer road to the west. The former residential properties to the east and to the north of the site will now not be affected by the Proposed Development during construction as they have been abandoned.

5.48 There will be ongoing noise disturbance as a result of construction traffic and other activity throughout the construction process. The construction phase therefore is considered likely to have a ***slight*** but ***short to medium term negative impact*** during the eight year construction period on the immediate local population and amenity of the area.

5.49 The Proposed Development will not result in any change to the permanent population of the area during the construction phase.

5.50 There is potential for a resultant increase in the temporary population of the area as a result of the employment of workers from outside the wider Dublin area that may choose to reside in the immediate and wider local area during the construction period. This is likely to amount to only a small percentage of the workforce employed during the construction phase but will result in some additional trade for local accommodation and services.

5.51 It is expected that the majority of the work force will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. However, some local employment from within the wider local area is expected. The potential for this is increased due to the eight year construction process.

5.52 The main construction phases of the Proposed Development will each take approximately 10-12 months, and will generate construction employment directly on-site, and 250 on average to a maximum of 400 during the main construction phases of development. Subsequent works will be internal and phased over two years.

5.53 Construction will benefit support industries such as building suppliers and local services. There will also be a need to bring in specialist workers on a regular basis that may increase the above estimated working population at times. Specialists are only likely to stay for shorter periods depending on the nature of the work. The construction phase therefore is considered to have the potential to have a ***moderate short to medium term positive impact*** on the economy and employment of the local and wider area.

5.54 There are many potential health and safety risks arising from the construction phase due to the use of large, mobile machinery and heavy equipment and materials. Mitigation measures which will be taken to reduce these risks are described on the following page.

5.55 Local community facilities are likely to be used more regularly as a result of the temporary working population resident in the local area. The impact on such facilities is likely to be ***imperceptible***.

5.56 Human health has the potential to be impacted by the construction process as a result of dust and other air pollutants even on a short-term perspective. This is outlined in more detail within Chapter 10 (Air Quality and Climate).

5.57 The application of limits on noise and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. In addition, due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be negligible. Therefore, the noise and vibration impact of the construction phase of the Proposed Development is likely to be ***temporary to short-term*** and ***slightly negative*** with respect to human health because of the temporary short-term of such impacts during the construction phase.

Operational phase

5.58 The nature of the proposed land use will facilitate the creation of a more intensive use of these lands that are currently primarily greenfield and the site of one abandoned residential dwelling. The greenfield part of the site that forms the focus of the majority of this application is located within the Grange Castle South Business Park and its associated infrastructure. The Proposed Development will not result in a material increase in the permanent population of the area.

5.59 The development will help to sustain 300 jobs that will be spread across the three shift operating times of the development with the majority (c. 50%) working during the day shifts of the office space and data centre. Some of the staff may move into the local area to be closer to their place of employment and therefore increasing the demand for housing within the wider local area. The facility will also attract a significant level of additional support services and therefore employers and employees into the area. In this regard, the development has the potential to generate some local employment through support services.

5.60 Mitigation design measures will ensure that the Proposed Development has been designed to the highest standard with safety as a key priority so there will be little risk of fires or other related events that may impact upon human health.

5.61 There are a range of local amenities in the area that include the Grange Castle Golf Course as well as other golfing facilities. The Grand Canal Way that is used for boating, fishing and walking as well as being an important ecological resource and habitat is some 1.3km away and therefore there is little potential to impact this in any meaningful way.

5.62 The Proposed Development has the potential to have a long-term and negative impact on the amenity of the residential dwellings to the south and south-west of the site. The increased planting and the separation distances to residential dwellings, as well as noise attenuation and overall master planning of the site, will ensure that the development will not have a negative impact on the amenity of the area or local residents and therefore not be detrimental to human health.

5.63 The 2014 EIA Directive, 2018 EIA Regulations and associated EPA Draft EIA Report Guidelines 2017 require that the vulnerability of the project to major accidents and/or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.) is considered in the EIA Report. The site has been assessed in relation to the following external natural disasters; landslides, seismic activity, volcanic activity and sea level rise/flooding as outlined below. The potential for major accidents to occur at the facility has also been considered with reference to Seveso/Control of Major Accident Hazards (COMAH) Regulations. There is a negligible risk of landslides occurring at the site and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the site. There are no active volcanoes in Ireland so there is no risk of volcanic activity.

5.64 The potential risk of flooding on the site was also assessed. A Stage 1 Flood Risk Assessment was carried out and it was concluded that the development is not at risk of flooding. Furthermore, the Proposed Development design has adequate attenuation etc. to ensure there is no potential impact on flood risk for other neighbouring properties. Nor is the site at risk from sea level rise.

5.65 The Proposed Development will not be a Seveso/COMAH facility. The only substance stored on site controlled under Seveso/COMAH will be diesel for generators and the amounts proposed do not

exceed the relevant thresholds of the Seveso Directive. There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapter 7 (Land, Soils, Geology and Hydrogeology) and Chapter 8 (Hydrology) of the EIA Report will ensure the risk of a minor/accident is low and that the residual effect on the environment is imperceptible.

5.66 The Proposed Development will require additional electrical power supply from the national grid and the requirements for this supply have been detailed in Chapter 15 (Material Assets). The utility provider has provided confirmation that there is sufficient capacity in the area network for the required power demand. The implementation of mitigation measures outlined in Chapter 15 will ensure there will be no impact on power supply to local residential or business users.

5.67 As detailed in Chapter 9, noise modelling was undertaken to assess the impact of the Proposed Development of the site with reference to noise limits typically applied by SDCC and the EPA. As demonstrated by the modelling results, the predicted noise emissions associated with the Proposed Development of the site during the operational phases are compliant with the adopted noise limit values which are based with due consideration of the effect on human health. Furthermore, any change in noise levels associated with additional vehicles at road junctions in the vicinity of the Proposed Development is expected to be imperceptible. In essence, the noise levels that are encountered at the nearest noise sensitive locations are predicted to be within relevant noise criteria that have been adopted here for the operation of the proposed data centre and associated infrastructure. These criteria have been selected with due consideration to human health, therefore, will not result in a significant impact on human health. The Proposed Development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

Mitigation and remedial measures

Construction phase

5.68 The Proposed Development does not have the potential to result in any significant negative impacts on population and community during the course of construction. Any perceived negative impacts on the immediate local population will be short-term and temporary in nature due to the 10-12 month main construction process for each building. No remedial or reductive measures are therefore required beyond normal landscaping, noise and construction mitigation that are outlined elsewhere within this EIA Report and should form a condition of permission.

5.69 In accordance with the Safety, Health, and Welfare at Work (Construction) Regulations, a safety management system will be put in place on-site to minimise any risks to both construction personnel and site visitors. The site will not be accessible to the public and will have strict procedures in place for allowing entrance to visitors and contractors.

5.70 Traffic mitigation measures proposed to reduce the impact of additional traffic movements to and from the development are set out under Chapter 13 of the EIA Report. Mitigation measures proposed to minimise the potential impacts on human health in terms of noise and vibration are discussed in Chapter 10 of the EIA Report.

5.71 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 to medium term and imperceptible*** with respect to human health.

5.72 ***No adverse impacts*** relating to employment are predicted during the construction phase. Impacts on employment will be ***positive if only slight*** within the immediate local area. Therefore no remedial or reductive measures are considered necessary.

Operational phase

5.73 No remedial or mitigation measures are considered necessary, beyond the landscaping proposed and detailed in chapter 11 of this EIA Report; as well as Traffic, Air Quality and noise mitigation, as the Proposed Development will not give rise to any adverse impacts on population, and amenity nor human health during the operational phase of the Proposed Development. The development will result in the creation of a significant number of new jobs especially in service activities and creation of some local jobs. This is considered a ***slight permanent positive impact*** of the Proposed Development. No remedial or reductive measures are therefore required.

Residual impacts

Construction phase

5.74 The construction phase of the Proposed Development will result in the creation of a large construction site that will have a short to medium term and slight negative impact on the immediate local environment and the amenity of existing residents as a result of noise and disturbance during construction. The nearest residences at 230m and 240m away will have ongoing noise disturbance as a result of construction activity and traffic throughout the construction process. This has been mitigated by ensuring that all construction traffic approaches the development site along the R120 and R134 (New Nangor Road).

5.75 The construction phase of the development therefore is considered likely to have a ***slight*** but ***short to medium term slight negative impact*** on the local community, human health and population.

5.76 The Proposed Development will not result in any material change to the permanent population of the area during the construction phase. There will be an increase in the temporary population of the area as a result of the employment of workers from outside the wider Dublin area that may need to reside in the immediate local area during the construction process. This will amount to only a small percentage of the workforce employed during the construction phases of the scheme but will result in some additional trade for local accommodation and services.

5.77 The majority of the work force will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. However, some local employment from within the wider local area is expected.

5.78 The total on-site construction phase of the development will be approximately 8 years. During the phased development of the construction of each data centre that will each be some 10-12 months in length, it is expected that up to 400 construction workers will be on site at the construction peak with an average of 250 during this main phase of construction. This is likely to benefit suitably qualified members of the local community, as well as others. The development will also support job creation in associated sectors such as building supply and local services.

5.79 Community facilities will be used more regularly as a result of the temporary working population resident in the local area. The construction phase therefore is predicted to have a ***slight short to medium term positive impact*** on the economy and employment of the area but a ***short to medium term slight negative impact*** on the local community and amenity of the area.

Operational phase

5.80 The operation of the proposed facility will be carried out in strict accordance with all Irish and European regulations governing safety in the work place with specific regard to the regulations implemented under the Safety, Health & Welfare at Work Act, 2005.

5.81 The Proposed Development will facilitate the creation of a more intensive use for the lands that are primarily within the Grange Castle South Business Park. The Proposed Development will upon completion sustain in the region of 300 workers. Based on the social class profile of the local community, a small number of the local population in the hinterland of the Proposed Development site are predicted to benefit from the new employment, which will be created. This is a ***slight and long-term positive impact***. Some additional employment will also be created in support services including building maintenance, cleaning and catering services.

Do-nothing scenario

5.82 The failure of the Proposed Development to proceed will mean that there would be no resulting local employment from support services or direct employment. Its zoning means that another form of development is likely to occur on the site that would generate new employment. Failure of the current proposal to proceed will mean that the population and amenity of the area remains unchanged. In these circumstances no further consideration of this scenario is necessary in respect of community, employment or population issues.

Monitoring

5.83 No monitoring is required.

6. BIODIVERSITY

6.1 Scott Cawley Ltd. was commissioned to undertake an assessment of impacts on biodiversity (flora and fauna) of a proposed development in Grange Castle Business Park South, Co. Dublin (Central Grid Reference O 03206 30881). The aims of this assessment were to:

- establish baseline ecological data for the Proposed Development site;
- determine the ecological value of the identified ecological features;
- assess the impact of the Proposed Development on ecological features of value (flora and fauna);
- apply mitigation measures to avoid, reduce, remedy or compensate impacts; and
- identify any residual impacts after mitigation.

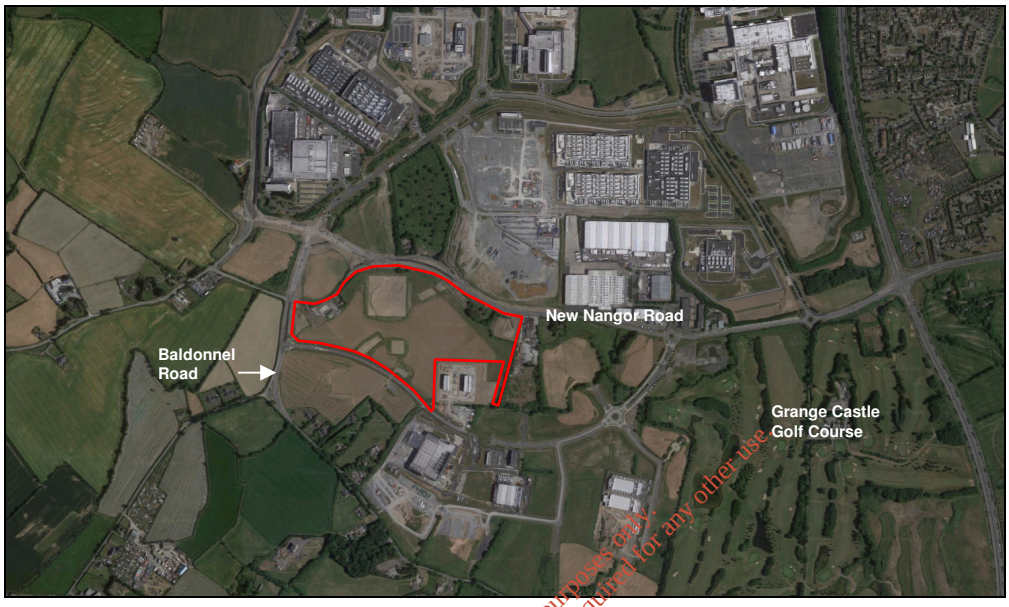

Figure 6.1 Proposed development site in the context of its surroundings

Methodology

Relevant legislation, policy and guidelines

6.2 The assessment of the likely impacts of the Proposed Development on ecological resources has considered legislation, policy documents, and guidelines outlined in Appendix C of this report, where relevant.

Desk study

6.3 In addition to those listed in the reference section, the following resources assisted in the production of this report:

- Ordnance Survey Ireland (OSI) mapping and aerial photography available from OSI online GeoHive mapping resource. Available from http://map.geohive.ie/mapviewer.html;
- Data on protected species and European sites, available for download and interrogation from the National Parks and Wildlife Service (NPWS) maps and data page. Available from https://www.npws.ie/protected-sites;
- Spatial information relevant to the planning process including land zoning and planning applications from Department of Housing Planning, Community and Local Government web map portal. Available from https://myplan.ie/;
- Data on waterbodies, available for download and interrogation from the Environmental Protection Agency (EPA) web map service. Available from https://gis.epa.ie/EPAMaps/;
- Information on soils, geology and hydrogeology in the area available for download and interrogation from the Geological Survey Ireland (GSI) online Spatial Resources service. Available from https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx;
- Information on the location, nature and design of the Proposed Development supplied by the applicant's design team; and,

- Information on the conservation status of birds in Ireland[1].

Consultation

6.4 The National Parks and Wildlife Service was contacted on 15th January 2020 and a response received on 2nd April 2020. All recommendations made in relation to nature conservation have been taken into account in the production of this Chapter.

Field survey methodology

Habitats and flora survey

6.5 The Proposed Development site was first surveyed for habitats on 28th July 2019 and reviewed again on 14th January 2020 to capture any changes to the environment of the Proposed Development site that may have occurred. Surveys were undertaken by Laura Higgins who holds a first class honours degree in Zoology from Trinity College Dublin, is an experienced Ecological Consultant with Scott Cawley Ltd. having undertaken a wide range of ecological surveys and assessments, All habitats were classified using the Guide to Habitats in Ireland[2], recording dominant species, indicator species and/or species of conservation interest; with the Fossitt category codes given in parentheses. Plant nomenclature follows the BSBI's List of Accepted Plant Names[3].

Fauna survey

6.6 A general fauna survey was carried out concurrently with the habitat survey on 28th July 2019 when faun are most active. Further fauna details were noted during the winter bird survey as detailed below. Terrestrial mammals were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats on site were assessed for signs of usage by protected/red-listed fauna species, and potential to support these species.

Bird surveys

6.7 Breeding bird surveys were undertaken on 11th June and 28th June 2019. Methodology followed an adapted version of the Breeding Bird Survey (BBS) methodology as detailed in Gilbert et al. (1998)[4]. A walkover route was undertaken which covered the site and a representation of each habitat type within the Proposed Development site. All bird species seen or heard within the site (including those flying overhead) were recorded and their location and activity noted onto suitably scaled maps.

6.8 Wintering bird surveys were carried out on a fortnightly basis from September - December 2019, the dates the surveys were undertaken are as follows: 26th September; 9th October; 23rd October; 8th November; 19th November; and 3rd December. Methodology followed best practice and prevailing guidance as set out in RSPB Bird Monitoring Methods (Gilbert et al. 1998). A similar walkover route used for the BBS surveys was walked and all bird species seen or heard within the site were recorded, location and activity was noted onto suitably scaled maps.

6.9 Target species for bird surveys included species listed on Annex 1 of the EU Birds Directive, species listed as Amber and Red in the Birds of Conservation Concern in Ireland 2014-2019, and species protected under the fourth schedule of the Wildlife Acts 1976-2018.

Bat surveys

6.10 Internal and external inspections of the buildings and external inspections of the trees within the Proposed Development site were carried out on 28th July 2019 and follow up inspections were carried out on 14th February 2020. The inspections involved a search for evidence of bats including the following signs:

[1] Colhoun, K. and Cummins, S. (2013). *Birds of Conservation Concern in Ireland.* Irish Birds 9: 523-544.
[2] Fossitt, A. (2000). *A Guide to Habitats in Ireland.* The Heritage Council, October 2000.
[3] BSBI (2007). *BSBI's List of Accepted Plant Names.* Available online at www.bsbi.org.
[4] Gilbert et al. (1998). Bird Monitoring Methods. Bedfordshire: The Royal Society for the Protection of Birds.

- Dead specimens;
- Bat droppings;
- Urine splashes;
- Fur-oil staining;
- Squeaking noises;
- Feeding remains (moth wings);
- Bat-fly (Nycteribiid) pupal cases; and/or,
- Odour.

6.11 Trees were visually inspected externally for potential roosting features (PRFs) such as dense ivy cover, splits in bark and knotholes.

6.12 The assessment criteria outlined in Table 6.1 below are derived from Collins (2016)[5], and are used for the assessment of the site in terms of its suitability for commuting and foraging bats, and where relevant, the suitability of roosting habitats for bats.

Table 6.1 Assessment criteria for potential suitability of proposed development sites for bats, derived from similar criteria in Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

Suitability	Description of Roosting Habitat	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting or foraging bats
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[6] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed)	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats in a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub, hedgerows. Linked back gardens, river valleys, streams and woodland edge. Habitat that is connected to the wider landscape that could be used by foraging bats such as trees scrub, grassland or water. Site is close to and connected to a known roost.

6.13 Bat emergence/ re-entry surveys of the farm buildings onsite were undertaken on 17th July and 31st July 2019. Two surveyors carried out one bat emergence survey and one bat re-entry survey of the old farmhouse and associated outbuildings on the Proposed Development site, with the aim of identifying presence / absence of roosting bats. The dawn re-entry survey was undertaken on 17th July 2019 and was carried out from 2 hours before sunrise until 15 minutes after. The dusk

[5] Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.
[6] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

emergence survey was undertaken on 31st July 2019 from 15 minutes before sunset but was ended 50 minutes after sunset due to a security issue on site. See Table 6.2 for details of the surveys.

Table 6.2 Time and weather data from the bat survey in 2019

Data	Dawn survey: 17th July 2019	Dusk survey: 31st July 2019
Sunrise/ Sunset time	05:19	21:22
Start time	03:19	21:05
Finish time	05:34	22:15
Weather conditions	Mild, dry, calm	Mild, dry, calm

Ecological evaluation and impact assessment methodology

Site evaluation criteria

6.14 The criteria used to assess the ecological value (Appendix C.2) and significance of habitats follows *Guidelines for assessment of Ecological Impacts of National Road Schemes* (NRA, 2009) as they are an Irish based methodology for assessment that is consistent with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (CIEEM, 2019). This provides the most appropriate criteria for assessment of ecological value.

Impact assessment criteria

6.15 In accordance with the NRA guidelines (2009), impact assessment is only undertaken of '*Key Ecological Receptors*' (KERs). KERs are within the zone of influence[7] of the development and are '*both of sufficient value to be material in decision making and likely to be affected significantly*'. To qualify as KERs, features must be of local importance (higher value) or higher as per the criteria in Appendix C.2. Features of lower ecological value are not assessed. The highest levels of impact significance for each Sensitive Ecological Receptor 'value' rating is shown in Table 6.3

Table 6.3 Maximum level of impact significance for Sensitive Ecological Receptors

Sensitive Ecological Receptor 'value' rating	Highest possible significance level
International Importance	Significant Positive/ Negative impact at International level
National Importance	Significant Positive/ Negative impact at National level
County Importance	Significant Positive/ Negative impact at County level
Local Importance (higher value)	Significant Positive/ Negative impact at Local level

Limitations / data deficiencies

6.16 Bat activity surveys of the Proposed Development site to identify bat activity across the Proposed Development site were not carried out due to health and safety/security concerns caused by illegal activity on the site when the surveyors were on site. As such bat activity across the entire Proposed Development site was not recorded, however bat emergence/ re-entry surveys were carried out on the buildings on site and an assessment of habitat suitability for bats within the Proposed Development site was undertaken. No other potential limitations were identified during the field surveys or desk data collection.

Receiving environment

Land use zoning

6.17 According to the South Dublin County Development Plan 2016-2022 the Proposed Development site is currently zoned as 'EE- Enterprise and Employment' with the objective '*To provide for enterprise and employment related uses*'. The immediately surrounding lands are located within Grange Castle

[7] In accordance with NRA (2009) Guidelines, the Zone of Influence is an important term to define the receiving environment for the activities associated with the project and the biophysical changes that are likely to occur. The Zone of Influence is the 'effect area' over which change is likely to occur. This differs for different species and habitats due to varying sensitivities to potential impacts.

Business Park and are also zoned as 'EE- Enterprise and Employment'. Lands in the vicinity of the Proposed Development site to the south and west are zoned as 'RU- Rural and Agriculture'. Grange Castle Golf Club is located to the east and south-east of the Proposed Development site and is zoned as 'OS- Open Space' with the objective '*To preserve and provide for open space and recreational amenities*'.

Designated sites

6.18 Special Areas of Conservation (SACs) are designated under the EC Habitats Directive (92/43/EEC), which is transposed into Irish law through a variety of legislation including the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011) and the Planning and Development Acts 2000-2019. The legislation enables the protection of certain habitats (listed on Annex I of the Directive) and/or species (listed on Annex II). Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC) that has been transposed into Irish Law under the Birds and Habitats Regulations. This allows for the protection of protected bird species listed on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and areas of international importance for migratory birds.

6.19 National Heritage Areas (NHAs) are designations under the Wildlife Acts in order to protect habitats, species or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning legislation which requires that planning authorities give recognition to their ecological value (generally via County Development Plans).

6.20 The Proposed Development site is not designated as a SAC, SPA, NHA, or pNHA, however, it is located upstream of European designated sites in Dublin Bay. For this reason, European and nationally designated sites have been considered as KERs for the Proposed Development.

6.21 There are no European sites within the Proposed Development boundary. The nearest European site to the Proposed Development is the Rye Water Valley/ Carton SAC; c. 5.2km north-west. A tributary of the Griffeen River flows east-west through the Proposed Development site and connects it to European sites in Dublin Bay c. 15.5km to the east via the surface water network. The following European sites are located in Dublin Bay: North Dublin Bay SAC, South Dublin Bay SAC, North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA.

6.22 A list of European and nationally designated sites within the vicinity of the Proposed Development, along with their qualifying interests or reasons for designation, are included in Appendix C.3. The locations of these designated sites in relation to the Proposed Development are illustrated in Figure 6.2 and 6.3. Sites shown on Figures 6.2 and 6.3 and not listed in Appendix C.3 are considered to fall well outside the zone of influence of the Proposed Development due to the lack of source-pathway-receptor links that would occur between the Proposed Development site and these other sites.

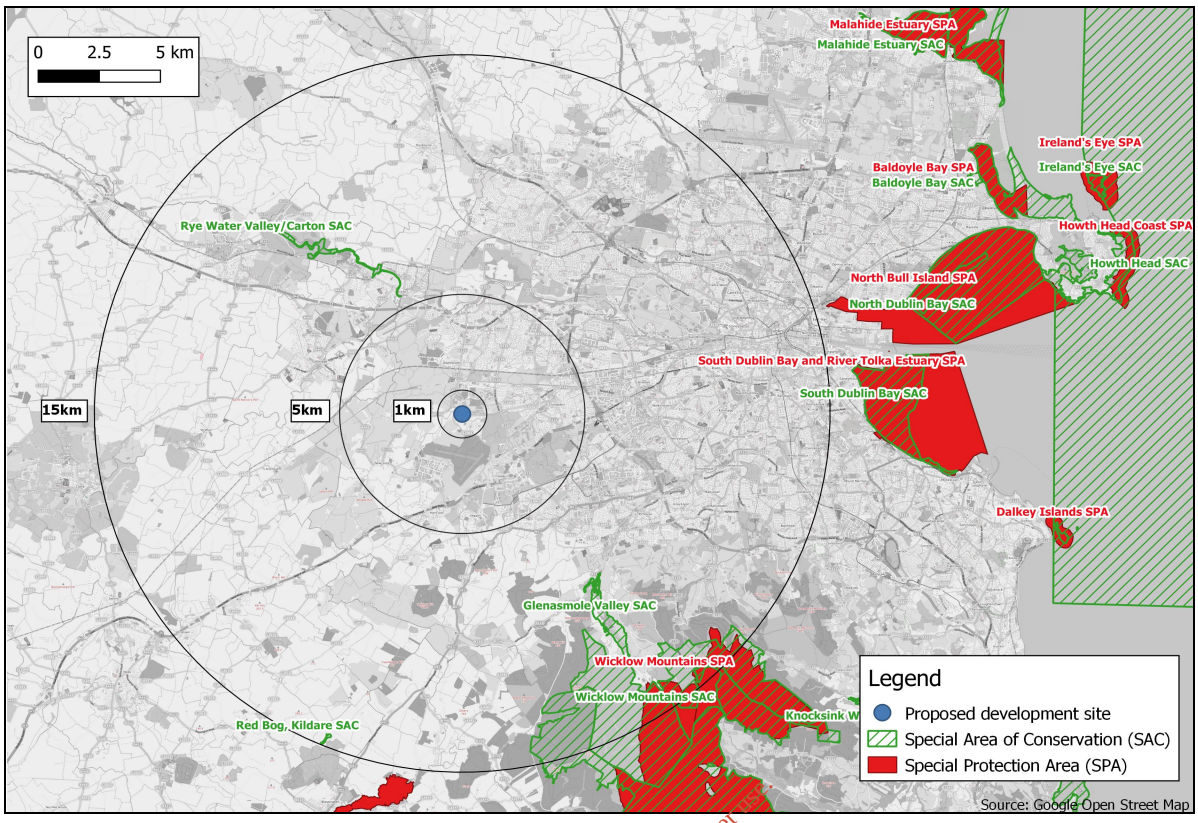

Figure 6.2 European sites in the vicinity of the Proposed Development site

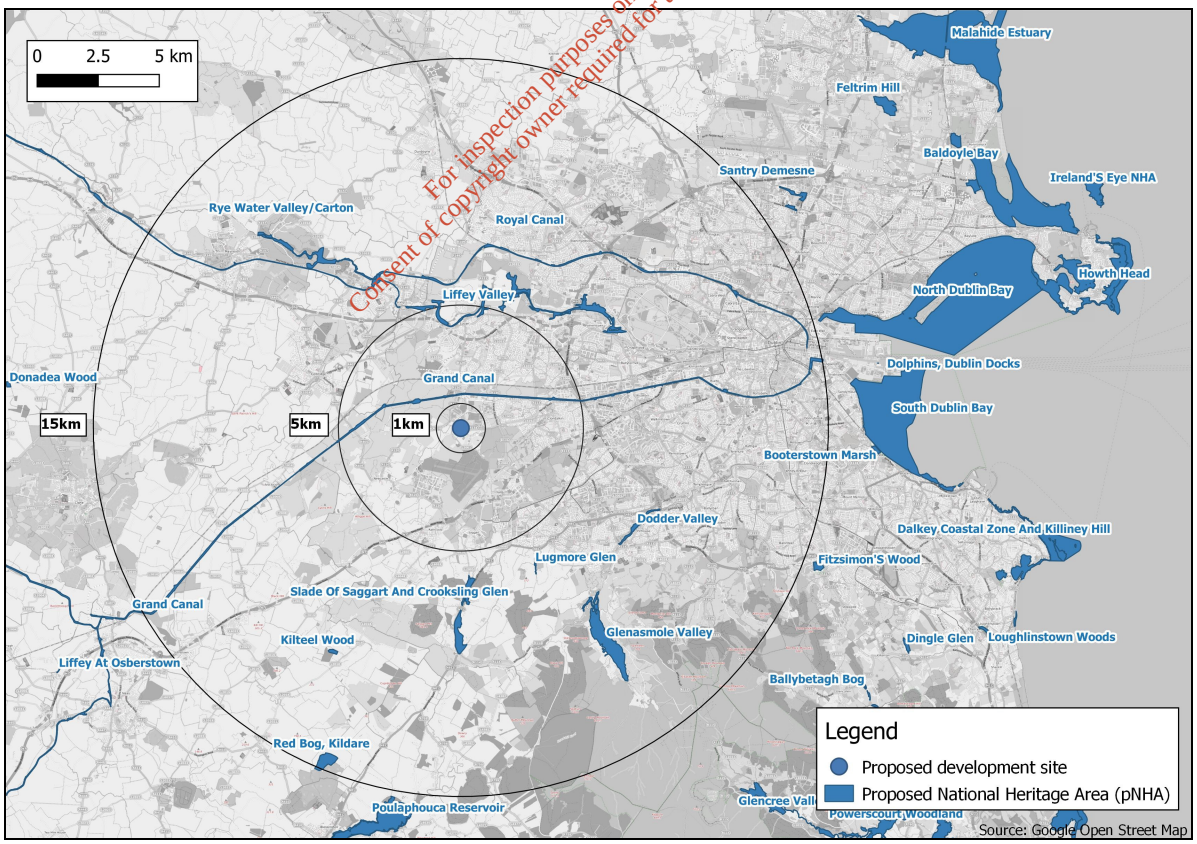

Figure 6.3 Nationally designated sites in the vicinity of the Proposed Development site

Habitats and flora

Desk study results

6.23 The National Biodiversity Data Centre (NBDC) database search returned no records of protected flora species under the Flora (Protection) Order 2015 within 2km of the survey area.

6.24 The NBDC database search returned records of two non-native invasive species listed on the Third Schedule of the *European Communities (Birds and Natural Habitats) Regulations 2011* (as amended) within 2km of the Proposed Development site[8]:

- Nuttall's waterweed *Elodea nuttallii*
- Three-cornered garlic *Allium triquetrum*

6.25 Records of other non-native invasive species which are not listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations and were returned from the desk study include, black currant *Ribes nigrum* and butterfly-bush *Buddleja davidii*[8].

Field survey results

6.26 One non-native invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, Spanish bluebell *Hyacinthoides hispanica,* was recorded within the garden of the farmhouse on the Proposed Development site, the location of which is mapped in Figure 6.4 below.

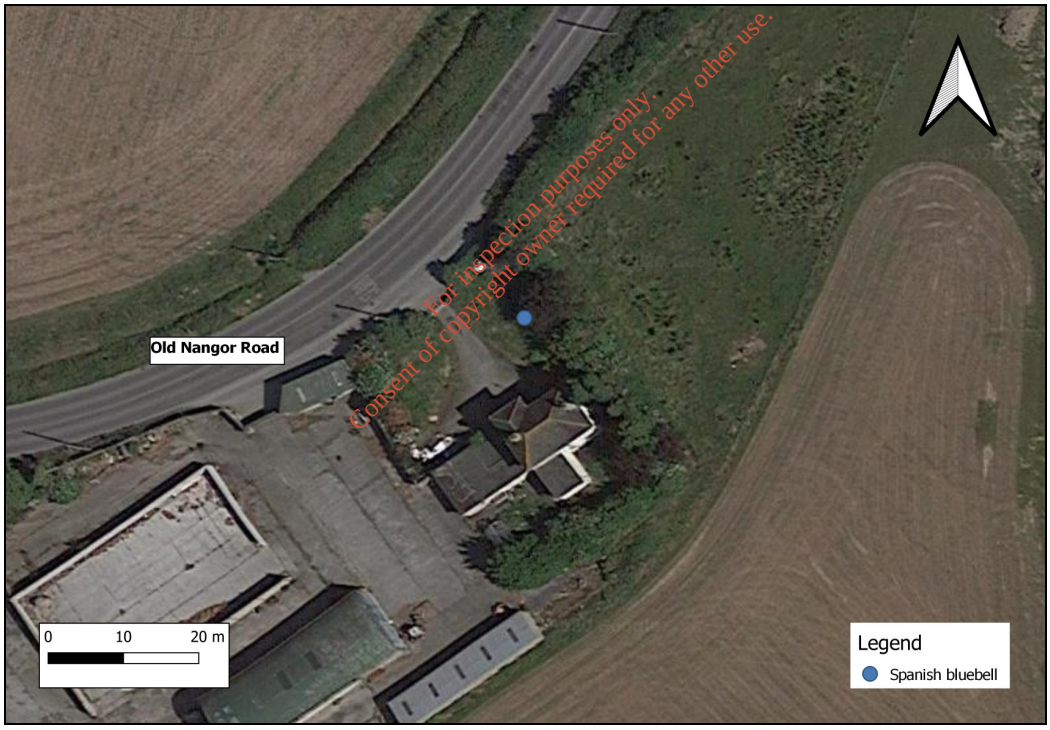

Figure 6.4 Spanish bluebell recorded within the Proposed Development site during field surveys

6.27 The following species, which are not listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, but which are considered to be invasive in some habitats and locations were also identified within the Proposed Development site:

- Sycamore *Acer pseudoplatanus*
- Beech *Fagus sylvatica*
- Copper beech *Fagus sylvatica ssp. purpurea*
- Variegated yellow archangel *Lamiastrum galeobdolon ssp. argentatum*

[8] These species are listed on Invasive Species Ireland's Amber list. In the right ecological conditions, they may impact on native species or habitats, but these species are not considered to have a high-risk rating overall. The list is available from http://invasive speciesireland.com.

- Snowberry *Symphiocarpos albus*
- Butterfly bush *Buddleja davidii*
- Winter heliotrope *Petasites fragrans*

6.28 The Proposed Development site is comprised of agricultural land. The following habitat types, assigned using the Heritage Council classification system (Fossitt, 2000), were identified within the survey area and are mapped in Figure 6.5:

- Improved agricultural grassland (GA1);
- Buildings and artificial surfaces (BL3);
- Recolonising bare ground (ED3);
- Hedgerows (WL1);
- Treelines (WL2);
- Hedgerows (WL1) and Ornamental/ non-native shrub (WS3) mosaic;
- Flower beds and borders (BC4);
- Spoil and bare ground (ED2);
- Depositing lowland rivers (FW2); and,
- Drainage ditches (FW4).

Figure 6.5 Habitats recorded within the Proposed Development site during field surveys

6.29 The majority of the Proposed Development site is comprised of improved agricultural grassland (GA1) which is no longer managed. From examination of aerial orthophotography, the field had been cut for livestock fodder in the past. This habitat is dominated by grass species such as perennial ryegrass *Lolium perenne*, Yorkshire fog *Holcus lanatus* and red fescue *Festuca rubra*. The invasion of weedy species such as curled dock *Rumex crispus*, ragwort *Senecio jacobaea* and creeping thistle *Cirsium arvense* indicates that the Proposed Development site has not been intensively managed for some time. The ecological value of this habitat type within the Proposed Development site has been classified as being of local importance (lower value). However, this habitat provides food and shelter to a range of fauna including birds and rabbits. Bird species recorded in this habitat include snipe *Gallinago gallinago* and meadow pipit *Anthus pratensis*.

Figure 6.6 Improved agricultural grassland (GA1) occurring within the Proposed Development site

6.30 There are some areas of buildings and artificial surfaces (BL3) habitat within the Proposed Development site. An abandoned farmhouse and associated yard and farm buildings are present in the western portion of the Proposed Development site and the now disused old Nangor Road which runs through the Proposed Development site. This habitat is very common and has potential to support a limited range of fauna. The ecological value of this habitat type is considered to be of local importance (lower value). However, the farmhouse is considered to be of moderate suitability for roosting bats[9] and swallows were confirmed to be nesting within a shed onsite.

Figure 6.7 Buildings and artificial surfaces (BL3) occurring within the Proposed Development site

6.31 Recolonising bare ground (ED3) habitat is common within the Proposed Development site and represents areas which have been disturbed by recent works and invaded by a range of weedy species. These species include broad-leaved dock *Rumex obtusifolius*, ragwort *Senecio jacobaea*, dandelion *Taraxacum officinale agg*. and nettles *Urtica dioica*. The non-native invasive species butterfly-bush *Buddleja davidii* was also recorded on this habitat within the Proposed Development site. This habitat is common and has the potential to provide food and shelter resources for local bird species. During breeding bird surveys in 2019 a range of bird species were recorded within recolonising bare ground habitat. The ecological value of this habitat type is considered to be of local importance (lower value).

[9] Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. The Bat Conservation Trust, London.

Figure 6.8 Recolonising bare ground (ED3) occurring within the Proposed Development site

6.32 There are several fragmented hedgerows (WL1) throughout the Proposed Development site. The hedgerows are comprised of a mix of native and non-native tree and shrub species. Native species include ash *Fraxinus excelsior*, hawthorn *Crataegus monogyna*, bramble *Rubus fruticosus agg.*, ivy *Hedera helix* and dog rose *Rosa canina*. Non-native species include sycamore *Acer pseudoplatanus*, cedar species *Cedrus sp.* and butterfly-bush *Buddleia davidii*. The understorey is comprised of a range of common native herbaceous species including cleavers *Galium aparine*, dandelion *Taraxacum officinale agg.*, nettles *Urtica dioica*, herb-Robert *Geranium robertanium*, common hogweed *Heracleum sphondylium* and black medick *Medicago lupulina*. This habitat provides breeding, resting and feeding habitat for a range of fauna species including birds and mammals. The section of hedgerow bounding the stream to the east of the site is of particular value to fauna species. The ecological value of hedgerow habitat within the Proposed Development site has been classified as being of local importance (higher value).

Figure 6.9 Hedgerows (WL1) occurring within the Proposed Development site

6.33 There is one fragmented treeline (WL2) within the Proposed Development site. It is comprised of cedar *Cedrus sp.,* blackthorn *Prunus spinosa,* beech *Fagus sylvatica* and ivy *Hedera helix*. Although this habitat is unconnected to similar habitats in the surrounding landscape and is relatively sparse, it provides nesting and feeding habitat to breeding bird species, therefore the ecological value has been classified as being of local importance (higher value).

Figure 6.10 Treeline (WL2) occurring within the Proposed Development site

6.34 The garden of the farmhouse on the Proposed Development site is surrounded by a mosaic of hedgerow (WL1) and ornamental/ non-native shrub (WS3) habitat. This habitat is comprised of a mix of native and non-native species. The majority of the hedge is comprised of non-native species including snowberry *Symphiocarpos albus*, copper beech *Fagus sylvatica ssp. purpurea*, ornamental rose species *Rosa sp*. and butterfly-bush *Buddleja davidii*. Native species include elder *Sambucus nigra*, ivy *Hedera helix* and dog rose *Rosa canina*. This habitat has potential to support breeding birds and provide shelter to mammal species, therefore the ecological value has been classified as being of local importance (lower value).

Figure 6.11 Hedgerows (WL1)/ Ornamental/ non-native shrub (WS3) mosaic occurring within the Proposed Development site

6.35 The garden of the farmhouse on the Proposed Development site is comprised of a mosaic of flower beds and borders (BC4) and amenity grassland (GA2). Species present in the garden are typical of these habitats and includes common grass species as well as a variety of ornamental flower and shrub species. A non-native invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, Spanish bluebell *Hyacinthoides hispanica* was recorded within the garden. There are also several undesirable non-native plant species with invasive properties[7] present in the vicinity of the farmhouse including winter heliotrope *Petasites fragrans*, variegated yellow archangel *Lamiastrum galeobdolon ssp. argentatum*, butterfly-bush *Buddleia davidii* and snowberry *Symphiocarpos albus*. Due to the habitat's limited potential to support fauna species and the presence of non-native invasive species, the ecological value of this habitat has been classified as being of local importance (lower value).

Figure 6.12 Flower beds and borders (BC4)/ Amenity grassland (GA2) mosaic occurring within the Proposed Development site

6.36 Recent archaeological investigation works have disturbed areas within the Proposed Development site and resulted in areas of spoil and bare ground (ED2) habitat. These are areas of exposed soil with little to no vegetation. Some bird species were recorded within this area during breeding bird surveys however this habitat is very common and has limited use in supporting local fauna. The ecological value has been classified as being of local importance (lower value).

Figure 6.13 Spoil and bare ground (ED2) occurring within the Proposed Development site

6.37 The stream present within the Proposed Development site is a tributary of the Griffeen River and has been highly modified in recent times to allow for the construction of the new Nangor Road. It is classified as a depositing lowland river (FW2). A small portion of the natural stream remains along the north-eastern portion of the site. In this area, there is bankside vegetation including Hart's tongue *Asplenium scolopendrium*, meadowsweet *Filipendula ulmaria*, ivy *Hedera helix* and celery-leaved buttercup *Ranunculus scleratus*. Overhanging tree and shrub species include hawthorn *Crataegus monogyna*, elder *Sambucus nigra*, sycamore *Acer pseudoplatanus* and butterfly-bush *Buddleja davidii*. In-stream vegetation includes species such as yellow iris *Iris pseudacorus*, water cress *Nasturtium officinale* and rush species *Juncus sp*. Where the stream has been realigned, steep slopes (up to 4m) have been created and no vegetation was planted as part of these works. The stream has become colonised by large mats of watercress *Nasturtium officinale* and the slopes have become colonised by a range of common weedy species including creeping thistle *Cirsium arvense*, sowthistle species *Sonchus sp.,* nettles *Urtica dioica* and dandelion *Taraxacum officinale agg.*

6.38 Despite recent modification to this habitat, it has the potential to support a wide range of fauna. Of particular note, otter *Lutra lutra*, kingfisher *Alcedo atthis* and grey wagtail *Motacilla cinerea* were all recorded along the stream. The ecological value of this habitat has therefore been classified as being of county importance.

Figure 6.14 Depositing lowland river (FW2) occurring within the Proposed Development site

6.39 There are drainage ditches (FW4) present within the hedgerows on the Proposed Development site. Standing water in these ditches are suitable for breeding amphibians such as common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*. The ecological value of this habitat has been classified as being of local importance (higher value) due to its potential to support amphibians.

Figure 6.15 Drainage ditches (FW4) occurring within the Proposed Development site

Bats

Desk study results

6.40 A search of the NBDC database returned records of five bat species within 2km of the survey area- brown long-eared bat *Plecotus auritus*, Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*. These bat species are all protected under the Wildlife Acts and the European Habitats Directive, where they are listed on Annex IV.

6.41 Scott Cawley have undertaken bat activity surveys in the wider Grange Castle area since 2011. These surveys have included adjacent sites to the immediate north and south of the Proposed Development. Bat activity surveys carried out from 2011-2019 have recorded four species of bat in the Grange Castle area- common pipistrelle *Pipistrellus pipistrellus,* soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's bat *Nyctalus leisleri* and Daubenton's bat *Myotis daubentonii.*

Field survey results

6.42 The hedgerows and treelines within the Proposed Development site as well as woodland, hedgerows and treelines in the surrounding area are considered to be suitable foraging and commuting habitat for bats. No bat roosts were confirmed within the Proposed Development site however the farmhouse onsite is considered to be of moderate suitability for roosting bats as there is access to the attic space through the roof tiles. No signs of bats were recorded during internal building inspections of the farmhouse. There are three barns within the Proposed Development site which are considered to have low suitability for roosting bats.

6.43 One tree on the Proposed Development site was considered to be of low suitability for bats. This tree is broken and ivy clad and has the potential to possess potential roosting features (PRFs) for small numbers of bats.

Figure 6.16 Location of tree with PRF on the Proposed Development site

Figure 6.17 Tree with PRF within Proposed Development site

6.44 Two species of bat were recorded during the emergence and re-entry survey at the unoccupied farmhouse; Leisler's bat *Nyctalus leisleri* and common pipistrelle *Pipistrellus pipistrellus*. These surveys recorded both species close to sunset and sunrise times. This indicates that their roosts are likely in the vicinity of the survey area however, no bats were recorded emerging from or entering any other building onsite.

Figure 6.18 Farmhouse with suitability for roosting bats within the Proposed Development site

Otter

Desk study results

6.45 Records of otter *Lutra lutra* were returned within the 2km search area. This mammal species is protected under the Wildlife Acts and under Annex II of the Birds and Habitats Regulations.

Field survey results

6.46 Otter was recorded in the stream on site on 8th November 2019 after a period of heavy rain. It was observed swimming west through the stream before entering the culvert in the northern portion of the Proposed Development site. No other signs of otter were recorded within the Proposed Development site such as a holt or spraint. There are recordings of otter breeding along the Griffeen River within Grange Castle Business Park. During realignment works to the river, undertaken as part of the industrial development of Grange Castle Business Park, artificial holts were installed along the Griffeen River.

Other mammals

Desk study results

6.47 Records of two other mammal species protected under the Wildlife Acts were returned within the 2km search area: European hedgehog *Erinaceus europaeus* and Irish hare *Lepus timidus subsp. hibernicus*.

Field survey results

6.48 The Proposed Development site is considered to be suitable to support a range of mammal species due to the presence of a stream, hedgerows and unmanaged grassland. No signs of badger or other protected mammals were noted in the Proposed Development site. It is possible, however that the hedgerows could host populations of hedgehog *Erinaceus europaeus* and pygmy shrew *Sorex minutus*. None of these were recorded. Rabbits and their burrows are present in the vicinity of the farmhouse.

Birds

Desk study results

6.49 All nesting wild birds are protected from disturbance and destruction under the Wildlife Acts. Records of four Red-listed species and nine Amber-listed species of Birds of Conservation Concern in Ireland (BoCCI) (Colhoun and Cummins, 2013) were returned within 2km from the survey area. Red-listed species include lapwing *Vanellus vanellus* which are known to feed in similar agricultural fields in the vicinity of the Proposed Development site in the winter months. Other red-listed species recorded within 2km are unlikely to use the Proposed Development site due to the ecology of the site- black-headed gull *Larus ridibundus*, herring gull *Larus argentatus* and tufted duck *Aytha fuligula.* Amber-listed species include two gull species which are unlikely to use the Proposed Development site due to its characteristics - great-black backed gull *Larus marinus* and lesser black-backed gull *Larus*

fuscus as well as a range of passerine species including swallow *Hirundo rustica*, swift *Apus apus*, house martin *Delichon urbicum* and sand martin *Riparia riparia*.

Field survey results- breeding birds

6.50 A wide range of bird species were recorded within the Proposed Development site during breeding bird surveys carried out in June 2019. Species recorded included nine Amber-listed species- swallow *Hirundo rustica*, starling *Sturnus vulgaris*, house sparrow *Passer domesticus*, skylark *Alauda arvensis*, goldcrest *Regulus regulus*, house martin *Delichon urbicum*, swift *Apus apus*, greenfinch *Carduelis chloris* and robin *Erithacus rubecula*. Nesting swallows were confirmed using a barn in the farmyard. One Red-listed species was recorded; meadow pipit *Anthus pratensis*. Other species recorded included a range of common urban and farmland species such as wren *Troglodytes troglodytes*, chaffinch *Fringilla coelebs* and blackbird *Turdus merula*. It is possible that all of the above species were breeding either in hedgerows, treelines or buildings on the Proposed Development site. Of note was the presence of buzzards *Buteo buteo* flying and calling overhead throughout ecological surveys, although no buzzard nest was recorded on the Proposed Development site. Ringed plover *Anthus pratensis* was also recorded feeding on an area of spoil and bare ground that had been cleared for archaeological surveys. It is not anticipated that this species was breeding here as they would have been subject to high levels of human disturbance.

Field survey results- wintering birds

6.51 The winter bird surveys were carried out from September to December 2019 and recorded an additional four Amber-listed and one Red-listed species. Additional Amber-listed birds included stonechat *Saxicola rubicola*, snipe *Gallinago gallinago*, wheatear *Oenanthe oenanthe* and kingfisher *Alcedo atthis.* Flocks of up to fifty meadow pipit *Anthus pratensis* were recorded wintering on the lands and up to six snipe were flushed from the unmanaged grassland during transects. The presence of kingfisher is notable as it is a species listed on Annex I of the Birds Directive and is subject to special conservation measures. Up to two kingfisher were recorded along the stream on the Proposed Development site, most regularly encountered being flushed from the southern bank of the realigned section. This indicates that a kingfisher territory occurs here, and they may breed during the summer. Grey wagtail *Motacilla cinerea,* a Red-listed species was regularly recorded along the riverbank during the winter surveys. Juvenile grey wagtails were noted, which suggests that this species may be breeding in close proximity to the Proposed Development site. During a site visit on 14th January 2020, a flock of 150 lapwing *Vanellus vanellus*, a Red-listed species were recorded feeding on the Proposed Development site. Yellowhammer *Emberiza citrinella*, a Red-listed species was also recorded on the site during winter bird surveys.

Amphibians

Desk study results

6.52 No records of amphibian species protected under the Wildlife Acts or listed on Annex V of the EU's Habitats Directive were returned within the 2km search area.

Field survey results

6.53 No signs of amphibians were noted during the field survey however drainage ditches on the Proposed Development site represent suitable breeding habitat for these species.

Invertebrates

Desk study results

6.54 No records of invertebrate species protected under the Wildlife Acts and listed on Annex II and V of the EU's Habitats Directive was returned within the 2km search area.

Summary of ecological evaluation

6.55 Based on results of surveys undertaken at the Proposed Development site, this section summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance, and identifies the Key Ecological Receptors (KERs). KERs are within

the zone of influence[10] of the development and are '*both of sufficient value to be material in decision making and likely to be affected significantly*'. To qualify as KERs, features must be of local importance (higher value) or higher as per the criteria in Appendix C.2. Features of lower ecological value are not assessed. The highest levels of impact significance for each key ecological receptor 'value' rating are shown in **Error! Reference source not found.**6.4.

Table 6.4 Maximum level of impact significance for Key Ecological Receptors

Key Ecological Receptor 'value' rating	Highest possible significance level
International Importance	Significant Positive/ Negative impact at International level
National Importance	Significant Positive/ Negative impact at National level
County Importance	Significant Positive/ Negative impact at County level
Local Importance (higher value)	Significant Positive/ Negative impact at Local level

6.56 The following ecological features are considered to be KERs in relation to the Proposed Development site:

- European sites are considered to be KERs as the Proposed Development site has connectivity to European sites in Dublin Bay.
- Nationally designated sites are considered to be KERs as the Proposed Development has connectivity to national sites in Dublin Bay.
- Bats are considered to be a KER as all bats and their roosts are protected under the Wildlife Acts and under the Habitats Directive. The results of the emergence and re-entry surveys indicate that there are likely bat roosts in the vicinity of the Proposed Development site. The hedgerow habitat on the Proposed Development site represents suitable commuting and foraging habitat for bats and bats were observed foraging along the hedgerows around the farmhouse during the surveys. The farmhouse and one tree on the site is considered to have potential roosting features for bats.
- Otter are considered to be a KER as a live animal was recorded in the stream on the Proposed Development site.
- Mammals (other) are considered to be a KER due to the presence of suitable feeding and resting habitat for mammal species such as badger and hedgehog within the Proposed Development site.
- Breeding birds are considered to be a KER as several species of bird, including Amber and Red-listed BoCCI species were confirmed to be breeding within the Proposed Development site. In addition, breeding birds and their nests are protected under the Wildlife Acts.
- Wintering birds are considered to be a KER as several species of bird, including Amber and Red-listed BoCCI species as well as one species listed on Annex I of the Birds Directive were confirmed to be wintering within the Proposed Development site.
- Amphibians are considered to be a KER on a precautionary basis due to the presence of wetland features which are suitable breeding habitat for amphibians within the Proposed Development site and due to their protection under the Wildlife Acts.
- Hedgerows, treelines and hedgerow/ ornamental/ non-native shrub mosaic habitat within the Proposed Development site provides potential foraging and commuting habitat for bats and suitable breeding habitat for birds. Hedgerows have been included as a KER for their function in supporting the local bat and breeding bird populations.
- The depositing lowland river habitat within the site provides suitable breeding and feeding habitat for otter, kingfisher, amphibian and invertebrate species. This habitat has been included as a KER for its function in supporting fauna species.
- Drainage ditches provide suitable breeding habitat for amphibian species within the Proposed Development site. They have been included as a KER for their function in supporting the local amphibian population.

[10] In accordance with NRA (2009) guidelines, the Zone of Influence is an important term to define the receiving environment for the activities associated with the project and the biophysical changes that are likely to occur. The Zone of Influence is the 'effect area' over which change is likely to occur. This differs for different species and habitats due to varying sensitivities to potential impacts.

6.57 Table 6.5 summarises all ecological features identified as KERs based on the completion of the desk study and field survey of the Proposed Development site.

Table 6.5 Ecological evaluation of Key Ecological Receptors

Habitat / Species	Highest Ecological Valuation Level	Key Ecological Receptor?
Designated Sites		
European Sites	International Importance	Yes
Proposed Natural Heritage Areas	National Importance	Yes
Fauna		
Bats	Local Importance (Higher Value)	Yes
Otter	Local Importance (Higher Value)	Yes
Other mammals	Local Importance (Higher Value)	Yes
Breeding birds	Local Importance (Higher Value)	Yes
Wintering birds	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Habitats & Flora		
(Unmanaged) Improved agricultural grassland (GA1)	Local Importance (Lower Value)	Yes, in relation to supporting protected fauna
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	Yes, in relation to supporting protected fauna
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Hedgerows (WL1)	Local Importance (Higher Value)	Yes, in relation to supporting protected fauna
Treelines (WL2)	Local Importance (Higher Value)	Yes
Hedgerows (WL1)/ Ornamental/ non-native shrub (WS3)	Local Importance (Lower Value)	Yes
Flower beds and borders (BC4)	Local Importance (Lower Value)	No
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Depositing lowland rivers (FW2)	County Importance	Yes, in relation to supporting protected fauna
Drainage ditches (FW4)	Local Importance (Higher Value)	Yes, in relation to supporting protected fauna

6.58 Spanish bluebell *Hyacinthoides hispanica* was identified within the Proposed Development site. Whilst this species is not considered to be a KER, its potential impact is still assessed in the context of habitats within the Proposed Development site. Under Section 49(2) of the European Communities (Birds and Natural Habitats) Regulations, 2011 as amended, it is illegal to plant, disperse, allow/ cause to disperse, spread or otherwise grow any species on the Third Schedule, i.e. Spanish bluebell.

Characteristics of the Proposed Development

6.59 The Proposed Development will consist of the demolition of an existing two storey farmhouse and associated farm buildings and the construction of 3 no. two storey data centres (Buildings A, B and C) and associated ancillary development that will have a gross floor area of 80,269sqm on an overall site of 16.5 hectares. It is proposed that construction work will begin in late 2020 and all phases of the development will be completed in 2028. A full description of the Proposed Development is provided within paragraph 2.11 of Chapter 2.

6.60 Foul waters for the development will outfall to the existing foul network and will ultimately be treated at Ringsend Wastewater Treatment Plant. The population equivalent (P.E.) for this development is 150. Effluent from water-based cooling systems will also drain to the foul sewer.

6.61 All storm water generated on site will be retained and released into the Baldonnel Stream at a controlled rate of 2l/sec/Ha or the natural greenfield runoff rate, whichever is greater. There are 3 no. attenuation areas proposed for this development. The storm water drainage system will take water runoff from hardstanding locations, roofs/ paths & roads and outfall into the attenuation areas via oil separators. Prior to entering attenuation areas, storm water will be directed into 'forebays' which will allow any detritus material to be removed from the water and will increase the water quality prior to

disposal. Works will include installing new underground ducting and cabling within a new trench that will extend to the northern boundary of the site. These new connections will be installed under the Baldonnel Stream using directional drilling or similar approved at a depth of c. 2.5m below the stream bed level.

6.62 The landscape plan accompanying this application proposes heavy landscaping throughout and particularly to the north, south and west of the overall site. The landscaping will be substantially completed as Phase 1 of this development during the construction of Building A, and completed following the completion of the main substation that will form a separate SID planning application to the east of the site so that it will be entirely in place prior to the construction of Building B. The landscape plan incorporates a range of positive ecological measures. Extensive native tree planting is proposed throughout the site to serve as screening from the surrounding roads and to enhance biodiversity. A range of bat boxes and bird boxes are proposed for incorporation within the landscape plan. Native wildflower meadows and sections of native woodland are also proposed for incorporation within the development. A wetland area and several attenuation ponds will be created within the Proposed Development site. The wetland area has been designed with biodiversity in mind. They will have shallow sloping areas and be planted with native wetland species. The Baldonnel Stream will be enhanced with riparian planting and connected to the surrounding landscape.

Potential impacts of the Proposed Development

6.63 As per relevant guidelines, potential significant impacts have only been assessed for key ecological receptors (KERs), as listed in Table 6.5. An impact is considered under the previously cited Guidelines to be ecologically significant if it is predicted to affect the integrity or conservation status of a KER at a specified geographical scale. All impacts are described in the absence of mitigation. In addition to the above guidance, the definitions of duration have been employed based on the EPA Guidelines (Draft, 2017) as follows:

- temporary: up to 1 year;
- short-term: from 1-7 years;
- medium-term: 7-15 years;
- long-term: 15-60 years; and
- permanent: over 60 years.

Do-nothing scenario

6.64 Under the do-nothing scenario, it is likely that the site would continue to offer suitable habitat for roosting, commuting and foraging bats, breeding amphibians, nesting birds, wintering birds, feeding and resting mammals and feeding/ commuting otter. The habitats on the Proposed Development site are not currently under any management regime. Rank grassland habitat on the Proposed Development site may become encroached by scrub over time. The spoil and bare ground and artificial surfaces may become recolonised by plant species present in the surrounding landscape. Storm damage may create new PRFs for bats in trees located across the Proposed Development site.

Impacts on designated sites

6.65 As concluded in the Screening Statement for Appropriate Assessment (Scott Cawley Ltd., 2020), there will be no likely significant effects as a result of the Proposed Development individually or in combination with another plan or project on any European site. There is no possibility of direct habitat loss or loss of habitats that support populations of QI/ SCI populations of European sites as a result of the Proposed Development. The Proposed Development will not have any measurable effects on water quality In Dublin Bay or the Irish Sea due to the relatively low volume of any surface water run-off or discharge events and due to the level of mixing, dilution and dispersion of any surface water run-off or discharge in the receiving watercourses. There is no potential for hydrogeological impacts on European sites as the nearest SAC for which groundwater dependent habitats have been designated, the Rye Water/ Carton Valley SAC is considered to be outside of the Zone of Influence of the Proposed Development. This is due to the SAC being buffered from the Proposed Development by significant infrastructure and waterbodies. There is no risk of invasive species spreading to European sites as a result of the Proposed Development. There are no

European sites within the disturbance Zone of Influence of the Proposed Development and therefore there are no disturbance/ displacement impacts predicted to QI/ SCI species associated with European sites.

6.66 There will be no likely significant effects on any nationally designated sites located in Dublin Bay for the same reasons outlined above in section 6.65. No impacts on the Grand Canal pNHA are predicted as a result of the development as it is located 1km from the Proposed Development site and there are no source-pathway-receptor links, hydrological or otherwise.

Construction phase

6.67 The Proposed Development will be completed over a number of phases; Phase 1 includes construction of Building A and landscaping and attenuation of the majority of the site; Phase 2 includes construction of the main substation to the east of the site and the completion of the landscaping that surrounds it; Phase 3 includes for the construction of Building B; and Phase 4 will be the construction of Building C.

6.68 Vegetation clearance for the entire site will occur as part of Phase 1 to allow for the implementation of the landscaping plan. The early establishment of the landscape plan following Phase 2, which will occur within the same timeframe, will result in reduced impacts during the construction of Buildings B and C as site clearance will be minimal and surrounding habitats established. As such, the below potential construction impacts section have considered the worst case scenario during construction.

6.69 Potential impacts could arise from:

- Habitat loss resulting from site clearance, soil-stripping, and earthworks;
- Water quality impacts resulting from surface water carrying silt, hydrocarbons or other chemicals into the existing Baldonnel Stream which discharges into the River Liffey via the River Griffeen; and
- Disturbance impacts resulting from noise, dust, lighting and physical disturbance from vehicles, plant, and construction staff.

Impacts on habitats and flora during construction

6.70 The Proposed Development will require the removal of the majority of habitats which have been classified as being of local importance (lower value) i.e. buildings and artificial surfaces, improved agricultural grassland, recolonising bare ground, hedgerows/ ornamental and non-native shrub, flower beds and borders and spoil and bare ground habitat. These habitats are very common and their removal is not regarded to be a significant ecological impact.

6.71 The Proposed Development will require the removal of some hedgerow and drainage ditch habitat, which are considered to be of local importance (higher value). Approximately 155m of hedgerow habitat and 90m of drainage ditch habitat will be removed to facilitate the development. As existing, these habitats are fragmented and relatively small in area. In the absence of mitigation, the loss of these habitats is regarded to be significant at the local scale only.

6.72 During the construction phase, surface waters carrying silt, hydrocarbons or other chemicals into the Baldonnel Stream, may result in impacts on habitat quality of the stream onsite and in downstream waterbodies i.e. the Griffeen River and River Liffey. Taking into account the nature of the Proposed Development, in the absence of mitigation, there is ***potential for temporary significant impacts*** on the receiving surface water system at the local scale only.

6.73 In-stream works proposed in the Baldonnel Stream include ecological enhancement measures. Full details of these works are included within the landscape plan accompanying this application (KFLA, 2020). In brief, the banks of the stream will be enhanced with suitable native riparian planting. Kingfisher tunnels will be installed within the banks of the stream and grey wagtail boxes will also be installed in a suitable location along the stream. These works will be temporary in nature and do not have the potential to cause significant impacts on habitats or flora.

6.74 The directional drilling or similar approved works to install underground ducting and cabling within a new trench below the Baldonnel Stream will be temporary in nature and do not have the potential to cause significant impacts on habitats or flora as drilling will take place at a depth of c. 2.5m below the stream bed level.

6.75 One Third Schedule invasive plant species listed under Section 49(2) of the European Communities (Birds and Natural Habitats) Regulations, 2011 as amended was recorded on the Proposed Development site, Spanish bluebell *Hyacinthoides hispanica*. It is illegal to plant, disperse, allow/ cause to disperse, spread or otherwise grow any species listed on the Third Schedule. Spanish bluebell was recorded in the garden on the farmhouse in the north-western portion of the property. Without mitigation, this species may spread during the construction phase from its current location and hybridise with the native bluebell species *Hyacinthoides nonscripta.*

Impacts on bats during construction

6.76 Temporary lighting required during construction could illuminate previously unlit feeding areas, potential tree roosts or commuting flight paths making them unsuitable to bats. All bats can be adversely affected by lighting and only Leisler's bats have shown any positive relationship or neutral response to artificial lighting, presumably because they fly well above the lit areas. Therefore, the potential impact on bat activity is regarded to be significant at the local level without mitigation measures.

6.77 Some of the buildings and one tree within the Proposed Development site are considered to have low suitability for a small number of roosting bats. Bat emergence and re-entry surveys carried out at the farmhouse and at trees identified with PRFs in summer 2019 and follow up internal and external building inspections on 14th February 2020 did not confirm any active roosts within the Proposed Development site however, the presence of roosting bats at the time of building demolition or tree removal cannot be ruled out. In the absence of mitigation, there is potential for building demolition and tree removal works to result in the loss of a bat roost on the Proposed Development site. The permanent loss of these roost features are considered to be significant at the local scale.

6.78 Removal of isolated hedgerows within the Proposed Development site will result in the loss of a potential commuting and foraging habitat for bats. Although these areas of hedgerow do not provide important connectivity to the surrounding landscape, in the absence of mitigation, this is considered to be a permanent significant impact at the local scale.

6.79 Removal of c. 90m of drainage ditches habitat as a result of the Proposed Development will result in the loss of potential breeding habitat for insects i.e. the food source for bats. In the absence of mitigation, the loss of drainage ditches is considered to be a permanent significant impact at the local scale.

Impacts on otter during construction

6.80 Noise, vibration and increased human presence during the construction phase of the development and particularly during directional drilling works may result in the temporary disturbance of otter and reduced usage of this section of the Baldonnel Stream for foraging and commuting otter during this time. However, given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, the local otter population are likely to be habituated to a degree to human and vehicle related disturbance. Nevertheless, a temporary significant impact at a local scale is predicted on the otter population using the Baldonnel Stream during the construction phase of the Proposed Development.

6.81 Otter are vulnerable to a water pollution incident in the Baldonnel Stream from surface water carrying silt, hydrocarbons or other chemicals entering the watercourse, and which may directly impact otter through direct contact with pollutants or indirectly by affecting their food source and prey items. Such direct or indirect impacts without mitigation measures would result in significant impacts on otter at the local scale.

Impacts on other mammals during construction

6.82 Although no signs of other protected mammals were noted within the lands, the Proposed Development site comprises a range of habitats, e.g. hedgerows, suitable to support protected mammal species such as hedgehog, badger and hare. In the absence of mitigation, the loss of potential foraging and resting habitat is considered to be a significant impact at the local scale.

Impacts on birds during construction

6.83 All birds are protected under the Wildlife Acts. If site clearance (vegetation removal) is carried out during the breeding bird season (i.e. from the 1st March to the 31st August), there is potential for adverse impacts to local breeding bird populations.

6.84 The Proposed Development will result in the loss of approximately 155m of hedgerow habitat which is suitable for foraging and nesting birds. The demolition of agricultural sheds will result in the loss of a confirmed barn swallow nesting site. In the absence of mitigation, the Proposed Development is predicted to have a permanent significant impact at a local scale.

6.85 Noise, vibration and increased human presence associated with the construction of the Proposed Development is likely to result in a disturbance impact to local bird populations during the bird breeding season and has the potential to result in reduced breeding success of birds occurring within the site and in green spaces adjacent to the construction zone. Given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, birds in the locality are expected to be somewhat habituated to a degree to human and vehicle related disturbance. However, during the construction phase disturbance impacts on breeding birds, without mitigation measures, are expected to result in a temporary significant impact at a local scale.

6.86 The Proposed Development will result in the loss of agricultural grassland which provides suitable feeding and roosting habitat for a range of wintering birds such as yellowhammer, snipe and lapwing. Similar agricultural fields are present in the surrounding area for use by bird species however, the Proposed Development is predicted, without mitigation measures, to have a permanent significant impact at a local scale.

6.87 In addition, birds that use aquatic habitats to feed, roost or breed are vulnerable to a pollution incident in the Baldonnel Stream from surface water carrying silt, hydrocarbons or other chemicals entering the watercourse. Such an event may directly impact kingfisher and grey wagtail through direct contact with pollutants or indirectly by affecting their food source and prey items. Pollution of water as a result of construction works on the Proposed Development site may result, without mitigation measures, in temporary significant impacts on these bird species at the local scale.

Impacts on amphibians during construction

6.88 Infilling of drainage ditches habitat onsite will result in the loss of suitable breeding habitat for amphibians. Although no amphibians were recorded during the surveys, drainage ditches represent suitable breeding habitat for these species, particularly common frog. Therefore, the development is predicted, without mitigation measures, to have a permanent significant impact at a local scale.

Operational phase

6.89 The operational phase of the Proposed Development includes a number of phases; Phase 1, the operation of Building A and main Substation that is subject to separate SID application, and establishment of landscape planting prior to the construction of Building B; and the operational phases of Building B and C. In parallel with Phase 1 of construction of the Proposed Development, construction of the permanent Substation that is subject to separate SID application is also anticipated to take place. As such, the below potential operational impacts section have considered the operation of all buildings and the early establishment of the site wide landscape plan.

6.90 Potential impacts could arise from:

- Artificial lighting impacts;
- Disturbance impacts results from increased human presence; and

- Water quality impacts resulting from surface water carrying silt, hydrocarbons or other chemicals into the existing Baldonnel Stream which discharges into the River Liffey via the River Griffeen.

Impacts on habitats and flora during operation

6.91 Surface waters carrying silt, hydrocarbons or other chemicals into the Baldonnel Stream, has the potential to result in impacts on habitat quality of the stream onsite and downstream waterbodies i.e. the Griffeen River and the River Liffey.

Impacts on bats during operation

6.92 The presence of artificial lighting across the Proposed Development during the operational phase is likely to result in some impact to bats commuting through or feeding within the Proposed Development site. The lighting plan for the Proposed Development '*External Lighting Design Report*' (Thorlux Ireland, 2020) has been designed to reduce light spill and has been reviewed by an ecologist. Existing features of ecological interest and those proposed in the landscape plan (i.e. the Baldonnel Stream, the wetland area and the attenuation ponds) will not be subject to any light spill and will be kept at 0 lux. As outlined in the plan, light spill modelling has not taken into account proposed tree planting and berms which will further mitigate the effects of light spill, therefore, no significant light spill impacts are predicted.

Impacts on otter during operation

6.93 Otter are vulnerable to a water pollution incident in the Baldonnel Stream from surface water carrying silt, hydrocarbons or other chemicals entering the watercourse, and which may directly impact otter through direct contact with pollutants or indirectly by affecting their food source and prey items. Such direct or indirect impacts would result in significant impacts, without mitigation measures, on otter at the local scale. It is likely that during the operational phase of the Proposed Development any pollution event, without mitigation measures, would be short to medium term and therefore resulting in a temporary impact.

6.94 Noise and increased human presence during the operational phase of the Proposed Development may result in the disturbance of otter and reduced usage of this section of the Baldonnel Stream for foraging. However, given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, the local otter population are likely to be habituated to a degree of human and vehicle related disturbance. As such disturbance impacts on otter during the operation of the Proposed Development, will not result in a significant impact at any geographical scale.

Impacts on birds during operation

6.95 Noise, vibration and increased human presence associated with the operational phase of the Proposed Development may result in a disturbance impact to local breeding bird populations during the bird breeding season. However, given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, birds on the Proposed Development site are likely to be habituated to a degree to human and vehicle related disturbance. As such disturbance impacts on otter during the operation of the Proposed Development, will not result in a significant impact at any geographical scale.

6.96 Surface water carrying silt, hydrocarbons or other chemicals into the Baldonnel Stream, may reduce the availability and visibility of prey to bird species associated with aquatic habitats such as kingfisher and grey wagtail. Pollution of water on the Proposed Development site as a result of pollution arising from the Proposed Development would result, without mitigation measures, in significant impacts on birds associated with aquatic habitats at the local scale.

Cumulative effects

6.97 Existing or proposed projects or plans, as outlined in Chapter 3, impacting the same sensitive ecological receptors have the potential to lead to impacts of a higher level of significance when assessed cumulatively with the Proposed Development.

6.98 It is proposed to provide a power supply to the data centres via a new permanent 110kV GIS Substation with transformer compound to the east of the Proposed Development site. These works and the MV and HV connections required to existing substations in the Grange Castle area will be applied for under separate application(s). These works may be determined as Strategic Infrastructure Development (SID) by An Bord Pleanála through the statutory pre-application consultations with the Board. These works have been cumulatively assessed under this EIA Report.

Construction phase

6.99 As the 10kV GIS Substation will be constructed within the area surveyed for this development, it is not considered likely that there will be any additional impacts on species or habitats. The MV and HV connections to existing substations will require minor works along existing roads i.e. the installation of ducts into trenches. Given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, the local fauna, as outlined within the survey resultsearlier in this chapter, are likely to be habituated to a degree to human and vehicle related disturbance and would not be predicted to be impacted in any significant way by these minor works.

6.100 The surrounding lands are largely zoned as '*EE- Enterprise and Employment'* in the *South Dublin County Council Development Plan 2016-2022* (South Dublin County Council, 2016). There are numerous granted planning permissions for industrial developments in the vicinity of the Proposed Development site which are likely to be in construction at the same time as the Proposed Development. In this case, there is potential for cumulative effects to arise as outlined within Chapter16 of this EIAR, as a consequence of the Proposed Development acting in-combination with other plans and projects, on water quality in the downstream surface water environment, disturbance to fauna and habitat loss. These potential cumulative effects would be temporary and occur at a local or county geographical scale. The reason and justification for this is addressed in detail within Chapter 16 of the EIAR. As outlined in the Hydrology chapter (Chapter 9) of this report, the construction of the Proposed Development does not have the potential to have measurable effects on water quality in Dublin Bay or the Irish Sea.

6.101 There will be no significant effects as a result of the construction of the Proposed Development individually or cumulatively with another plan or project on any European site. As outlined in the AA Screening accompanying this development (Scott Cawley Ltd., 2020) the potential impacts associated with the Proposed Development do not have the potential to affect the conservation objectives supporting the qualifying interest (QI)/ special conservation interests (SCI) of any European sites. As the Proposed Development itself will not have any effects on the QIs/SCIs or conservation objectives of any European sites, there is no potential for any other plan or project to act in combination with it to result in likely significant effects on any European sites.

Operational phase

6.102 In the absence of mitigation measures, there is potential for cumulative effects to arise as a result of the operation of the Proposed Development in-combination with other industrial developments as outlined within Chapter 3 of this EIAR, in the surrounding area. These impacts include artificial lighting impacts, disturbance impacts results from increased human presence and water quality impacts resulting from surface water carrying silt, hydrocarbons or other chemicals into the existing Baldonnel Stream which discharges into the River Liffey via the River Griffeen. However, as outlined in the Hydrology chapter (Chapter 9) of this report and the AA Screening accompanying this application, the construction of the Proposed Development does not have the potential to have measurable effects on water quality in Dublin Bay or the Irish Sea. Assuming the full and successful implementation of the mitigation measures outlined in this Chapter, no impacts on flora or fauna will occur as a result of the operational phase of this development. Therefore, there is no potential for cumulative impacts to arise as a result of any other plans or project to act cumulatively with the Proposed Development.

6.103 There will be no significant effects as a result of the operation of the Proposed Development individually or in combination with another plan or project on any European site. As outlined in the AA Screening accompanying this development (Scott Cawley Ltd., 2020) the potential impacts associated with the Proposed Development do not have the potential to affect the conservation objectives supporting the qualifying interest (QI)/ special conservation interests (SCI) of any

European sites. As the Proposed Development itself will not have any effects on the QIs/SCIs or conservation objectives of any European sites, there is no potential for any other plan or project to act in combination with it to result in likely significant effects on any European sites.

Mitigation and compensation / enhancement measures

Construction phase

Pollution prevention

6.104 As outlined in the Outline Construction Management Plan (CS Consulting, 2020), a project environmental management plan will be developed prior to works commencing. This document will ensure that storm water and wastewater runoff are managed and will not cause an off-site environmental impact. This document will be developed and include the following:

- Silt control on the roads;
- Discharge water from dewatering systems;
- Diversion of clean water;
- Treatment and disposal of wastewater from general clean-up of tools and equipment;
- Spills control;
- A buffer zone of at least 20m separating working machinery from watercourses;
- A prohibition on machinery entering watercourses;
- Refueling of machinery off-site or at a designated bunded refueling area; and,
- Silt trapping and oil interception (to be considered where surface water runoff may enter watercourses).

6.105 The Outline Construction Management Plan (CS Consulting, 2020) specifies that the following general pollution prevention measures will be implemented:

- It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence;
- Only approved storage system for oil/ diesel within the site will be permitted. The bunded area will accommodate the relevant oil/ diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment/ removal from site;
- The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkalinity in watercourses. Consequently, it is a requirement that all concrete truck washout takes place in the ready-mix depot;
- The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner; and,
- The cleaning of public roads in and around the Proposed Development site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses

6.106 The mitigation measures outlined in the Hydrology chapter (Chapter 9) of this EIAR will prevent pollution of the Baldonnel Stream and the receiving surface water network. These include measures which prevent contaminated surface water run-off entering the stream, measures to prevent spillage of fuels and chemicals, measures to deal with accidental releases and measures to prevent impacts arising from the management of soil removal and compaction.

Habitats and flora

6.107 Invasive species (including Spanish bluebell) on the Proposed Development site will be controlled/ eradicated according to the methodology outlined in the Outline Invasive Species Management Plan (Scott Cawley, 2020) that forms a stand-alone document to this EIA Report. Spanish bluebell will be physically removed ensuring that all bulbs and runners are removed. The bulbs will be left in the sun for one month and then placed in a plastic bag for a year prior to composting. Other invasive species on the site will be appropriately controlled and eradicated using either physical or chemical control methods.

6.108 Full landscaping details are provided in the landscaping plan accompanying this planning application (KFLA, 2020). The landscape strategy will enhance the biodiversity value of the Proposed Development site and provide green infrastructure links to the surrounding area. It is proposed that landscaping works will be carried out in the first phase of the development and will be in place prior to the construction of Building B. Therefore, suitable breeding, foraging and roosting habitat will be available to a wide range of fauna prior to the completion of the development.

6.109 Existing hedgerows and other vegetation will be retained along the Baldonnel Stream and strengthened with native planting. This will create commuting and foraging corridors within the Proposed Development site for a range of fauna species. A woodland belt is proposed along the northern boundary of the site. Large, semi-mature tree planting has been proposed for this area and will provide an immediate ecological corridor within the site. Additional smaller areas of hedgerow, woodland and large tree planting will take place throughout the Proposed Development site and will provide suitable foraging, roosting and nesting habitat for fauna. Large areas of native wildflower meadow are also proposed within the site and will provide foraging and resting habitat for a range of fauna, particularly pollinators and birds. Planting lists for hedgerows and woodlands have included pollinator friendly species as recommended by the All Ireland Pollinator Plan 2015-2020.

6.110 A wetland / attenuation area and three attenuation ponds will be constructed as part of the Proposed Development. These areas will enhance the biodiversity value of the Proposed Development site. The wetland area will be planted with native riparian flora and surrounded by wildflower meadows and small woodland berms. The range of proposed habitats in this area will provide a refuge for flora and fauna species. The wetland area has been designed with shallow, sloping areas which will provide suitable amphibian breeding habitat.

Bats

6.111 Construction lighting will be designed so as to be sensitive to the potential presence of bats and should adhere to the following guidance:

- *Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers* (Bat Conservation Trust, 2010);
- *Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011);*
- *Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2008).*

6.112 Where trees are considered to have low potential for roosting bats, a PRF (potential roosting feature) inspection survey will be conducted on the day of the proposed felling by a suitably qualified and experienced ecologist. Access to PRFs on the day of removal will be facilitated using a cherry picker/Mobile Elevating Work Platform (MEWP) where possible and the PRFs will be inspected with the aid of an endoscope and/or torch. Where bats are encountered, all relevant works will cease and an application for a derogation licence must be submitted to the NPWS to permit removal of the roost.

6.113 If bat roosts are not encountered during the survey, trees will be section-felled in the presence of a suitably qualified ecologist. Tree sections with PRFs will be left in-situ with bat access points facing upwards for 48 hours to allow any bats that may be present to emerge.

6.114 The farmhouse and associated buildings on site must be re-surveyed prior to demolition to ensure there are no roosting bats present. A suitably qualified and experienced ecologist must carry out a minimum of one bat emergence survey and one bat re-entry survey. Where a bat roost is encountered, all relevant works will cease and an application for a derogation licence must be submitted to the NPWS to permit removal of the roost.

6.115 Suitable woodcrete bat boxes will be installed on trees within the Proposed Development site. The boxes will be installed in areas that are in close proximity to suitable commuting and foraging habitat in areas not subject to light spill.

Otter

6.116 Two artificial otter holts will be installed in the banks of the Baldonnel Stream. These must have two or three entrances below, at, or above the water level. The tunnel must slope upwards from the entrance to avoid flooding of the chamber. They may be constructed from log piles, stones or bricks or alternatively, a pre-made holt may be purchased (for example, from NHBS.com) and installed following the manufacturer's guidelines. One holt will be installed into the remaining natural section of the stream to the east of the site and the other in the realigned section of the stream prior the commencement of planting.

Birds

6.117 In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, all works involving the demolition of buildings and/or removal of trees or hedgerows will be undertaken outside of the nesting season (1st March to 31st August inclusive). If vegetation removal is required to take place in the nesting season, then checks for breeding birds will be undertaken immediately prior to site clearance. Where active nests are found, works must cease until such a time that the nests are deemed inactive.

6.118 It is proposed to provide compensation measures such as alternative nesting habitat for birds of conservation concern that were recorded on the Proposed Development site. It is proposed to build a structure that replicates a farm building that swallows may use, and suitable nest boxes will be installed within it. It is also proposed to install dipper/ wagtail boxes along the stream to provide suitable nesting habitat for grey wagtails. Kingfisher tunnels will be installed into the banks of the stream. These will be installed during the first phase of the development[11].

6.119 It is proposed to install bird boxes in appropriate locations within the Proposed Development site. Bird boxes have been selected to provide nesting habitat for birds of conservation concern that have been recorded on the site i.e. kingfisher, swallow and grey wagtail..

Amphibians

6.120 An amphibian check will be carried out by an experienced ecologist prior to works to infill the drainage ditch to ensure that no common frog *Rana rana* or smooth newt *Lissotriton vulgaris* species are present. This check will involve a torching survey for smooth newt the night prior to infilling. A sweep-net survey immediately prior to works will also be required to check for common frog. Should amphibians be encountered during this check they will be translocated from the affected ditch to a suitable receptor site in a sensitive manner so as to avoid any mortality or injury to amphibians present.

Operational phase

6.121 In addition to the mitigation measures as set out below, construction phase mitigation measures including the erection of bird and bat boxes will be maintained throughout the operational phase of development.

Pollution prevention

6.122 Pollution of the Baldonnel Stream as a result of surface water run-off during the operation phase of the development will be prevented as outlined in the *'Engineering Services Report'* (CS Consulting, 2020). In summary, all surface waters from hardstanding areas within the Proposed Development site will pass through an oil interceptor and 'forebays' to remove detritus from the water. These waters will be retained onsite in one of the three attenuation areas prior to controlled release into the Baldonnel Stream.

[11] Guidelines on the installation of nest boxes: Chris Du Feu (2005). *Nestboxes. Extracts from British Trust for Ornithology Field Guide Number 23 with some additions and amendments.* British Trust for Ornithology, The Nunnery, Thetford, Norfolk. Available from: https://www.bto.org/sites/default/files/u15/downloads/publications/guides/nestbox.pdf

Operational lighting

6.123 The lighting plan for the Proposed Development 'External Lighting Design Report' (Thorlux Ireland, 2020) has been designed to reduce light spill and has been reviewed by an ecologist. Existing features of ecological interest and those proposed in the landscape plan (i.e. the Baldonnel Stream, the wetland area and the attenuation ponds) will not be subject to any light spill and will be kept at 0 lux. As outlined in the plan, light spill modelling has not taken into account proposed tree planting and berms which will further mitigate the effects of light spill.

Predicted (residual) impacts

Designated sites

6.124 The Proposed Development will not individually or in combination with another plan or project be likely to have a significant effect on designated sites. Therefore, there is no potential for residual impacts.

Bats

6.125 Assuming the full and successful implementation of the mitigation measures, no residual impacts are predicted on roosting/ foraging/ commuting bats at any geographical scale.

Otter

6.126 Assuming the full and successful implementation of the mitigation measures, no residual impacts are predicted on foraging/ commuting otter at any geographical scale.

Mammals (other)

6.127 Assuming the full and successful implementation of the mitigation measures, no residual impacts are predicted on mammals at any geographical scale.

Breeding birds

6.128 Residual impacts on breeding birds include their temporary displacement from the Proposed Development site during the construction phase and vegetation clearance. However, assuming the full and successful implementation of the mitigation measures, no long-term significant residual impacts are predicted on breeding birds at any geographical scale.

Wintering birds

6.129 Residual impacts on wintering birds includes the permanent loss of agricultural grassland habitat. This is considered to be a permanent significant impact at the local scale.

Amphibians

6.130 The construction of the Proposed Development is phased such that the landscaping of wetland features will be carried out in tandem with the construction of Building A. As such, the duration of impacts resulting from habitat loss will be reduced to temporary/ short-term impacts.

Hedgerows, treelines and hedgerows/ ornamental and non-native shrub

6.131 Assuming the full and successful implementation of the mitigation measures, the area of hedgerow habitat within the Proposed Development site will be increased and therefore the residual impacts will be positive over long term.

Depositing lowland rivers

6.132 Assuming the full and successful implementation of the mitigation measures, the Baldonnel stream will be ecologically enhanced as a result of proposed planting outlined in the landscape plan and therefore the residual impacts will be positive over long term.

Drainage ditches

6.133 The construction of the Proposed Development is phased such that the landscaping of wetland features will be carried out in tandem with the construction of Building A. As such, the duration of impacts resulting from habitat loss will be reduced to temporary/ short-term impacts.

Monitoring

6.134 As requested by the SDCC Heritage officer in a pre-planning meeting and in order to ensure successful implementation of the mitigation measures relating to potential light spill and bats, monitoring of activity will be undertaken pre-construction (estimated to be August 2020) and following completion of the Proposed Development. A comparison of bat activity will be undertaken and if necessary additional adjustments to the lighting will be made as necessary.

7. LAND, SOIL, GEOLOGY AND HYDROGEOLOGY

7.1 AWN Consulting Ltd (AWN) has prepared this chapter of the Environmental Impact Assessment Report (EIA Report) 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 impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

7.2 This chapter assesses and evaluates the potential impacts of the Proposed Development described in Chapter 2 (Description of the Proposed Development) on the land, soils, geological and hydrogeological environment. The impact on hydrology is addressed in Chapter 8.

Methodology

7.3 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.

7.4 The rating of potential environmental effects on the land, soil, geological and hydrogeological environment is based on the matrix presented in Table 1.2 in Chapter 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).

7.5 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 Table D.1 in Appendix D.

Guidelines

7.6 This assessment has been carried out generally in accordance with the following guidelines:

- EPA Draft EIA Report Guidelines 2017
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report, European Union 2017;
- Institute of Geologists of Ireland (IGI) '*Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements*' (2013); and
- National Roads Authority (NRA) '*Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* (2009).

7.7 The principal attributes (and impacts) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the Proposed Development 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 as requirement to remove it off-site as waste for recovery or disposal;
- 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;

- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally; and
- Vulnerability of the Proposed Development to major disasters from a geological and hydrogeological standpoint such as landslides and seismic activity.

Sources of Information

7.8 Desk-based geological and hydrogeological information on the substrata underlying the extent of the site and surrounding areas was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Geological Survey of Ireland (GSI) - online 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;
- Meath & Louth County Council(s) - illegal landfill information;
- Research papers referred to in this chapter.

7.9 Site specific data was derived from the following sources:

- Information from the Due Diligence undertaken by O'Connor Sutton Cronin & Associates, Multidisciplinary Consulting Engineers (OCSC);
- Various design site plans and drawings; and
- Consultation with civil engineers, CS Consulting Group (CS Consulting).

Receiving environment

7.10 The receiving environment is discussed in terms of land geology, soils, hydrogeology and site history including potential for existing contamination. The Proposed Development is to be located in the Grange Castle Business Park, Clondalkin, Dublin 22. This land is zoned for development. Much of the surrounding lands are already developed as data centres, pharmaceutical developments and other forms of commercial development.

Topography and setting

7.11 The site falls generally from south to north, with topographical levels ranging from c. 75mAOD in the south east to c. 68mAOD in the north-west of the site. This site is currently greenfield and was previously used for agriculture purposes. An assessment of site history using historical maps (OSI, 2019) indicates that the site has been in agricultural use since the earliest mapping available (1837-1842).

7.12 Currently, a two-story farmhouse and associated buildings are located to the north-west of the site, along the eastern side of the Old Nangor Road. The Proposed Development will include the demolition of these buildings. Recently constructed roads lie to the north (Nangor Road), south (GCBPS Access Road) and west (Baldonnell Road) of the site with a Motor Sales Business (Boland's Grangecastle) along the majority of the eastern boundary.

7.13 The site is in the catchment of the Griffeen River and the existing drainage is discussed in Chapter 9 of this EIA Report.

Areas of Geological Interest & Historic Land-Use

7.14 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 program nor is there any recorded in the South Dublin County Development Plan 2016-2022. The closest geological heritage site is the Belgard Quarry, which is located 3 km to the south-east of the site. Details of historic land use are included in Chapter 13 : Cultural Heritage.

7.15 The land surrounding the site comprises 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 uses. The closest residential building is on the north side of the Nangor Road, east of the Nangor Road/Old Nangor Road junction, but it is currently unoccupied. On the north side of Baldonnel Road there are 6 no. dwellings in a ribbon development layout. There are also a number of occupied residents on the west side of the Newcastle Road, with a motor sales business on the east side of the road. Lastly, there are is a number of dwellings on the north side of Aylmer Road.

7.16 According to the EPA (2019), there are a number of licensed Integrated Pollution Prevention and Control (IPPC) and waste facilities in the vicinity but these are located c. 3 km away from the site. Consultation with South Dublin County Council confirmed that there are no known illegal/historic landfills within 500 meters of the site.

Regional Soils

7.17 Figure 7.1 shows the regional soil coverage in the area of the Proposed Development site. The soil type beneath the local area is composed of BminPD and BMinDW. BminPD and can be defined as Surface water Gleys / Ground water Gleys Basic and BMinDW soils by Grey Brown Podzolics/Brown earths.

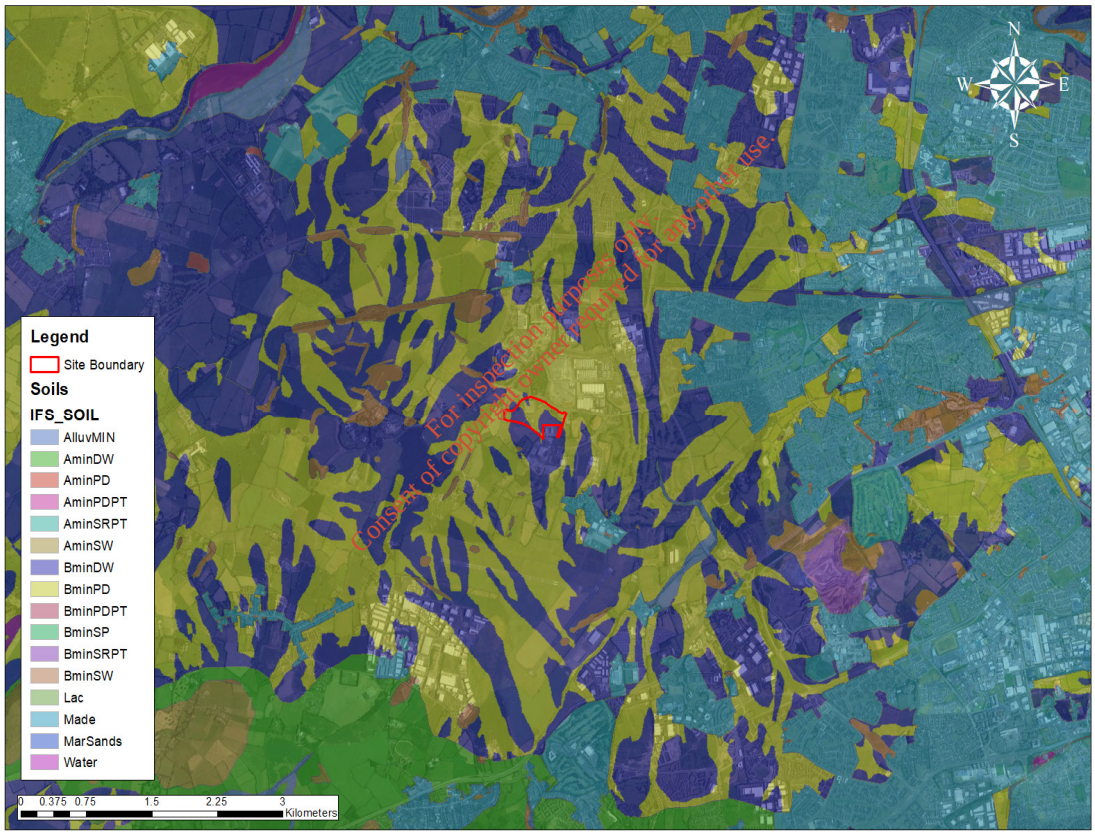

Figure 7.1 Soils map for the Proposed Development site (boundary indicated in red) (GSI, 2019)

7.18 The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period and which extended up to 10,000 years ago, and the Holocene Epoch, which extends from that time to the present day.

7.19 The GSI/Teagasc subsoil mapping database of the quaternary sediments in the area of the Proposed Development site indicates two principal soil types, as shown in Figure 7.2 on the following page. These comprise Quaternary Glacial Till (TLs). The Glacial Till is derived from limestone and is a common soil cover in this region.

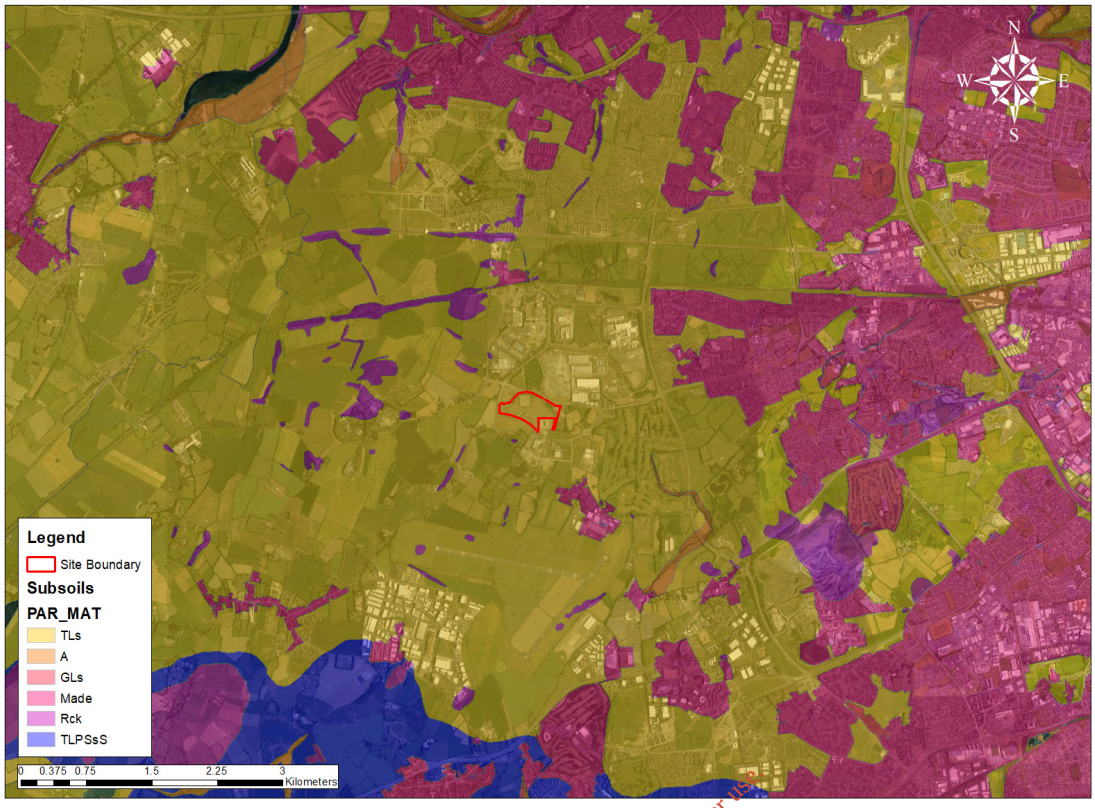

Figure 7.2 Subsoils map for the Proposed Development site (boundary indicated in red) (GSI, 2019)

7.20 The following ground conditions were encountered in the site-specific due diligence investigations undertaken in April and May 2019. There were 16 no. cable percussive boreholes (with rotary coring carried out at 8 of the locations) drilled and 6 no. trial pits excavated across the site (Figure 7.3 shows the borehole/trial pit locations).

- The site is overlain by topsoil in most locations. However, a thin covering of Made Ground was encountered in boreholes BH01 and BH02 comprising granular fill and gravelly clay.
- The underlying deposits comprise sandy gravelly clay. Stiff and very stiff deposits were generally encountered within 1.0 to 1.5 metres below ground level (BGL). Limestone bedrock was confirmed to be present at depths of typically 2.0 to 2.6 m BGL, deepening to 3.6 m BGL towards the north of the site (RC07).
- Based on the results of the standard penetration (SPT) tests, bearing pressures of the order of 150 kPa could be assumed for the stiff gravelly clay soils, increasing to c. 250 to 300 kPa for the very stiff deposits.
- During the site investigations, water strikes were encountered in most boreholes at depths between 2.0m and 2.5m BGL. Moderate groundwater ingress was also observed in several trial pits. However, when the rotary core holes were drilled, there was no groundwater inflows in the bedrock. This would suggest that the water strikes found in the boreholes and trial pits were from perched water at the weathered interface of the overburden and bedrock.

Figure 7.3 Site Investigation Sample Locations (site boundary indicated in red) (Source: OCSC, 2019).

Regional Geology

7.21 Inspection of available GSI records (2019) show 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 the Lucan formation, also called the Dinantian (Upper Impure) Limestones or 'Calp' limestone that is dark grey to black limestone and shale. (Figure 7.4 below).

7.22 No bedrock outcrops were encountered on the site. However, bedrock outcrops occur at several locations within this region as illustrated in Figure 7.4. The GSI database currently lists no karst features in the immediate vicinity of the Proposed Development site and significant karstification would not be expected in this type of limestone.

7.23 In terms of the structural relationship of the area, the GSI (2019) bedrock geology map (100K structural database) shows some fault lines to the south and east of the Proposed Development site.

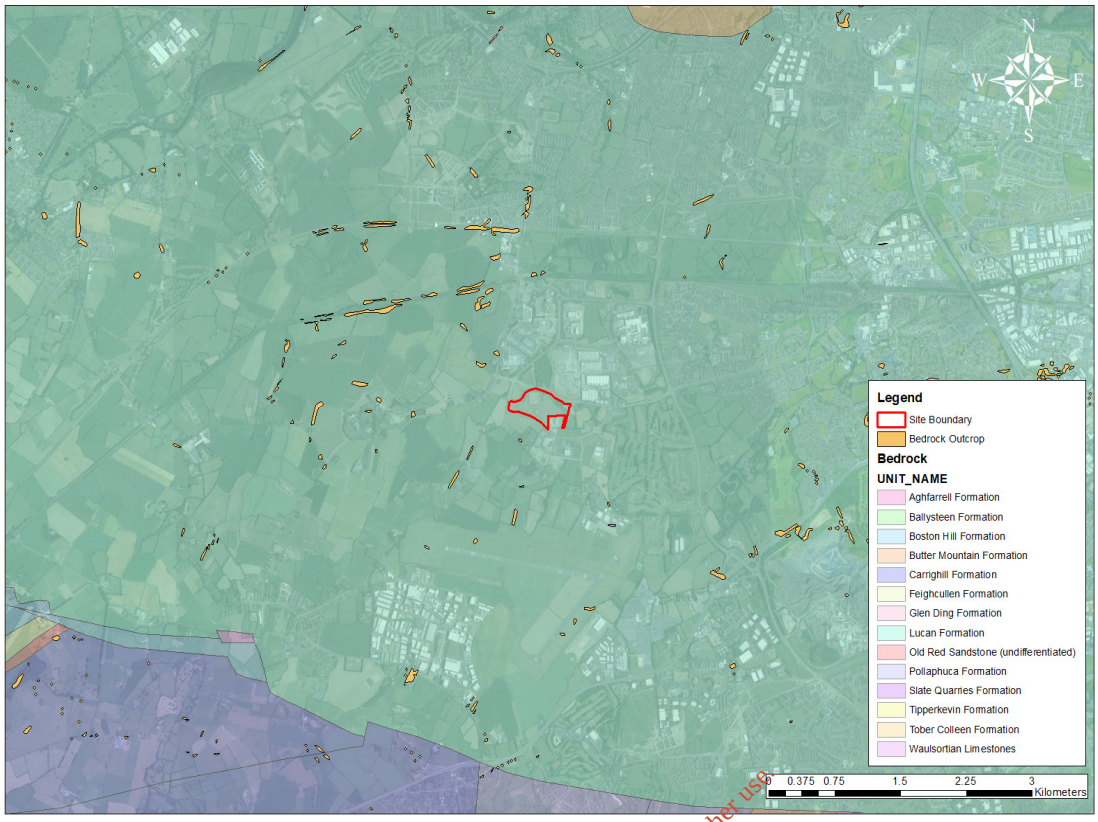

Figure 7.4 Bedrock geology map (site boundary indicated in red) (GSI, 2019)

Regional Hydrogeology

Description of the Groundwater Body

7.24 The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

7.25 The bedrock aquifers underlying the Proposed Development site according to the GSI National Draft Bedrock Aquifer Map are classified as Dinantian Limestones (Calp). The GSI has classified this aquifer as Locally Important (Ll) i.e. an aquifer which is moderately productive only in local zones. Figure 7.5 presents the bedrock aquifer map for the Proposed Development area.

Figure 7.5 Aquifer Classification map (*Source: www.gsi.ie*)

7.26 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/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of or of mixtures of peat, sand, gravel, glacial till, clays or silts).

7.27 The GSI currently classifies the aquifer vulnerability in the region of the Proposed Development as 'Extreme' (E) on the west of the site and 'High' (H) on the east of the site. Extreme vulnerability indicates an overburden depth of 0-3m is present, while High vulnerability indicates an overburden depth of 3-5m is present. Site investigation confirmed that presence of limestone bedrock was found at depths that were typically in the range 2.0 to 2.6 m BGL. This can be seen in Figure 7.6 found on the next page.

Groundwater Wells and Flow Direction

7.28 The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland. This current index does not show any wells drilled or springs at the site or surrounding area with the nearest recorded wells located over 3km to the west and east 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 source protection zones in the immediate vicinity of the site.

7.29 Figure 7.7 presents the GSI well search for the area surrounding the site (Note this source does not include all wells) and Table 7.1, both on the following page, summarises the details of wells recorded within this search area.

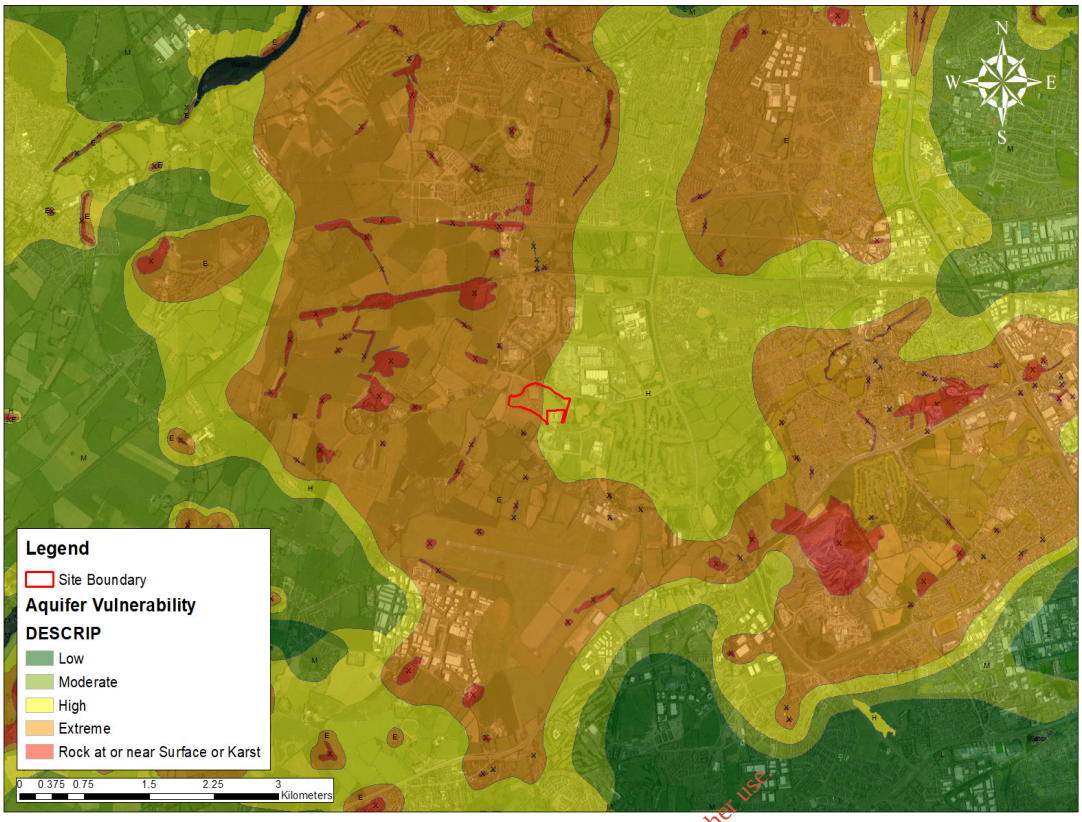

Figure 7.6 Aquifer Vulnerability map (Source: www.gsi.ie)

Figure 7.7 GSI Well Search (*GSI, 2019*)

Table 7.1 GSI Well Index Table from well search (GSI, 2019)

GSI Name	Type	Depth to Bedrock	Townland	County	Use	Yield Class	Yield m3/d
2923SEW006	Borehole	3	Clondalkin	Dublin	Industrial	Good	157.1
2923SEW005	Borehole	1.2	Clondalkin	Dublin	Industrial	Good	185
2923SEW018	Borehole	6.3	Wilkinstown	Dublin	Industrial	Excellent	480
2923EW041	Spring		Bridswell Common	Dublin			
2923SEW025	Borehole	7	Fox and Geese	Dublin	Industrial	Good	384
2923WW207	Borehole	1.5	Lucan	Dublin	Unknown	Poor	35
2921NEW002	Borehole	2.1	Cheeverstown	Dublin	Unknown	Good	109.1
2921NEW003	Borehole		Belgard	Dublin	Industrial	Excellent	654
2921NWW007	Spring		Rathcole	Dublin			
2921NWW004	Borehole	0.9	Highdownhill	Dublin	Domestic		
2921NWW130	Borehole	6	Lyons Demesne	Dublin	Unknown	Good	390
2921NWW128	Borehole	30	Lyons Demesne	Dublin	Unknown	Poor	10
2921NWW129	Borehole		Lyons Demesne	Dublin	Unknown	Moderate	75
2923SWW205	Spring		Loughtown Lower	Dublin			
2923SW196	Borehole	1.2	Loughlinstown	Dublin	Other		
2923SWW129	Borehole	3.1	Stacumny	Dublin	Unknown	Good	218.2
2923SWW202	Borehole	2	Backstown	Dublin	Other	Poor	17.5
2923SWW203	Borehole	3	Backstown	Dublin	Other		
2923SWW204	Borehole	3	Backstown	Dublin	Other	Poor	39.9
2923SWW133	Borehole	2.5	Castletown	Dublin	Other		
2923SWW134	Borehole	3.5	Castletown	Dublin	Other		
2923SWW135	Borehole	2.2	Castletown	Dublin	Other		
2923SWW136	Borehole	3.9	Castletown	Dublin	Other		

7.30 Based on a review of available information, local groundwater flow is expected to be to the north. Information taken from the due diligence states that groundwater ingress occurred in most boreholes at depths of between 2.0 and 2.5m BGL i.e. the weathered surface. Final levels were in the range 0.5 to 1.4m BGL. Moderate groundwater ingress was also observed in several trial pits. However, when the rotary core holes were drilled, there was no groundwater inflows in the bedrock. This would suggest that the water strikes found in the boreholes and trial pits were from perched water at the weathered interface of the overburden and bedrock.

Groundwater quality

7.31 The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required '*Good Water Status'* for all European water by 2015, 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'*.

7.32 The Groundwater Body (GWB) underlying the site is the Dublin GWB (EU Groundwater Body Code: IE_EA_G_008). An assessment carried out under the Water Framework Directive 2010-2015 groundwater body (EPA, 2019) has concluded that the groundwater within the bedrock aquifer is presently of "Good status" and has a GWB risk score of "not at risk". The objective is to protect the "Good status" and "not at risk" score by recognising that the quality of the groundwater could be at risk in the future due to point and diffuse sources of pollution.

Hydrogeological features

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

Areas of Conservation

7.34 There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the facility. The nearest designated land to the site at Grange Castle Business Park is the Grand Canal pNHA (Site Code: 002104) at c.1.2kms to the north of the northern boundary of the overall site. There is no direct hydrogeological link with the canal. Refer to Chapter 6 - Biodiversity for further details.

Cross sections

7.35 Figure 7.8 and 7.9 present the location of representative cross sections through the site to show the local hydrogeology conceptual site model (CSM) which is as follows:

- The site falls generally from south to north, with topographical levels ranging from c. 75mAOD in the south east to c. 68mAOD in the north west of the site.
- The due diligence report indicated shallow bedrock (< 1m) to the south-eastern area of the site, lying beyond the proposed site limits. Within the proposed site, bedrock depths are generally between c. 2 and 3 m BGL, with the overlying soil primarily comprised firm to stiff, brown or grey sandy gravelly clays.
- The underlying aquifer is a Locally Important (LI) aquifer with no evidence of karstification.
- There is no evidence of a continuous water table within the clayey soil and shallow water was encountered within the weathered surface of the limestone bedrock.
- 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.
- Regional groundwater flows are in a northerly direction, towards the Griffeen River, 195m from the site; however, the potential for any impact on the baseflow in the Griffeen River as a result of the Proposed Development is low.

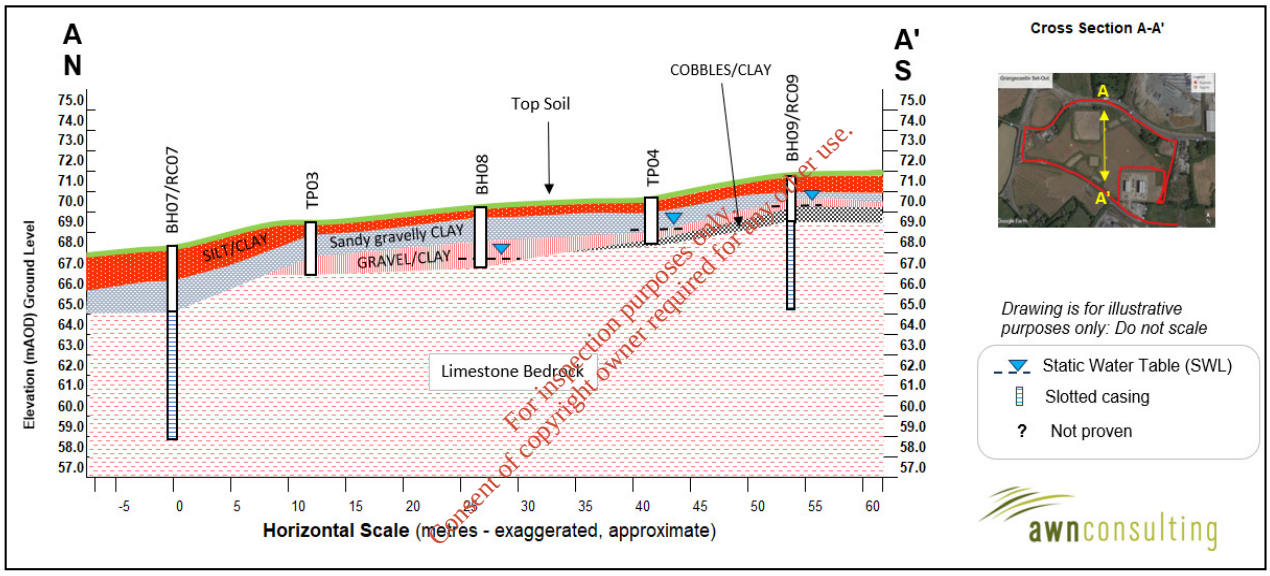

Figure 7.8 A - A' cross section of proposed site.

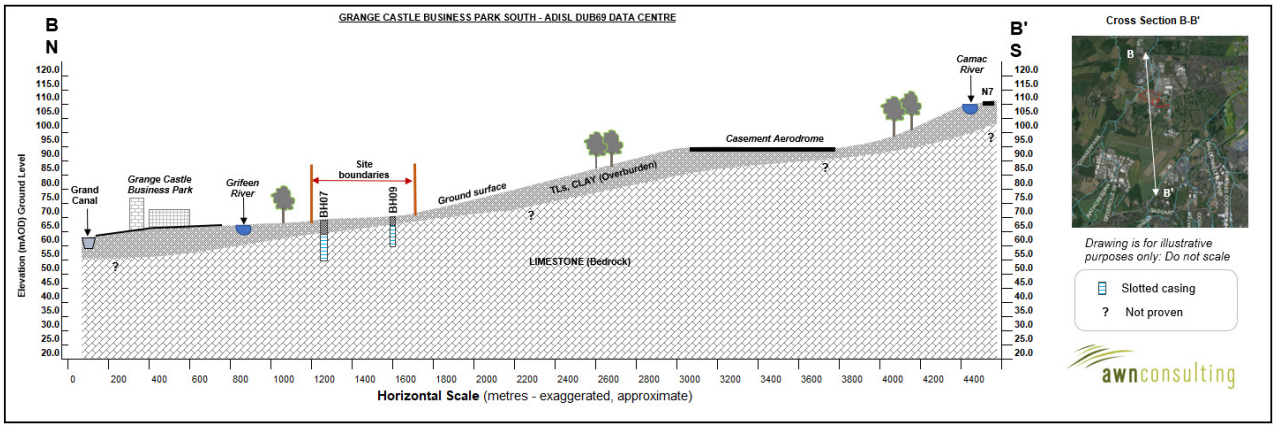

Figure 7.9 B – B' cross section of region located around the proposed site.

Rating of site importance of the geological and hydrogeological features

7.36 Based on the NRA methodology (see Appendix D), the criteria for rating site importance of hydrogeological features, the importance of the hydrogeological features at this site is rated as ***medium importance***. This is 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.

Economic Geology

7.37 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 with the nearest quarry is located c. 4km 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.

Radon

7.38 According to the EPA (now incorporating the Radiological Protection Institute of Ireland) the site location in Grange Castle is a Low Radon Area where is it estimated that between 5% - 10% of dwellings will exceed the Reference Level of 200 Bq/m^3. This is the third lowest of the five radon categories which are assessed by the EPA.

Geohazards

7.39 Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result. 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 and leads 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.

7.40 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 Ml 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.

7.41 There are no active volcanoes in Ireland so there is no risk from volcanic activity.

Land take

7.42 There will be a loss of agricultural land due to the Proposed Development however the land is within a holding currently owned by South Dublin County Council (SDCC) as a business and industrial park. The site is also zoned to provide for enterprise and employment uses subject to the provision of necessary physical infrastructure.

Summary & Type of Geological/Hydrogeological Environment

7.43 Based on the regional and site-specific information available the type of Geological/ Hydrogeological Environment as per the IGI Guidelines is:

Type B – Naturally Dynamic Hydrogeological Environment.

7.44 A summary of the site geology and hydrogeology is outlined thus:

- The Proposed Development site has been predominantly greenfield/agricultural use historically. There is no evidence of any historical waste disposal or source of contamination.
- The site is underlain by a locally important aquifer.
- The site is underlain by the Lucan formation comprising dark grey to black limestone and shale from the Carboniferous Age.

Characteristics of the Proposed Development

7.45 A detailed description of the Proposed Development is provided in Chapter 2 of this EIA Report. The activities associated with the Proposed Development which are relevant to the land, soils, geology and hydrogeological environment are detailed in Table 7.2 on the following page.

Table 7.2 Site Activities Summary

Phase	Activity	Description
Construction	Earthworks: Excavation of Superficial Deposits	Cut and fill will be required to facilitate construction of the data centres and associated ancillary development. The maximum depth of excavation required to facilitate construction, as specified by project engineers CS Consulting, is c. 4m. There will be no excavation of bedrock required as part of the Proposed Development. Subsoil stripping and localised stockpiling of soil will be required during construction. It is estimated that approximately 55,814m^3 of soils will be excavated to facilitate construction of the development. Soil will be reused on site for site levelling, roads, car parking areas, berms and other landscaping purposes.
	Storage of hazardous Material	Bunded fuel storage and wet concrete during construction phase.
	Import/Export of Materials	Suitable excavated material will be reused for site levelling, roads, car parking areas, berms and other landscaping purposes. Material removed from site may be re-used offsite for beneficial use on other sites with appropriate planning/waste permissions/derogations (e.g. in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011) as amended or will be reused, recovered and/or disposed off-site at appropriately authorised waste facilities. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product. The removal of waste from the site will be carried out in accordance with Waste Regulations, Regional Waste Plan (Eastern Midland Region) and Waste Hierarchy/Circular Economy Principals. Refer to Chapter 14 Waste Management for further detail. It is estimated that 41,500m^3 of clean engineered fill material will be required to facilitate construction.
Operation	Increase in hard standing area	Altering of local recharge due to increase in hard standing area of 8.43 ha
	Storage of hazardous Material	Fuel oil storage (diesel) will be required for the operational phase. Bulk storage for each facility will be within a bunded tank (40,000 L capacity) serviced from a contained refueling pad. Diesel will be piped from bulk storage to the back-up generator units (each one has an internal double-skinned tank). Leak detection, refueling procedures, contaminant and monitoring of run-off prior to discharge of collected water are all being carried out as standard.

7.46 As outlined in Table 7.2 the activities required for the construction phase of the Proposed Development represents the greatest risk of potential impact on the geological environment. These activities primarily pertain to the site preparation, excavation, levelling and infilling activities required to facilitate construction of Proposed Development and ancillary services.

Potential impacts of the Proposed Development

7.47 An analysis of the potential impacts of the Proposed Development on the soils, geology and hydrogeological environment during the 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 EIA Report. Remediation and mitigation measures included in the design of this project to address these potential impacts are presented in section 7.58 – 7.77.

Construction phase

7.48 The following potential effects to land soil and groundwater have been considered:

- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content which can impact on water bodies. The potential risk from this indirect impact to water bodies and/or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.
- Due to the lack of development at the site and the historical agricultural use the risk of contaminated soils being present onsite is low. Nonetheless material, which is exported from site, if not correctly managed or handled, could impact negatively on human beings (onsite and offsite) as well as water and soil environments. However, it is currently anticipated that all soil will be reused on site.
- As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer. The potential main contaminants include:
  - Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
  - Cement/concrete (increase turbidity and pH) – arising from construction materials;
  - Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
  - Wastewater (nutrient and microbial rich) – arising from poor on-site toilets and washrooms.

Accidental spills and leaks

7.49 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.

7.50 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 underlying groundwater. Groundwater vulnerability at the site is currently classified as Extreme and High. 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.

Loss of agricultural land

7.51 There will be local loss of agricultural soil however, the area of development is small in the context of the overall agricultural land available in the region and has been zoned EE with an objective to facilitate enterprise and employment development. There will be no impact to mineral resources in the area as a result of the Proposed Development.

7.52 These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined in section 7.57 – 7.72.

Operational phase

7.53 The following risks have been considered in relation to the operational phase of the development:

- During the operational phase there is a potential for leaks and spillages from the fuel storage (bulk storage and local storage at the back-up generators) to occur on site. In addition to this there is a potential for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental emissions of oil, petrol or diesel could cause soil/groundwater contamination if the emissions are unmitigated.
- In the event of a fire at the facility, firewater will also need to be contained or it may contaminate soil/groundwater.

7.54 These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined in section 7.73 – 7.77.

Do Nothing Scenario

7.55 Should the Proposed Development not take place the land, soils, geological and hydrogeological environment would not be subject to changes with no soil removal or hardstand cover. The site would remain greenfield, until such time as a similar or alternative development consistent with the land use zoning is granted permission and constructed.

Remedial and mitigation measures

7.56 This section describes a range of mitigation measures designed to avoid or reduce any potential adverse geological and hydrogeological impacts identified.

Construction phase

7.57 In order to minimise impacts on the soils and geology environment a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of soil excavation and export from site;
- Sources of fill and aggregates for the Proposed Development;
- Fuel and chemical handling, transport and storage; and
- Control of water during construction.

Construction Environment Management Plan

7.58 In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator.

7.59 A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractors during the construction and operational phases. The CEMP will cover all potentially polluting activities and include emergency response procedures. All personnel working on the site will be trained in the implementation of the procedures.

Control of soil excavation

7.60 Subsoil will be excavated to facilitate the construction of foundations, access roads, car parking areas, expansion of drainage connections and other ancillary works. The Proposed Development will incorporate the reduction, reuse and recycle approach in terms of soil excavations on site. The construction will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Reuse of 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. It is envisaged that any soil excavated will be retained on site and reused as fill material or landscaping. The project engineers, CS Consulting, have estimated that c. 55,814m^3 of spoil will be

generated. It is envisaged that all of this material will be re-used on site in the proposed preparatory levelling phase.

7.61 It is unlikely that any contaminated material will be encountered during construction of the Proposed Development. Nonetheless, any excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil. In the unlikely event that any potentially contaminated soils are encountered, they should be tested and classified as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication, HazWasteOnline tool or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with *EC Decision 2003/33/EC*. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

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

7.63 Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.

Export of material from site

7.64 It is currently envisioned that all soil/stones arising on the site will be re-used on site. In the event that any excavated material requires removal off-site, it may be removed as either 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 spoil as a by-product. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product. Where material cannot be reused off site it will be sent for recovery or disposal at an appropriately authorised facility. Refer to Chapter 14 Waste Management for further detail.

7.65 If any waste soil requires removal from site, it will be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery/disposal offsite. Refer to Chapter 14 Waste Management for further relevant information.

Sources of fill and aggregates

7.66 All fill and aggregate for the Proposed Development will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the Proposed Development;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

Fuel and chemical handling

7.67 The following mitigation measures will be taken at the construction stage in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site; and
- Where mobile fuel bowsers are used the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit
  - Operatives must have spill response training; and

– Drip trays used on any required mobile fuel units.

7.68 In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

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

7.69 The aforementioned list of measures is non-exhaustive and will be included in the CEMP.

Control of water during construction

7.70 Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation. Due to the very low permeability of the overburden and the relative shallow nature for foundation excavations, infiltration to the underlying aquifer is not anticipated.

7.71 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses/ drainage ditches.

7.72 Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps), 20m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

Operational phase

7.73 During the operational phase of the Proposed Development site there is limited potential for site activities to impact on the geological and hydrogeological environment of the area. There will be no emissions to ground or the underlying aquifer from operational activities.

Environmental procedures

7.74 As detailed in Section 2.105 in Chapter 2 the operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to operation of the Proposed Development, a comprehensive set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures.

Fuel storage

7.75 The primary potential impact relates to a failure or accidental spill of diesel fuel which is stored and used on site for back-up power generation.

7.76 In order to minimise any impact on the underlying subsurface strata from material spillages, the fuel storage tanks are located above ground in designated fuel storage bunds with an impervious base. Three no. 40,000 litre bunded tanks will provided next to each data centre. They will be bunded to volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunds will be diverted for collection and safe disposal. Fuel delivery to the bulk storage tanks will take place within designated bunded unloading areas. Diesel will be piped

from the bulk storage tanks to belly tanks at each of the back-up generator units. The belly tanks will be double skinned. Delivery of fuel will be undertaken following a documented procedure which minimises risk of spills and spill containment/clean-up kit shall be readily available on site. It is anticipated, based on the Operator's experience, that the back-up generators will rarely be used.

Increase in hard stand

7.77 A proportion of the development area will be covered in hardstand (c. 8.43ha). This provides protection to the underlying aquifer but also reduces local recharge in this area of the aquifer. As the area of aquifer is large this reduction in local recharge will have no significant change in the natural hydrogeological regime.

Predicted impact of the Proposed Development

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

Construction phase

7.79 The implementation of mitigation measures outlined in Section 7.57 – 7.72 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short to medium term-imperceptible-neutral***. Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Operational phase

7.80 The implementation of mitigation measures highlighted in Section 7.73 – 7.77 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral.*** Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Residual impacts

7.81 Based on the natural conditions present and with appropriate mitigation measures (see Section 7.57-7.77) to reduce the potential for any impact of accidental discharges to ground during this phase, the potential impact on land soils, geology and hydrogeology during construction (following EPA, 2017) are considered to have a ***short to medium term, imperceptible*** significance, with a ***neutral*** impact on quality.

7.82 There are no likely significant impacts on the land, geological or hydrogeological environment associated with the proposed operational development of the site with mitigation in place. As such the impact is considered to have a ***long-term, imperceptible*** significance with a ***neutral*** impact on quality i.e. no effects of effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.

7.83 Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible*** for the construction and operational phases.

Cumulative effect

7.84 The implementation of mitigation measures highlighted in Section 7.57 to 7.77 will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral.*** Following the NRA criteria for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***Negligible***.

8. HYDROLOGY

8.1 This chapter assesses and evaluates the potential impacts of the Proposed Development described in Chapter 3 (Description of the Proposed Development) on the surrounding water and hydrological environment. The impact on land, soils, geology and hydrogeology is addressed in Chapter 7. Chapter 16, Material Assets addresses the impacts on water supply, wastewater and storm water drainage.

Methodology

8.2 The methodology used in this assessment follows current European and Irish guidance as outlined in:

- EPA Draft EIA Report Guidelines 2017
- European Commission *'Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report'* 2017
- National Roads Authority (NRA) '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes',* by the National Roads Authority (2009).

Criteria for Rating Impacts

8.3 In assessing likely potential and predicted impacts, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

8.4 The quality, significance and duration of potential impacts defined in accordance with the criteria provided in the EPA Draft EIA Report Guidelines (2017) for describing effects are summarised in Table 1.2 in Chapter 1. In addition, due significance is also given to the document entitled '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* by the National Roads Authority (2009) where appropriate. The National Roads Authority (NRA) criteria is summarised in Table D.1, Appendix D.

Sources of information

8.5 This assessment was considered in the context of the available baseline information, potential impacts, consultations with statutory bodies and other parties, and other available relevant information. In collating this information, the following sources of information and references were consulted:

- Latest EPA Maps & Envision water quality monitoring data for watercourses in the area (these data can be accessed at https://gis.epa.ie/EPAMaps/ & catchments.ie);
- National River Basin Management Plan 2018-2021;
- Eastern River Basin District (ERBD) Management Plan;
- 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);
- Flood points & Historical Floods – Office of Public Works (OPW) floods website www.floodmaps.ie;
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports;
- Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' (Inland Fisheries Ireland, 2016);
- South Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council;
- Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0 (Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council);
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001);
- South Dublin County Development Plan 2016-2022 (South Dublin County Council, 2016).

8.6 Other relevant documentation consulted as part of this assessment included the following:

- Information from the Due Diligence Report, prepared by O'Connor Sutton Cronin & Associates, Multidisciplinary Consulting Engineers (OCSC).
- Various design site plans and drawings; and
- Consultation with project engineers, CS Consulting Group (CS Consulting).

Receiving environment

8.7 The Proposed Development is to be located on a portion on lands formerly used for agriculture located in the Grange Castle Business Park, Clondalkin, Dublin 22. This land is zoned for development. Much of the surrounding lands have been recently developed for various data centre, pharmaceutical and other similar uses.

Hydrology (Surface Water)

8.8 The site falls generally from south to north, with topographical levels ranging from c. 75mAOD in the south east to c. 68mAOD in the north west of the site. The Proposed Development is within the River Liffey catchment, which encompasses an area of approximately 1,369 km^2. The river extends from the mountains of Kippure and Tonduff in County Wicklow to the sea at Dublin Bay. The main channel covers approximately 120 km and numerous tributaries enter along its course. The Proposed Development site is within the sub catchment of the Griffeen River and Baldonnel Stream which are tributaries of the River Liffey.

8.9 The Griffeen River (stream) is located to the north of the site. The Griffeen River rises in the townland of Greenoge, approximately 3.5 km south of the Proposed Development. It flows in a northerly direction to the west of the site and 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 Grange Castle Business Park.

8.10 The Baldonnel Stream runs roughly east to west along the north-eastern corner of the site. The river is in three distinct forms. The eastern section, which runs over the north east corner of the site, is in its natural condition and runs at surface for approximately 200m from the boundary with Boland's Grangecastle in an open ditch. The central 280m length of stream has been realigned and borders the northern boundary of the site. This section of the river runs on the surface in a newly formed channel parallel to the Nangor Road. The final, western reach is in a 200m culvert and borders the north-west boundary of the site. This section of the stream continues westwards to outfall to the Griffeen River at a point south east of the junction of the New Nangor and Baldonnel roads.

8.11 Other notable hydrological features near the Proposed Development are the Camac river and the stream called 'Miltown 09' by the EPA. The River Camac runs from the south to the north east, approximately 2.5km south west of the Proposed Development site. The River Camac catchment from immediately downstream of Baldonnel Business Park has an estimated catchment area of 13.6km^2 and is steeply to moderately sloping (1% to 10%). The catchment area consists largely of greenfield, a section of the residential areas on the outskirts of Saggart, Baldonnel Business Park and one-off residential/ commercial developments. The local hydrological environment as shown on www.catchments.ie is indicated on Figure 8.1 on the following page. The Miltown 09 is indicated as a small tributary of the Griffeen River, which has been culverted and runs through the site from north-west to south-east.

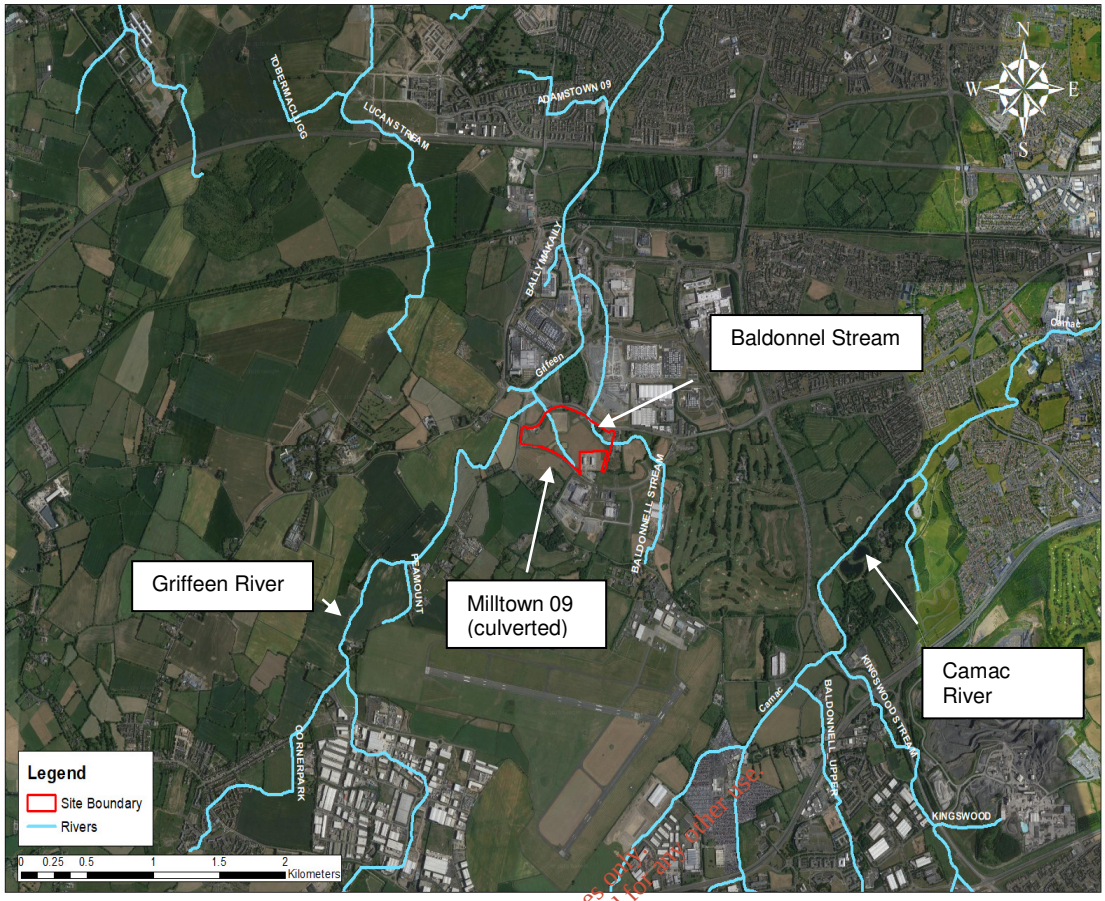

Figure 8.1 Local hydrological environment Source: https://gis.epa.ie/epamaps.

(Note In the area of the proposed development, the Milltown Stream is culverted and diverted).

Surface Water Quality

8.12 The Proposed Development is located within the former ERBD (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). The Proposed Development is situated in Hydrometric Area No. 09 of the Irish River Network and is located within the River Liffey Catchment.

8.13 The WFD requires *'Good Water Status'* for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both *'Good Ecological Status'* and *'Good Chemical Status'.* In 2009 the ERBD River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g. water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for Ireland is currently in place and will run between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD).

8.14 This second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). In more general terms, three key lessons have emerged from the first cycle and the public consultation processes. These lessons have been firmly integrated into the development of the second cycle RBMP. Firstly, the structure of multiple RBDs did not prove effective, either in terms of developing the plans efficiently or in terms of implementing those plans. Secondly, the governance and delivery structures in place for the first cycle were not as effective as expected. Thirdly, the targets set were too ambitious and were not grounded on a

sufficiently developed evidence base. The second cycle RBMP has been developed to address these points.

8.15 The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended by SI No. 77 of 2019)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)
- 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 1998

8.16 Figure 8.2 below presents the EPA surface water quality monitoring points in the context of the site and other regional drainage settings.

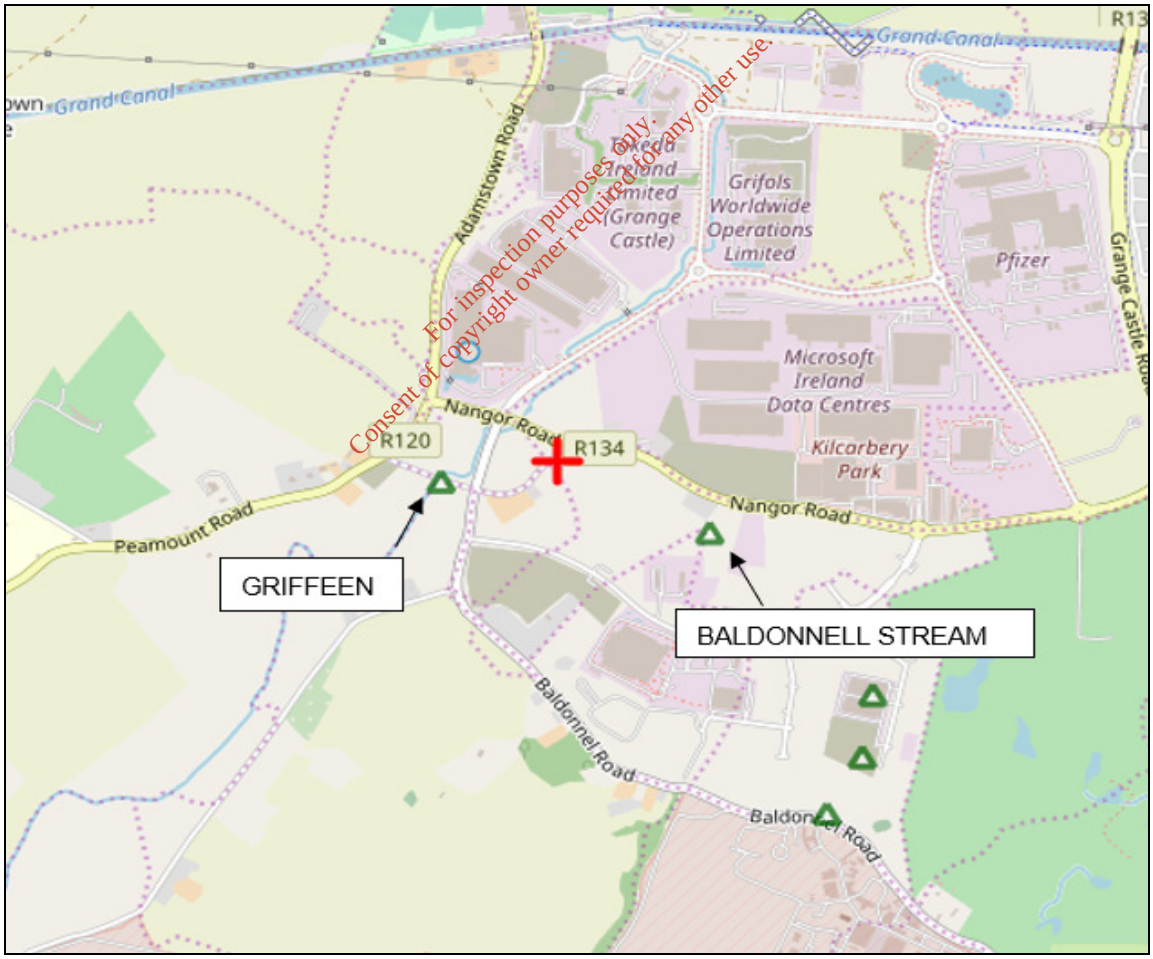

Figure 8.2 Surface Water Quality Monitoring Point (EPA, 2020) (Site location indicated with a red cross).

8.17 Surface water quality is monitored periodically by the EPA at various regional locations along principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water

quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

8.18 With reference to the site setting, the nearest EPA monitoring stations are Griffeen (RS09G010200), located at the first bridge East of Milltown, and Baldonnel Stream (RS09B090400), located at Nangor Road. The status given from the Griffeen station by the EPA is from 1991 and classified as Q3- Poor. A more recent status, a station at the Lucan Bridge, which monitors the Liffey River, is classified as 'Good'. This monitoring was undertaken between 2004 and 2016 and is taken at a point approximately 400m downstream from where the Griffeen River enters the River Liffey.

8.19 In accordance with the WFD, each river catchment within the former ERBD was assessed by the EPA and a water management plan detailing the programme of measures was put in place for each. Currently, the EPA classifies the Griffeen River, which leads into the Liffey River, waterbody as being 'at risk'. For the River Liffey WMU (Water Management Unit) the main pressure preventing achievement of 'Good Status' is diffuse agricultural pollution. As part of the River Basin Management Plan 2009-2015 the water quality of the Griffeen Lower was assessed. The overall water quality status obtained for the Griffeen Lower was 'Bad' primarily due to its fish status and overall chemical status which each obtained a 'Bad' classification. The overall objective is to achieve 'Good' water quality status by 2027 however the Griffeen Lower has an overall risk rating of '1a' therefore is at risk of not achieving 'Good' status. Figure 8.3 presents the river waterbody risk EPA map.

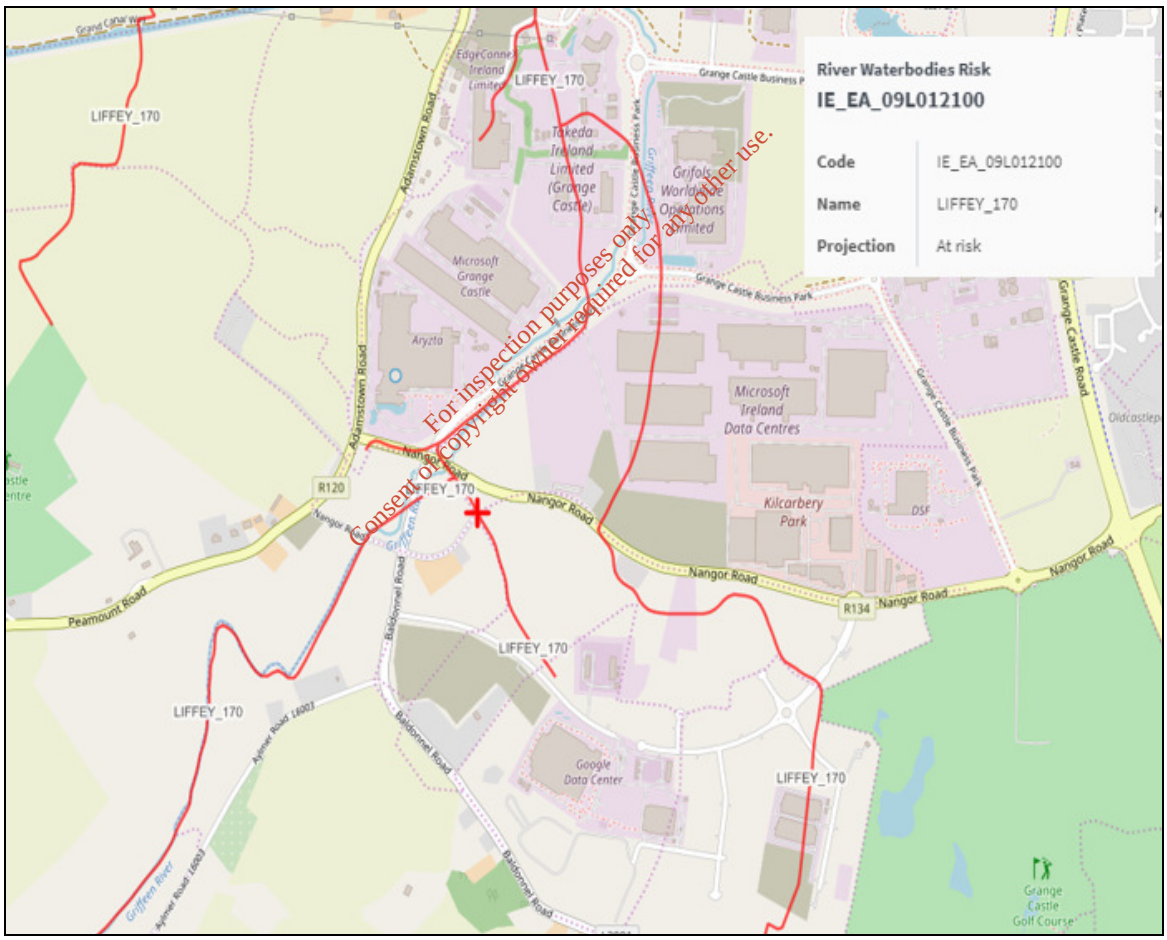

Figure 8.3 River Waterbody Score – The Griffeen River (Liffey_170 in the figure above) is currently considered 'at risk' (Site location indicated with red cross)

8.19 The County Development Plan includes measures to protect biodiversity and water quality. Specifically 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*".

Flood Risk

8.20 A Catchment Flood Risk Assessment and Management (CFRAM) Study provides flood extent and depth mapping. The Eastern Catchment Flood Risk Assessment Management (CFRAM) Study was undertaken by the Office of Public Works (OPW) and its Partners. This study identified a programme of prioritised studies, actions and works to manage the significant flood risks in the Eastern River Basin District. The areas within the Eastern Catchment recommended for further assessment as part of the Preliminary Flood Risk Assessment (PFRA) study was brought forward for further detailed hydraulic modelling.

8.21 RPS Group undertook the Grange Castle Flood Study that included hydraulic modelling, which forms part of, and Appendix C of the Flood Risk Assessment undertaken by CS Consulting Engineers and accompanies the application documentation. This report states that the Proposed Development site is within 1% AEP floodplains. As a mitigation measure, it is recommended to incorporate compensatory flood storage within the Proposed Development site with a safe discharge route to the unnamed stream located along the northern boundary. The proposed compensatory storage volume of 750m^3 plus freeboard will be designed to accommodate the 1% AEP event taking into account climate change as per the OPW guidelines for new developments. The results of the hydraulic analysis indicated that proposed compensatory storage with a limited peak discharge rate of 75l/s to the unnamed stream will not increase the flood risk to the stream and at other locations.

Rating of site importance of the hydrological features

8.22 In accordance with the 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the NRA (2009) the environmental significance of the nearest receiving environment (i.e. Griffeen River and Baldonnel Stream) has been considered as having low-quality significance or value on a local scale.

Characteristics of the Proposed Development

8.23 The Proposed Development comprises three new data centres and associated ancillary development (see Chapter 2 for a more detail description of the development).

8.24 The Baldonnel Stream currently runs east to west through the north-eastern corner of the site. The original course of the stream was northwards under the Nangor Road where it joined the Griffeen River on the western side of the Grifols facility in Grange Castle Business Park, to the north of the Proposed Development site. EPA mapping shows a second stream on site called the Miltown Stream. This stream has been culverted and diverted and as such will not be impacted by the Proposed Development. There is no proposed disturbance to flow or water quality in the Baldonnel Stream as a result of the Proposed Development. Where services are required to cross the stream, this will be undertaken by horizontal drilling beneath the bed of the river.

8.25 As part of the realignment of the Nangor Road, and as part of flood alleviation works, South Dublin City Council (SDCC) realigned Baldonnel Stream to continue along the southern edge of the Nangor Road, at surface, before continuing, via a culvert, to outfall to the Griffeen upstream of its original confluence at a new confluence immediately southeast of the new Nangor Road – Baldonnel Road junction. This watercourse offers a ready outfall for surface water from the site following standard attenuation to 2 l/s/ha in accordance with the Greater Dublin Strategic Drainage Study.

8.26 The characteristics of the Proposed Development regarding the hydrological environment, related to both construction and operation activities are described below.

Construction phase

8.27 The key civil engineering works which will have potential impact on the water and hydrological environment during construction of the Proposed Development are summarised below.

(i) Excavations of topsoil and overburden are required for site preparation and levelling, building foundations, installation of underground services, access roads and car parking areas. As such there is potential for sediment laden water in run-off if not adequately mitigated.
(ii) Possible discharge of collected rainwater during excavation works and groundworks (the extent of which is dependent on the time of year development works are carried out); and

(iii) Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site if not mitigated adequately. Mitigation measures are set out in Section 9.46 below and will be included in the detailed CEMP.

Operational phase

8.28 The key activities which will have a potential impact on the hydrological environment during operation of the Proposed Development are summarised below:

(i) Fuel will be stored on site for operation of back-up generators. Its storage will be bunded. However, accidental releases may occur during transport/filling etc. if not adequately mitigated. Localised accidental discharge of hydrocarbons (likely small quantities) could also occur in car parking areas and along roads.
(ii) Increased hard standing of c. 8.43ha will increase surface water run-off rate but this will be limited to the allowable greenfield run-off rate of 2.01 litres per second (l/s), as detailed in the *Engineering Services Report* prepared by CS Consulting through the use of collection pipes, three no. attenuation basins, forebays, a hydrobrake, and permeable surfaces, in the design of the Proposed Development.
(iii) Wastewater will be discharged to the municipal foul sewer system (no discharges to ground/surface waters).
(iv) A pre-connection enquiry (PCE) form was submitted to Irish Water (IW) in January 2020 which addressed wastewater discharges (and water demand) for the development of the indicative masterplan for overall landholding.

Potential impacts of the Proposed Development

8.29 The potential impacts in relation to surface water during the construction and operational phases are outlined below. The assessment of effects defined is based on the description of effects as set out in the EPA Draft EIA Report Guidelines (2017) (refer to Table 1.2 Chapter 1) and the NRA criteria detailed in Appendix D.

Construction phase

8.30 During the construction phase, there is a risk of accidental pollution incidences from the following sources:

- Spillage or leakage of fuels (and oils) stored on site.
- Spillage or leakage of fuels (and oils) from construction machinery or site vehicles.
- Spillage of oil or fuel from refuelling machinery on site.
- The use of concrete and cement.
- Storage of chemicals on site
- Run -off containing high loadings of suspended solids

8.31 During the construction phase, there is potential for a slight increase in run-off 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 run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage, if not adequately mitigated.

Operational phase

Surface water

8.32 Rainwater runoff from the impermeable areas of the site will be collected in storm water drainage pipes and diverted to three no. storm water attenuation basins (sized for a 1 in 100-year rainfall event and increased by 10% for the effects of climate change) with a storage volume of 3,270m^3 (Pond A), 4,353m^3 (Pond B), and 2,762m^3 (Pond C). The drainage design also includes 'forebays' for collecting small intensity rainfall events to be stored separated from the main water body. This allows for any detritus material to be removed from the water and aids in particulate removal, increasing overall storm water quality prior to disposal. SuDS design features, which are detailed in *Engineering Services Report*, prepared by CS Consulting. A 10 metre buffer zone will be placed

around the Baldonnel Stream to create distance from the Proposed Development to the open water course.

8.33 All storm water generated on site from roof areas, hardstanding, & roads will pass through a suitably sized oil separator prior to discharge.

8.34 The attenuated storm water will be discharged at the allowable greenfield run off rate of 2.01 l/s to the Baldonnel Steam. It is proposed to use 'Hydrobrake' flow control systems to achieve the required discharge rates. Further detail on the storm water drainage system and the basis of its design is provided in the *Engineering Services Report*, prepared by CS Consulting, which accompanies this planning application.

Wastewater

8.35 As stated above, a connection to the wastewater network can be facilitated subject to a connection agreement from Irish Water. It is proposed to use 225mm uPVC pipes & precast manholes for the external drainage network. It is proposed to outfall into the existing foul network at two location, one to the west & a second to the east. The proposed western outfall will cater for foul flows from Blocks A, B & 50% of Block C. The second outfall to the east will cater for 50% of Block C and the welfare facilities associated with the Substation.

8.36 In additional to domestic effluent generated on site, there is a requirement to have the capability to discharge run-off from coolant effluent into the foul network. The coolant effluent is a bi-product of potable water used, when atmospheric temperatures are in excess of 25 degrees C to cool components within the facility.

Water supply

8.37 A pre-connection enquiry (PCE) form was submitted to Irish Water (IW) in January 2020 which addressed wastewater discharges (and water demand) for the development of the indicative masterplan for overall landholding. IW have confirmed the capacity needed for standard operation of the facility. Where water demand is required during a short term drought, additional supply can be provided from an alternative source such as tanker supply.

Fuel and other accidental spills

8.38 There is a potential for leaks and spillages from the fuel tanks for the onsite generators. In addition to this there is a potential for leaks and spillages from vehicles along access roads and in parking areas. Any accidental emissions of oil, petrol or diesel could cause contamination if the emissions enter the water environment unmitigated.

8.39 There is a direct pathway to surface water from this site, however based on design and mitigation measures discussed in section 8.45 there will be no impact on the receiving surface water bodies i.e. the Baldonnel Stream and Griffeen River.

Do-Nothing Scenario

8.40 Should the Proposed Development not take place, the site will remain undeveloped and there will be no change to the onsite drainage characteristic and surface water. The site would remain greenfield, until such time as a similar or alternative development consistent with the land use zoning is granted permission and constructed.

Remedial and mitigation measures

8.41 The design of the Proposed Development has taken account of the potential impacts of the development and the risks to the water environment specific to the areas where construction is taking place.

8.42 There is a watercourse (Baldonnel Stream) in the north-eastern corner of the site which is a tributary of the Liffey River, therefore caution is required 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.

Construction phase

Construction Environmental Management Plan (CEMP)

8.43 An outline Construction Environmental Management Plan (CEMP) has been prepared by CS Consulting for the Proposed Development and is included with the planning documentation. A detailed CEMP will be prepared and maintained by the appointed contractors during the construction phase of the proposed project. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the CEMP. At a minimum, the CEMP will be formulated in consideration of the standard best international practice including, but not limited, to:

- CIRIA, (2001), *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532)* Construction Industry Research and Information Association;
- CIRIA (2002) *Control of water pollution from construction sites: guidance for consultants and contractors (SPI56)* Construction Industry Research and Information Association;
- CIRIA (2005), *Environmental Good Practice on Site* (C650); Construction Industry Research and Information Association;
- BPGCS005, *Oil Storage Guidelines*;
- CIRIA 697 (2007), *The SuDS Manual*; and
- *UK Pollution Prevention Guidelines,* (PPG) UK Environment Agency, 2004.

8.44 All contractors will be required to implement the CEMP.

Surface water run-off

8.45 As there is potential for direct run-off to a watercourse present on the site, mitigations will be put in place to manage run-off during the construction phase. A 10 metre buffer zone will be implemented along the Baldonnel Stream. 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 (silt traps, silt sacks and settlement tanks/ponds).

8.46 The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. The material will be stored away from any surface water drains. This will prevent any potential negative impact on the storm water drainage. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

8.47 Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

8.48 Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and a suitable distance of topsoil piles from surface water drains will be maintained.

Fuel and chemical handling

8.49 The following mitigation measures will be taken at the construction stage in order to prevent any spillages of fuels and prevent any resulting impacts to surface water systems;

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers will carry a spill kit and operatives must have spill response training; and
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

8.50 In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

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

8.51 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 waste waters or contaminated storm water to the underlying subsoil. Wash-down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

Accidental releases

8.52 Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

Soil removal and compaction

8.53 The project engineers have estimated that c. 55,814m^3 of material will require excavation to facilitate construction. Excavated material will be reused on site for site levelling, roads, car parking areas, berms and other landscaping purposes. Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

8.54 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 potential contaminants 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 segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Operational phase

Environmental procedures

8.55 The operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to operation of the Proposed Development, a set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures.

8.56 Specific mitigation measures related to water protection for the operational phase include the following:

Fuel and chemical handling

8.57 The containment measures planned will minimise the risk of release of solid/ liquid material spillages to the water environment. Containment measures will include storage of fuels on site in bunded containers or compartments. The design of all bunds will conform to standard bunding specifications - BS EN 1992-3:2006, *Design of Concrete Structures – Part 3: Liquid retaining and containment measures.*

Storm water & foul sewer drainage

8.58 As stated previously the proposed drainage system design has incorporated SuDS features throughout. The proposed discharge rates for the development and overall landholding have been addressed in the *Engineering Services Report,* prepared by CS Consulting, which accompanies this

planning application. The allowable discharge rate (QBAR) applicable to the Proposed Development is 2.01 l/s.

8.59 The proposed surface water attenuation system will be released via a hydrobrake to the Baldonnel Stream.

8.60 Foul drainage for the Proposed Development will be in accordance with the relevant standards for design and construction as detailed in the *Engineering Services Report,* prepared by CS Consulting.

8.61 In compliance with objective G3 of the County Development Plan, a 10 metre buffer zone will be implemented along the Baldonnel Stream, creating distance from the Proposed Development to the open watercourse. This measure will maintain a biodiversity protection zone and protect water quality. In addition, instream works proposed in the Baldonnel Stream include ecological enhancement measures. Full details of these works are included within the landscape plan accompanying this application (KFLA 2020). In brief, the banks of the stream will be enhanced with suitable native riparian planting. Kingfisher tunnels will be installed within the banks of the stream and grey wagtail boxes will also be installed in a suitable location along the stream. These works will be temporary in nature and do not have he potential to cause significant impacts on habitats or flora.

Water supply

8.62 A pre-connection enquiry (PCE) form was submitted to Irish Water (IW) in January 2020 which addressed wastewater discharges (and water demand) for the development of the indicative masterplan for overall landholding. IW have confirmed the capacity needed for standard operation of the facility. Where water demand is required during a short term drought, additional supply can be provided from an alternative source such as tanker supply.

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

Predicted impacts of the Proposed Development

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

Construction phase

8.65 The implementation of mitigation measures highlighted in Section 9.44 will ensure that the potential impacts on the surface water environment do not occur during the construction phase and that the predicted impact will be ***short to medium term-imperceptible-neutral***.

Operational phase

8.66 The implementation of mitigation measures highlighted in Section 9.55 will ensure that the potential impacts on the surface water environment do not occur during the operational phase and that the predicted impact will be ***long-term-imperceptible- neutral.***

Residual impact assessment

8.67 In the case of the Proposed Development, there will be no significant residual impacts; the potential impact on surface water during operation and closure (following the EPA Draft EIA Report Guidelines (2017) will be ***long-term, imperceptible*** and ***neutral*** i.e. an impact capable of measurement but without noticeable consequences.

Cumulative effect assessment

8.68 The Proposed Development is determined to have a ***long-term, imperceptible*** significance, with a ***neutral*** impact on quality. As all current and future developments in the surrounding area will be required to manage any discharges to surface waters in compliance with Surface water Regulations (S.I. No 77/2019), therefore there will be no likely cumulative effect to surface water quality. All developments will be required under planning to attenuate run-off to ensure there will be no increase in flooding as a result of development in the area.

9. NOISE AND VIBRATION

Introduction

9.1 The following chapter presents an assessment of the impacts of the Proposed Development, in terms of the noise and vibration impact on the local environment. This chapter has been prepared by AWN Consulting Limited.

9.2 The proposal is to develop three two-storey data centres that will have a gross floor areas of 28,573sqm (Building A), 21,725sqm (Building B) and 28,573sqm (Building C) and ancillary elements on an overall site of 16.5 hectares.

9.3 The two-storey data centres will accommodate data halls, associated electrical and mechanical plant rooms, loading bays, maintenance and storage space, office administration areas, and plant at roof level. The maximum overall height of the data centre development is 19.85m above the finished floor level with plant above.

9.4 There are 26 containerised standby diesel generators associated with Building A and C and 18 containerised standby diesel generators associated with Building B, located at ground level. It is proposed that there will be a total of 70 exhaust flues (one per generator), grouped into 35 towers of two flues, each 25m in height from the proposed ground floor level. The proposal will also include 70 no. ventilation shafts that will be located above the northern (Building A) southern (Building B) and western (Building C) ends of each generators that will measure 20m in height.

9.5 The Proposed Development will also include a single storey and temporary substation that is included in this current application.

9.6 A new two-storey 110kV GIS Substation with associated transformer compound to the east of the overall site does not form part of this application and will be applied for under separate application as detailed in Chapter 2.

9.7 The nearest occupied residential noise sensitive locations are located to the south and south west of the site and consist of single dwelling private properties. The nearest commercial units are located to the east, north and south of the site. A section of the northern and eastern boundaries of the site abuts the Old Nangor Road.

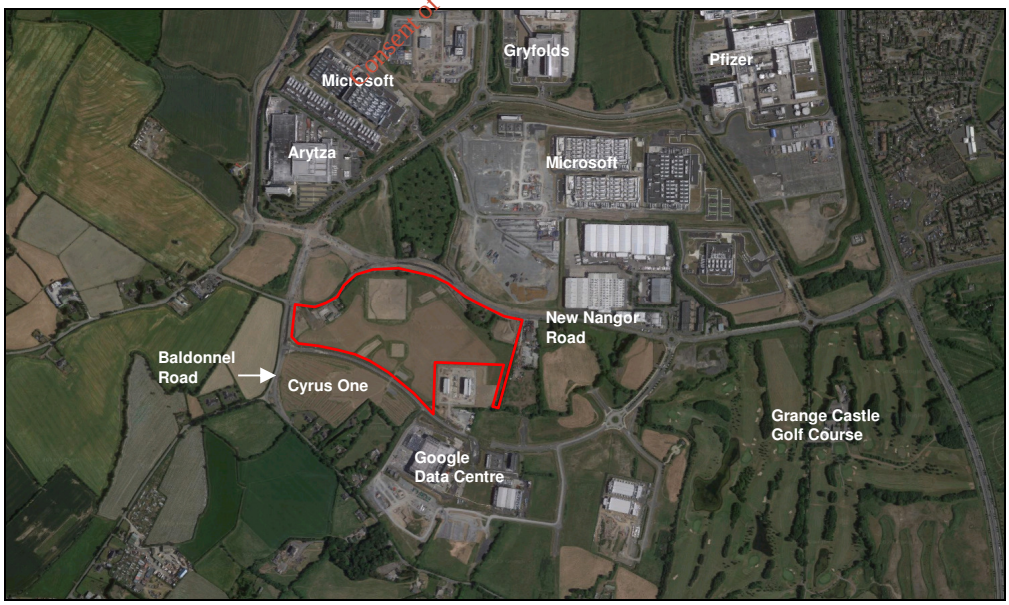

Figure 9.1 Site location and context (Source: Google Earth)

9.8 This Proposed Development has been assessed and discussed in this assessment in terms of potential noise and vibration impacts on the surrounding environment.

9.9 In the development of this application, the applicant has undertaken a master-planning exercise for the development of the entire site which is described in detail in Chapter 2 of the EIA Report. A glossary of the acoustic terminology used in this chapter is presented in Appendix F.1.

Methodology

Proposed approach

9.10 The following methodology has been adopted for this assessment:

- review appropriate guidance, typical local authority planning conditions, etc. in order to identify appropriate noise criteria for the site operations;
- 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 Development; and
- comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

9.11 Appendix F.1 of this document 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

9.12 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.

9.13 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).

9.14 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.

9.15 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.

9.16 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.

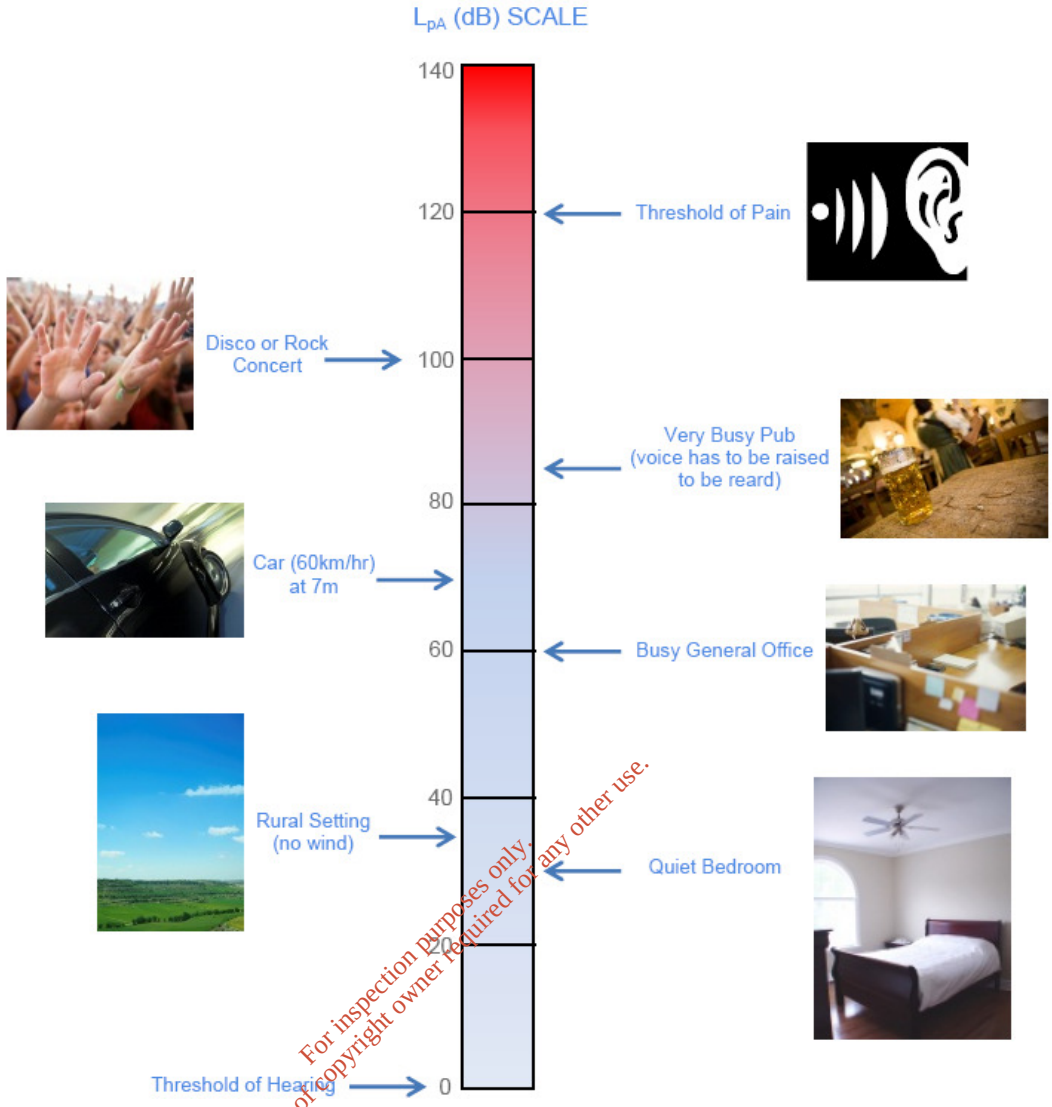

Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

Significance of impacts

9.17 The significance of noise and vibration impacts has been assessed in accordance with the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015 see Tables 9.1 to 9.3 below. As these guidelines do not quantify the impacts in decibel terms further reference has been made to the draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.

9.18 With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Table 9.1 Quality of potential effects

Quality of Effects	Definition
Negative	A change which reduces the quality of the environment (e.g. by causing a nuisance).
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment (e.g. by removing a nuisance).

9.19 The significance of an effect on the receiving environment are described as follows:

Table 9.2 Significance of effects

Significance of effects on the receiving environment	Description of potential effects
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

9.20 The duration of effects as described in the Draft EPA Guidelines are:

Table 9.3 Duration of effects

Duration of Impact	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Construction phase guidance

Criteria for rating noise impacts

9.21 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.

9.22 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*.

9.23 The approach adopted in BS5228 – 1 calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

9.24 BS5228 – 1 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.4 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS 5228 – 1. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9.4 Example threshold of potential significant effect at dwellings

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

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

9.25 It should be noted that this assessment method is only valid for residential properties.

9.26 For the appropriate periods (i.e. daytime, evening and night-time) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out as part of this assessment would indicate that the categories detailed in Table 9.5 are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

Table 9.5 Rounded baseline noise levels and associated categories

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq,T}$ (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	B	70
Evening (19:00 to 23:00hrs)	B	60
Night time (23:00 to 07:00hrs)	B	50

9.27 See paragraphs 9.118 onwards for the predicted impact assessment in relation to this site. If the construction noise level exceeds the appropriate category value, then a potential significant effect is indicated.

9.28 This assessment process determines if a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise are set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[12], which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.6 sets out these levels.

Table 9.6 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.

9.29 In exceptional circumstances there may be a requirement that certain construction works are carried out during evening and night-time periods. In these instances, the relevant evening (60dB L_{Aeq1hr}) and night-time (50dB $L_{Aeq,1hr}$) will apply.

[12] *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, March 2014*, Transport Infrastructure Ireland

9.30 Therefore, based on the above the following construction noise criteria are proposed for the site in relation to day to day works during the stated construction hours:

70dB $L_{Aeq,1hr}$ at noise sensitive location
75dB $L_{Aeq,1hr}$ at commercial property

Criteria for rating vibration impacts

9.31 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).

9.32 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 12mm/s and 5mm/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.

9.33 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*.

9.34 BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

9.35 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 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz 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 5228-2 also comments that important buildings which are difficult to repair might require special consideration on a case by case basis.

9.36 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 9.7 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 – Noise guidance

BS 4142:2014+A1:2019

9.37 BS 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound* is the industry standard method for analysing building services plant sound emissions to residential receptors. BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. It should also be noted that the Environmental Protection Agency (EPA) document "*Guidance Note for Noise: Licence Applications,*

Surveys and Assessments in Relation to Scheduled Activities" (NG4 - 2016) indicates that this assessment methodology should be used in the assessment of complaints associated with a site's operations.

9.38 For an appropriate BS 4142 assessment it is necessary to compare the measured external background sound level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS4142 advises that penalties be applied to the specific level to arrive at the rating level.

9.39 The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142 recommends the application of a 2dB penalty for a tone which is just perceptible at the receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible. In relation to intermittency, BS 4142 recommends that *If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.* The following definitions as discussed in BS 4142 are summarised below:

"*ambient sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at any given time, usually from many sources near and far, at the assessment location over a given time interval, T.
"*residual sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level of the residual sound (i.e. ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound) at the assessment location over a given time interval, T.
"*specific sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
"*rating level, $L_{Ar,T}$*"	specific sound level plus any adjustment for the characteristic features of the sound.
"*background sound level, $L_{A90,T}$*"	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

9.40 In order to establish an *initial estimate* of impact, BS 4142 states the following:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following.

a. *Typically, the greater this difference, the greater the magnitude of the impact.*
b. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
d. *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

9.41 The assessment methodology described above (i.e. comparison of rated sound level to background sound level) is quoted in BS4142 as representing a methodology to '*obtain an initial estimate'* of

impact. It is important to note that BS4142 also comments that *'Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration'*. BS4142 provides a list of potential pertinent factors that can influence the *'initial estimate'*. The plant noise assessment conducted in the following sections has been carried out with consideration of the guidance contained in BS4142 as summarised above.

9.42 As part of the survey work undertaken to inform the current assessments (See Appendix F.2), the average night-time background noise level identified in the vicinity of noise sensitive locations which are proximate to the Proposed Development, are as outlined in Table 9.8.

Table 9.8 Measured background levels & target design criteria

Location	Period	Average Background Noise Level dB L_{AF90} (Measured)	Target Criterion dB $L_{Aeq,15min}$
A	Day (07:00 to 23:00hrs)	54	55 Note A
	Night (23:00 to 07:00hrs)	35	35
B	Day (07:00 to 23:00hrs)	61	55 Note A
	Night (23:00 to 07:00hrs)	38	38
C	Day (07:00 to 23:00hrs)	51	55 Note A
	Night (23:00 to 07:00hrs)	40	40
D	Day (07:00 to 23:00hrs)	50	55 Note A
	Night (23:00 to 07:00hrs)	38	38

Note A Adopted criterion limited to 55dB(A) during daytime in line with best practice and consideration of typical local authority planning condition applied to nearby development.

9.43 Based on the review it is proposed that the design criterion of typically 55dB $L_{Aeq,15min}$ during daytime periods and 35 to 40dB $L_{Aeq,15min}$ during night-time be adopted at the façades of nearby residential properties. The night time criterion will dictate the design of the building from an acoustic perspective so this will be focused on in this assessment as compliance with the night time criterion infers compliance with the daytime one. This criterion is considered to be approximately equivalent to the lower existing background noise level measured during night-time periods at nearby residential properties and adverse impacts would not be considered likely should noise emissions be controlled to this level. Considering the L_{AF90} levels measured during various surveys it is considered that the above represents a robust design criterion.

9.44 In addition, typical planning conditions applied to developments of this nature by the relevant planning authority in terms of noise would state the following:

> *"Noise due to the normal operation of the Proposed Development, at the façade of a noise sensitive location, shall not exceed the daytime background level by more than 10dB(A) and shall not exceed the background level for evening and night time."*

9.45 It is considered the approach outlined in this section result in an adopted operational noise criterion that complies with the intent of the typical local authority planning condition for developments of this nature.

Assessment of significance

9.46 The draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party have been referenced in relation to the potential impact of changes in the ambient noise levels during the construction and the operational phases of the Proposed Development.

9.47 The findings of the Working Party are draft at present although they are of some assistance in this assessment. The draft guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise.

9.48 The draft 'Guidelines for Noise Impact Assessment' scale adopted in this assessment is shown in Table 9.9 below. The corresponding significance of impact presented in the EPA Draft EIA Report Guidelines 2017 is also presented.

Table 9.9 Noise impact scale

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIA Report's (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant, Profound

9.49 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

9.50 It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Commercial properties

9.51 A number of commercial / industrial properties are located in the vicinity of the site. In terms of noise emissions from the site it is considered that an appropriate noise criterion at these locations is 55dB $L_{Aeq,15min}$. This criterion has been derived with consideration of BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* which recommends that for *Study and work requiring concentrations* in an *Executive office* a design range of 35 to 40 dB L_{Aeq} is desirable internally. Arriving at an external noise level of 55dB $L_{Aeq,15min}$ would ensure that this range of noise levels internally will be achieved.

Emergency operation

9.52 In order to provide continuity of service a number of back-up emergency generators will be provided as part of the current proposal. These generators will only operate in a situation where there is a failure in the electricity supply from the national grid and for routine testing. Routine testing will be conducted during regular weekday daytime periods only. Section 4.4.1 of the Environmental Protection Agency (EPA) document "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*" (NG4 - 2016) contains the following comments in relation to emergency plant items:

> *'In some instances, …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'.*

9.53 It is therefore considered that the proposed noise criterion of 55dB $L_{Aeq,1hr}$ on these emergency units is appropriate. Generators will be designed and mitigated in order to achieve this design goal at nearby residential noise sensitive locations. In relation to commercial properties an emergency operation criterion of 65dB $L_{Aeq,1hr}$ is proposed.

Recommended criteria

9.54 Following review of relevant guidance, the following noise criteria are proposed for the development:

Day to Day Operation (Noise Sensitive) – **35 to 40dB $L_{Aeq,15min}$** (Ref. BS 4142:2014+A1:2019)
Generator Testing (Daytime) (Noise Sensitive) – **55dB $L_{Aeq,15min}$** (Ref. EPA NG4)
Day to Day Operation (Commercial) – **55dB $L_{Aeq,15min}$** (Ref. BS8233)
Emergency Operation (Noise Sensitive) – **55dB $L_{Aeq,15min}$** (Ref. EPA: NG4)
Emergency Operation (Commercial) – **65dB $L_{Aeq,15min}$**

9.55 Plant noise emissions are to be designed and plant selected such that they are not tonal and do not have impulsive characteristics at the nearest noise sensitive locations.

Operational phase – Vibration guidance

Criteria for rating vibration impacts

9.56 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 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.

9.57 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

9.58 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 operational 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.*

9.59 Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

Receiving environment

9.60 A series of noise surveys have been undertaken as part of the EIA Report preparation for the Proposed Development. Table 9.10 reviews the findings of these surveys. Full details of the noise monitoring are presented in Appendix F.2.

Survey and review locations

9.61 Figure 9.3 illustrates the noise sensitive locations in the vicinity of the Proposed Development site at which noise monitoring was undertaken as part of the current assessment. These can be summarised as:

Location A Located in the vicinity of the nearest noise sensitive locations to the south west of the development site.

Location B Located midway along the southern boundary of the site. The lands to the immediate south are currently being developed with construction ongoing at the time of survey work completed here. This located is chosen to be representative of those noise sensitive locations further south. A review of the planning assessment completed for the development under construction has been completed in order to inform expected levels of noise in the absence of these activities at this location.

Location C Located in the vicinity of the nearest residential noise sensitive location to the east of the Proposed Development site.

Location D Located in the vicinity of an existing structure associated with the existing pitch and putt course.

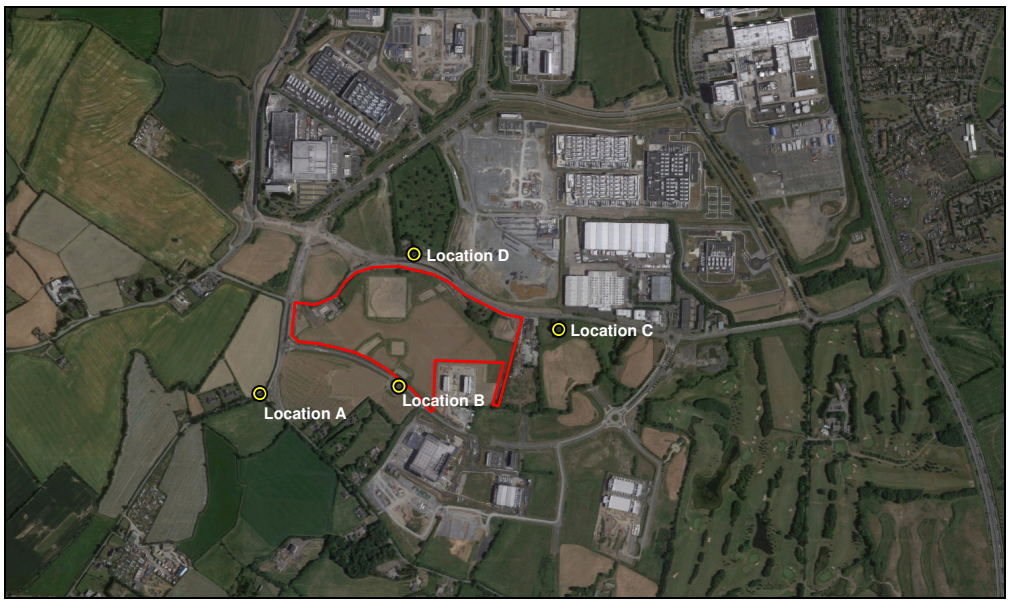

Figure 9.3 Noise monitoring locations

Comment on noise levels

9.62 Road traffic noise, both distant and local was noted as the most significant source of noise and typically dictated ambient noise levels (i.e. $L_{Aeq,T}$) at the nearest noise sensitive locations to the site during daytime and night-time periods. Background noise levels (e.g. $L_{A90,T}$) at the various locations were typically dictated by local and distant road traffic noise. These levels fell as would be expected into the early hours of the morning when the volume of traffic on the local and wider road network reduced. Distant plant noise from existing commercial sites was noted at Location B and D. Table 9.10 reviews the typical ambient and background noise levels at the sample locations discussed above.

Table 9.10 Review of typical noise levels

Location	Period	Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
			L_{Aeq} (Ambient)	L_{AF90} (Background)
A	Day	11:48	71	53
		12:59	66	56
		14:23	63	54
	Night	23:55	44	35
		01:09	37	35
B	Day	11:31	66	61
		12:42	65	61
		14:06	64	59
	Night	23:36	45	36
		00:51	40	39
C	Day	10:51	71	49
		12:07	71	51
		13:25	72	54
	Night	23:00	66	39
		00:14	61	40
D	Day	11:08	72	54
		12:24	71	47
		13:43	71	50
	Night	23:17	60	36
		00:32	60	39

9.63 These typical noise levels have been considered when discussing appropriate noise criteria in relation to the development as outlined in Table 9.8. Traffic noise from the local road network and other roads in the study area dictated noise levels at all locations during the survey periods in question. It is considered that these conservative assumptions ensured and will ensure that appropriate noise criteria are applied to Proposed Development.

Characteristics of the Proposed Development

9.64 The Proposed Development will comprise the construction of the proposed data centres and associated ancillary development over an eight year construction period. The Proposed Development consists of three data centres and associated ancillary development. A full Description of the Proposed Development is provided in Chapter 2 of this EIA Report.

9.65 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.

9.66 As stated, the construction phase will involve excavation, general site preparation over the development site and the erection of the new building over a phased construction period. Comment will also be presented in the following sections in relation to construction traffic on local roads in terms of noise and vibration.

9.67 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.

9.68 These issues are discussed in detailed in the following sections.

Potential impacts of the Proposed Development

Construction phase

9.69 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 excavators, lifting equipment, dumper trucks, compressors and generators.

9.70 The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00hrs on Saturdays. Occasional weekday evening and night works may also be required, however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner and a more stringent construction noise criteria (as per Table 9.5) will be applicable during any evening works that may be required. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

9.71 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.

9.72 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 9.11 outlines

typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

9.73 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.

Table 9.11 Typical noise levels associated with construction plant items (BS5228-1)

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq,1hr}$)
1 – Site Preparation	Pneumatic Breaker (C5.6)	95
	Rock Breaker (C9.12)	85
	Wheeled Loader Lorry (C2 28)	74
	Tracked Semi-Mobile Crusher (C9.14)	90
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
2 – Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (C3 19)	75
	Poker Vibrator (C4 33)	78
3 – Steel Erection	Tower Crane (C4.48)	76
	Sarens SCG 120 Crane	86
	Articulated lorry (C11-10)	77
4 – General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
5 - Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

9.74 A number of representative noise sensitive locations have been considered in relation to the Proposed Development as illustrated in Figure 9.4.

R01 Located at a private residence to the south west of the proposed site at a distance of some 300m from the site boundary.

R02 Located at a private residence to the south west of the proposed site at a distance of some 250m from the site boundary.

R03 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 220m from the site boundary.

R04 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 230m from the site boundary.

R05 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 250m from the site boundary.

R06 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 270m from the site boundary.

R07 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 375m from the site boundary.

R08 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 380m from the site boundary.

R09 Located at a private residence, adjoining a nearby pitch and putt course on the opposite side of the New Nangor Road, to the north of the site, some 50m from the northern site boundary.

R10 Located at nearby commercial site, on the opposite side of the Old Nangor Road, some 55m from the northern site boundary.

R11/12 Located at nearby commercial site, opposite the eastern boundary of the site.

R13 Located at a private residence located off the Old Nangor Road, to the east of the site some 120m from the eastern site boundary. It is understood this property is abandoned and is unlikely to be reoccupied going forward.

9.75 Figure 9.4 illustrates three other properties (yellow dots) to the south of the site, on the opposite side of the Cyrus One building (currently under construction). These properties are within the site boundaries of nearby commercial operations and are not occupied and are due for demolition. For the purposes of this assessment these are not considered noise sensitive receptors.

9.76 Table 9.12 presents the predicted construction noise levels in the vicinity of the site. Note for the purposes of this assessment it has been assumed that construction works are concentrated on the southern end of the site (i.e. where the closest proposed data centre to offsite noise sensitive locations will be located).

Table 9.12 Review of potential daytime construction noise impact

Location	Construction phase (dB $L_{Aeq,1hr}$)				
	Site preparation	Foundations	Steel erection	General construction	Landscaping
R01	37	29	31	17	28
R02	44	36	39	26	35
R03	42	35	38	24	32
R04	44	37	38	24	35
R05	42	35	38	25	33
R06	44	38	41	29	35
R07	43	37	39	27	34
R08	43	36	39	28	34
R09	57	50	50	38	47
R10	54	48	48	37	45
R11	50	43	44	32	40
R12	50	43	44	32	40
R13	45	39	41	30	36

9.77 There are no items of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 9.5 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 and short-term in nature and mitigation

measures will be implemented to minimise the impact of construction activities on the noise environment. Figures 9.5 to 9.9 present indicative contours for the various construction phases identified for the construction of the Proposed Development.

9.78 It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 07:00 to 18:00hrs Monday to Friday and 08:00 to 14:00hrs on Saturdays. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. 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. A more stringent construction noise criteria (as per Section 9.29) will be applicable during any evening works that may be required.

Construction traffic

9.79 In terms of the additional construction traffic on local roads that will be generated as a result of the Proposed Development the following comment is presented: Considering 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 the construction phase associated with various phases of the development, as outlined in the relevant sections of Chapter 12 will not result in a significant noise impact.

Review of construction impacts

9.80 In terms of noise associated with these construction activities the associated effect is stated to be:

Quality	***Significance***	***Duration***
Negative	*Slight*	*Short Term*

9.81 In terms of vibration due to the distance of activities from the site to the nearest sensitive locations and controlling vibration levels to those detailed in Table 9.7 the associated effect is stated to be

Quality	***Significance***	***Duration***
Neutral	*Imperceptible*	*Short Term*

Figure 9.4 Sample sensitive locations considered for assessment

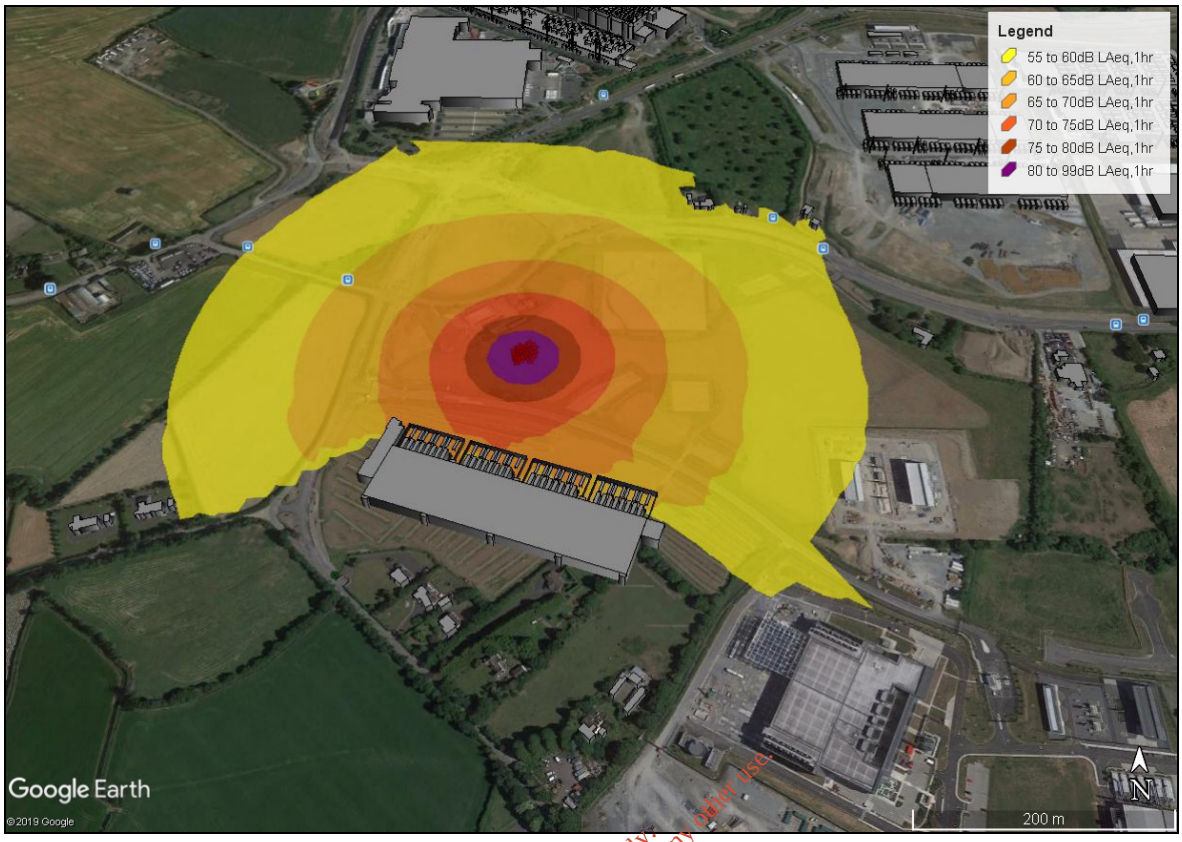

Figure 9.5 Construction noise contour – site preparation

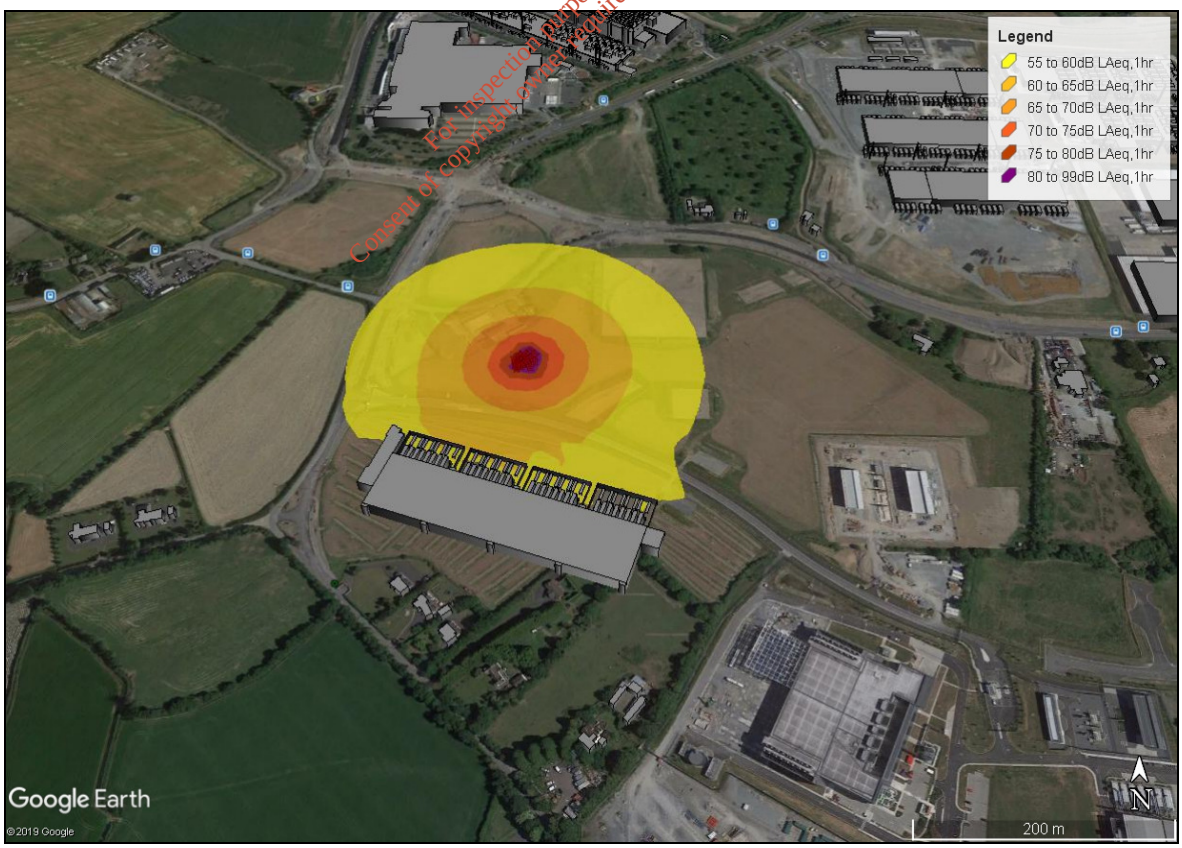

Figure 9.6 Construction noise contour – foundations

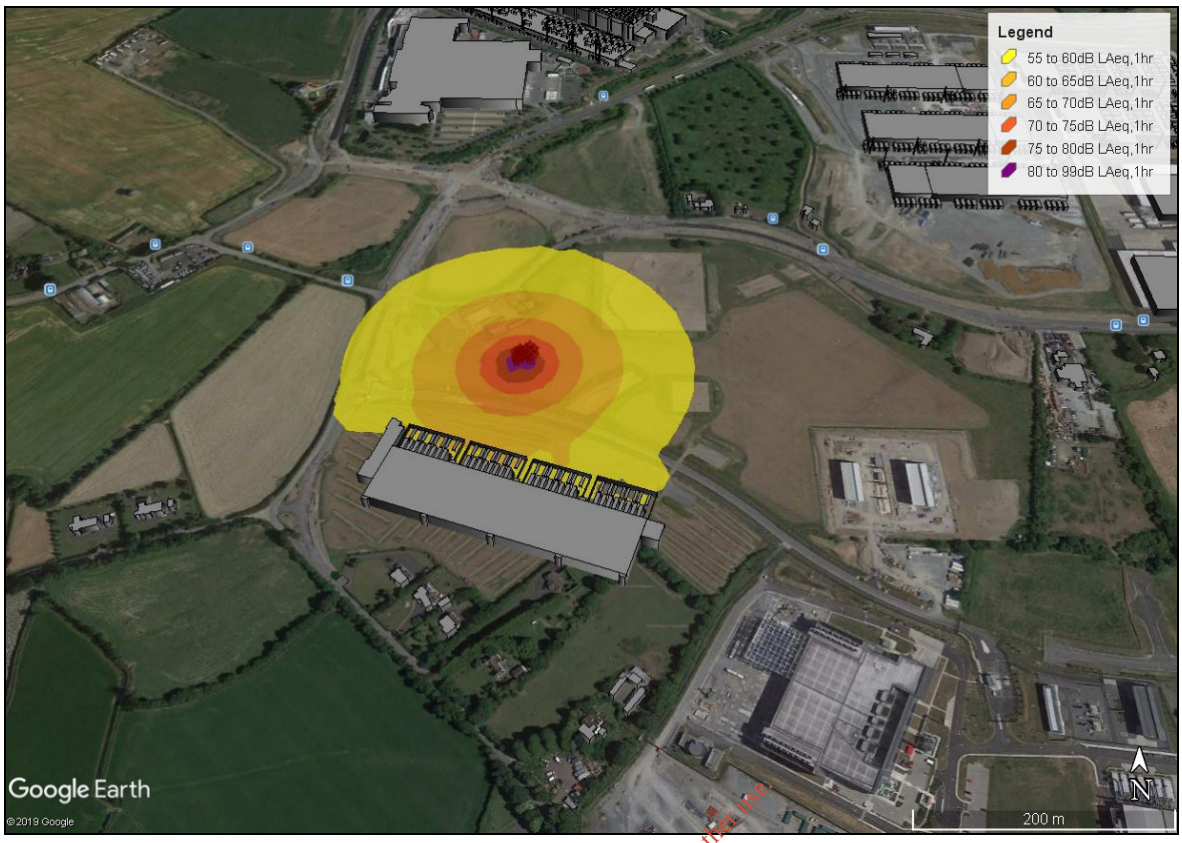

Figure 9.7 Construction noise contour – steel erection

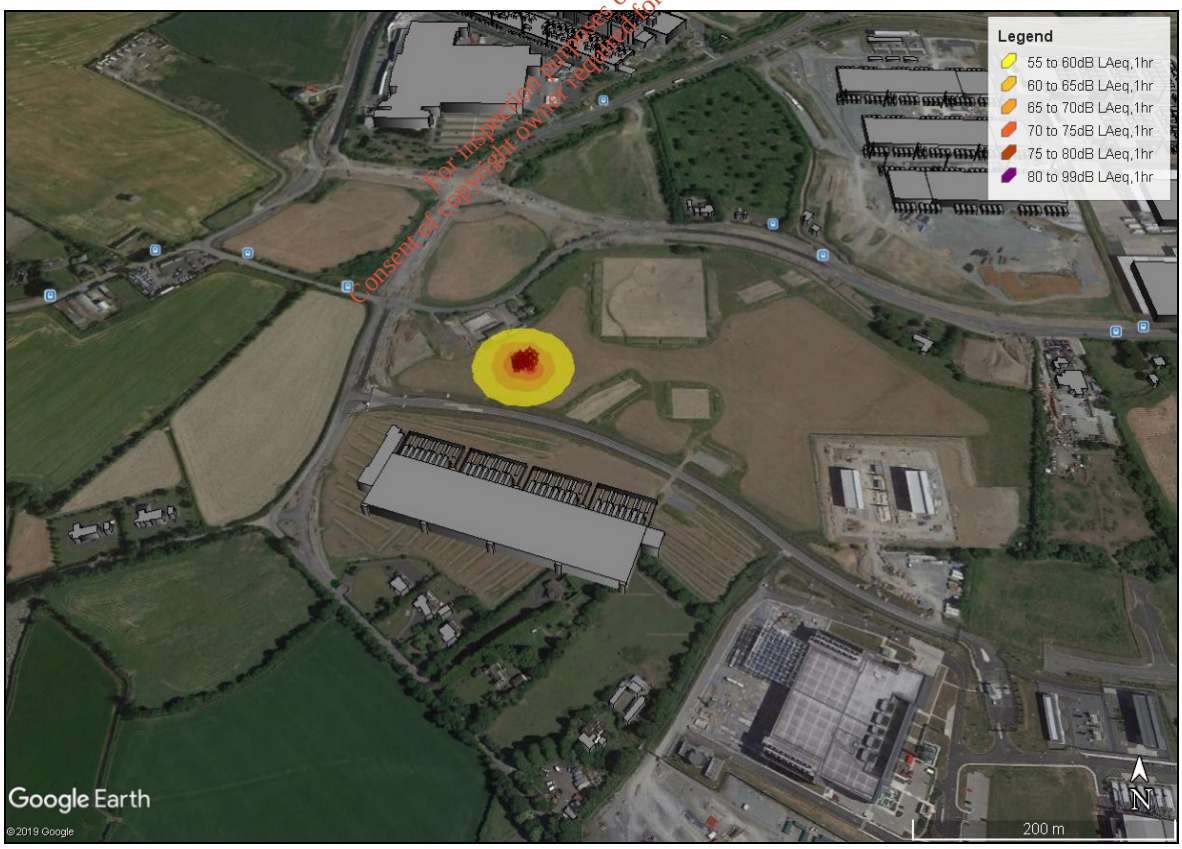

Figure 9.8 Construction noise contour – general construction

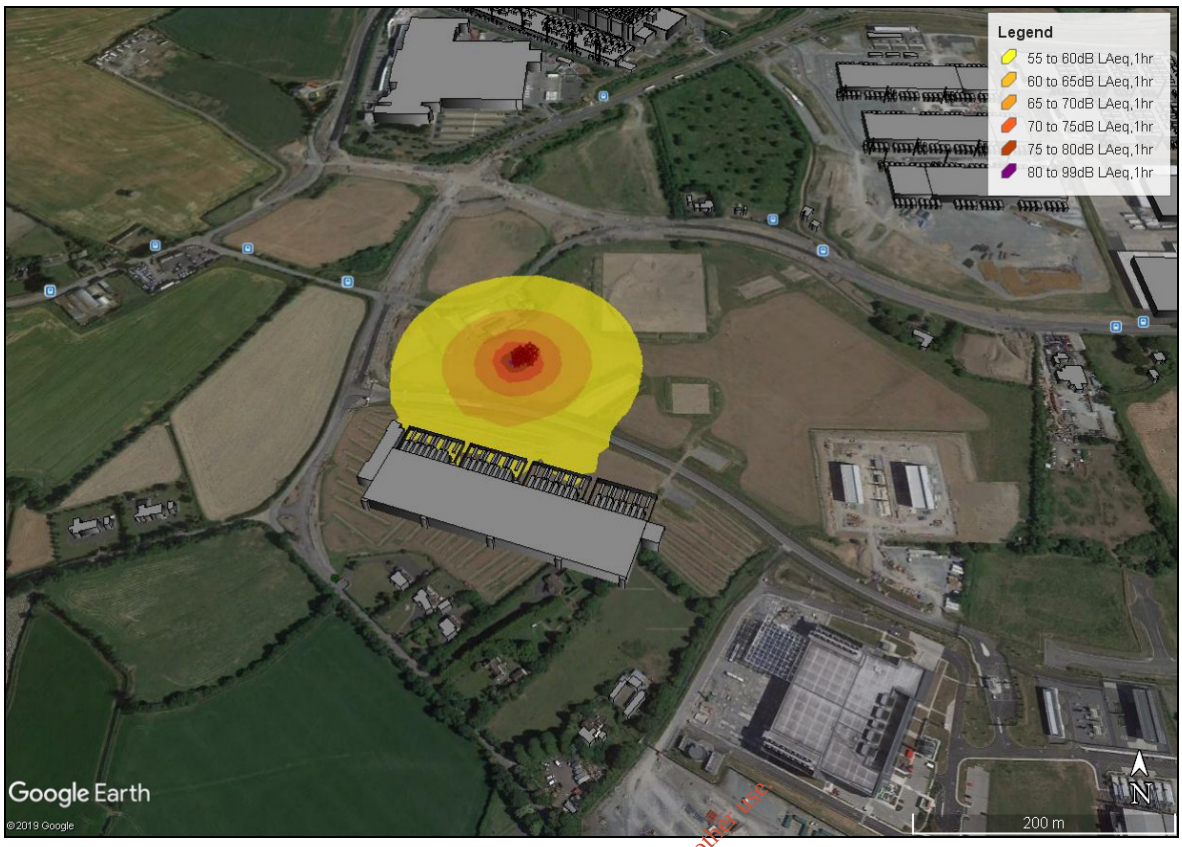

Figure 9.9 Construction noise contour – landscaping

Operational phase

9.82 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.

9.83 These issues are discussed in detailed in the following sections. See Appendix F.3 for details of the noise modelling undertaken for this assessment and associated assumptions.

Building Services Noise / Emergency Site Operation

9.84 Four scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A – Proposed Data Centre – Day to Day
- Scenario B – Proposed Data Centre – Emergency
- Scenario C1 – Proposed Data Centre – Generator Testing Building A
- Scenario C2 – Proposed Data Centre – Generator Testing Building C

9.85 Scenario A would be considered to be the most representative of the day to day operation. Scenario B is representative of an emergency situation when a power outage or issue with supply from the national grid has occurred. It should be noted that such an event is an extremely rare occurrence.

9.86 Scenarios C1 and C2 consider the impact associated with the occasional testing of proposed back-up emergency generators on the site. Typically, only two generator units will be tested at any one time. The assessment presented here assumes the closest generators to existing noise sensitive locations are running when presenting expected noise levels associated with the generator testing.

9.87 Figure 9.4 highlights the nearest noise sensitive locations at which predictions have been carried out. Various noise contours are also presented for scenarios A, B, C1 and C2 in order to demonstrate the noise impact of the Proposed Development over a wider area.

9.88 The results of the iterations of the noise model are presented in Table 9.14. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Table 9.14 Predicted plant noise levels for various scenarios

Location	Predicted dB $L_{Aeq,T}$			
	Scenario A	Scenario B	Scenario C1	Scenario C2
R01	23	34	24	24
R02	25	35	26	26
R03	28	38	29	29
R04	29	38	30	30
R05	30	39	31	31
R06	33	45	33	35
R07	32	43	32	34
R08	31	43	32	33
R09	36	54	38	44
R10	36	53	36	46
R11	35	41	35	36
R12	35	41	35	35
R13	33	40	33	35

9.89 The above predicted levels are based on a situation where the receiver is downwind of all noise sources and that all plant is operating on full duty (which will rarely if ever be the case). For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption.

Comment on adopted noise criteria day to day operations

9.90 The predicted noise levels presented in Table 9.14 have been compared to the relevant daytime noise criteria as adopted for this assessment, presented in Table 9.8. It should be noted that the back-up generator testing shall take place only between 09.00 and 17.00hrs. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

9.91 Scenario A All locations are within the relevant adopted limits by a clear margin. All locations comply with the adopted criteria in relation to day to day operations. Figure 9.10 presents a noise contour for Scenario A.

9.92 Scenario B All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 9.11 presents a noise contour for Scenario B.

9.93 Scenario C1/2 All locations are within the relevant adopted daytime limits during periods when two generators are undergoing routine testing. Figure 9.12 presents a noise contour for Scenario C.

Summary

9.94 Scenario A is 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 noise criterion adopted for this assessment.

9.95 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 the site-specific levels comply with the noise criterion that has been adopted for these situations following review of relevant guidance.

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

Location	Scenario A			Scenario B			Scenario C1			Scenario C2		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
R01	23	35	✓	34	55	✓	24	55	✓	24	55	✓
R02	25		✓	35		✓	26		✓	26		✓
R03	28	38	✓	38		✓	29		✓	29		✓
R04	29		✓	38		✓	30		✓	30		✓
R05	30		✓	39		✓	31		✓	31		✓
R06	33		✓	45		✓	33		✓	35		✓
R07	32		✓	43		✓	32		✓	34		✓
R08	31		✓	43		✓	32		✓	33		✓
R09	36		✓	54		✓	38		✓	44		✓
R10	36	55	✓	53		✓	36		✓	46		✓
R11	35		✓	41		✓	35		✓	36		✓
R12	35		✓	41		✓	35		✓	35		✓
R13	33	40	✓	40		✓	33		✓	35		✓

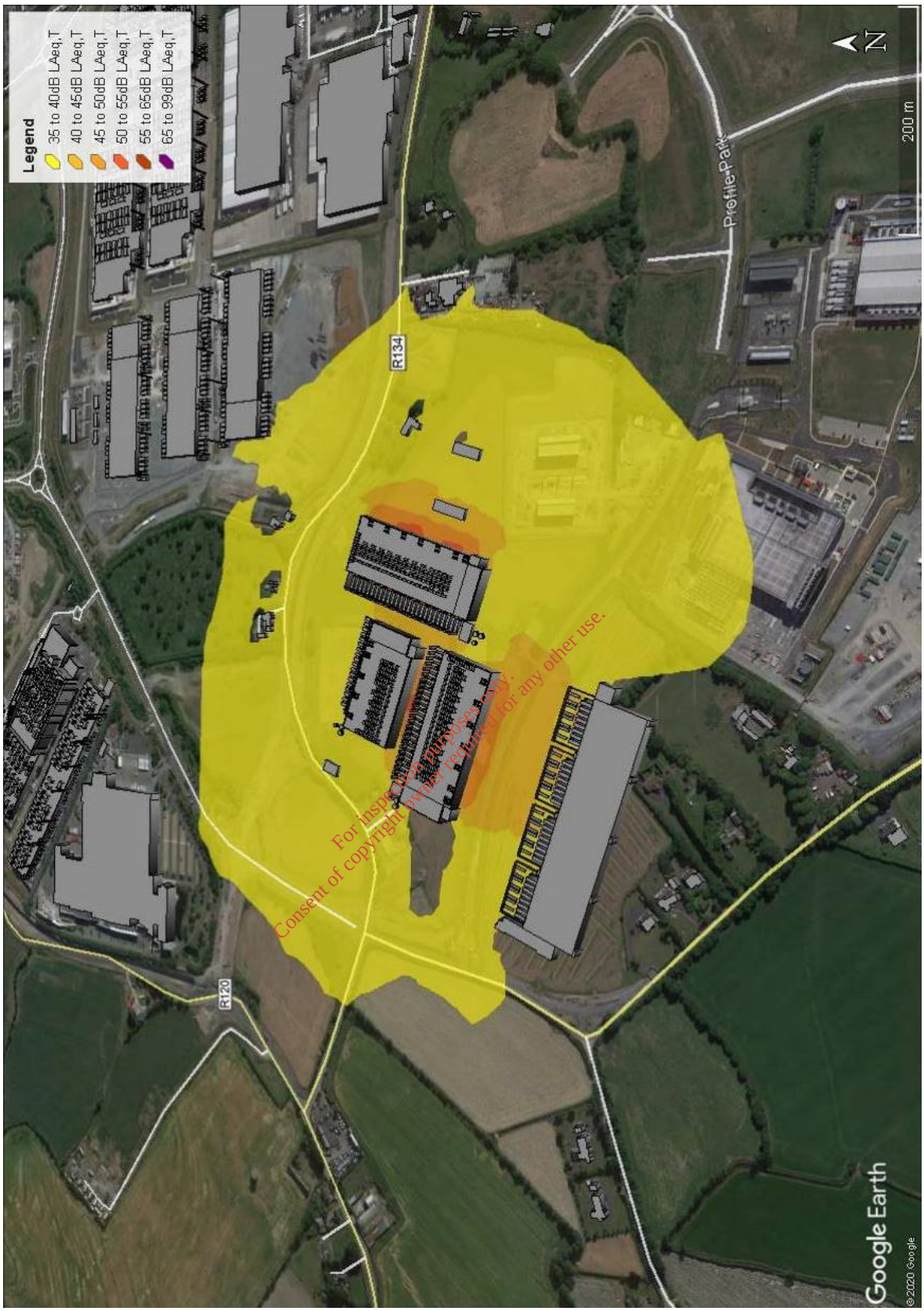

Figure 9.10 Scenario A: Proposed Data Centre (current planning application) – Day to Day Noise Contour (Extent of 35dB(A))

Comment All locations are within the relevant adopted daytime and evening limits by a significant margin. All locations comply with the adopted criteria in relation to day to day operations. Figure 9.10 presents a noise contour for Scenario A.

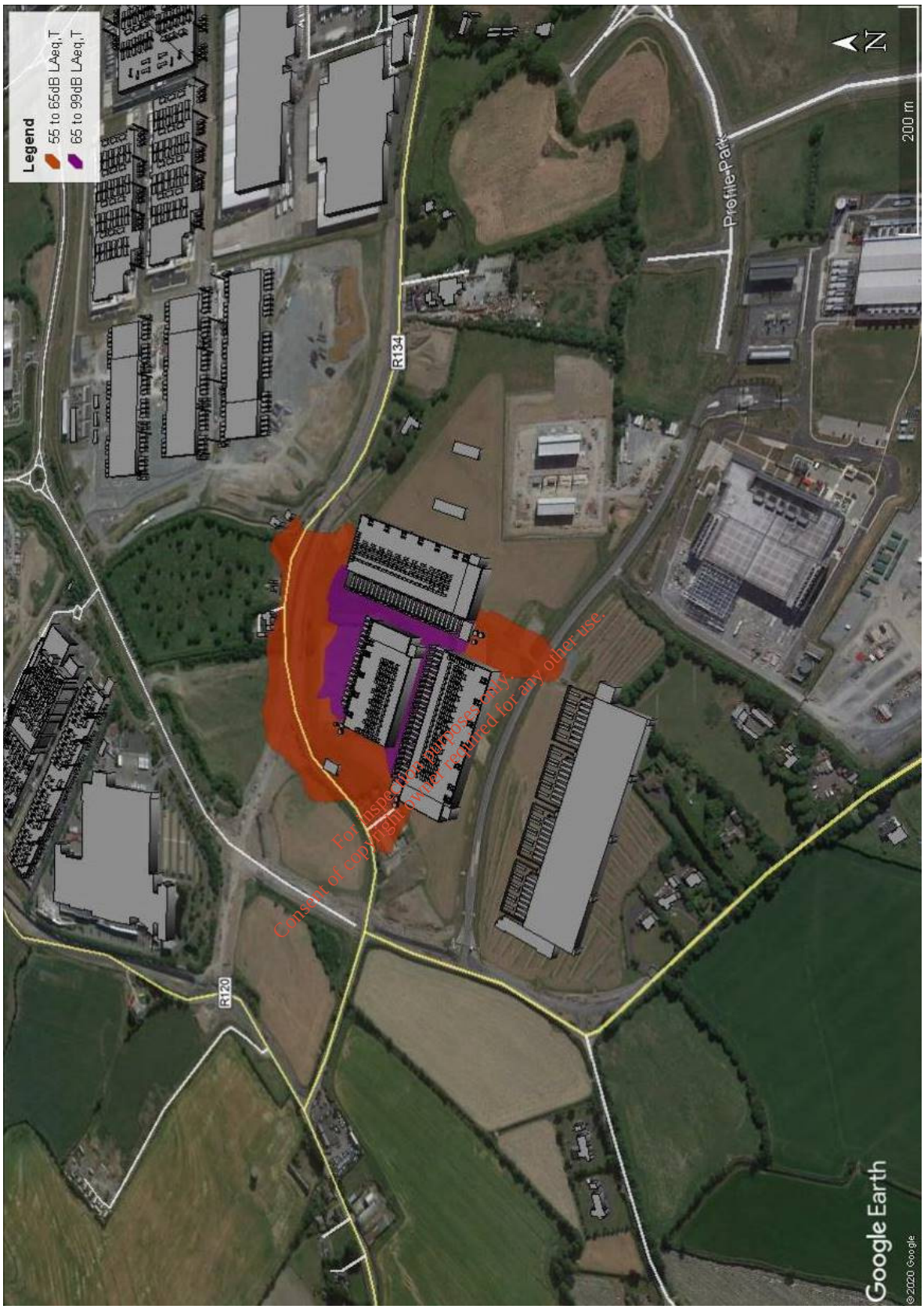

Figure 9.11 Scenario B - Proposed data centre (current planning application) – Emergency noise contour (Extent of 55dB(A))

Comment : All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 9.11 presents a noise contour for Scenario B.

Figure 9.12 Scenario C1 - Proposed Data Centre (current planning application) – Generator Testing Noise Contour (Extent of 35dB(A))

Comment : All locations are within the relevant adopted daytime limits by a significant margin during periods when a single generator is undergoing routine testing. Figure 9.12 presents a noise contour for Scenario C1.

Figure 9.13 Scenario C2 - Proposed Data Centre (current planning application) – Generator Testing Noise Contour (Extent of 35dB(A))

Comment : All locations are within the relevant adopted daytime limits by a significant margin during periods when a single generator is undergoing routine testing. Figure 9.13 presents a noise contour for Scenario C2.

Review of increases in noise level

9.96 Table 9.16 presents the predicted changes in noise level associated with the development at the nearest noise sensitive locations to the site.

Table 9.16 Review of predicted changes in existing noise levels

Loc.	Scenario A – Typical Operation Daytime				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level dB(A)	Change in Noise Level (dB)	EPA Glossary of Impacts
R01	23	54	54	0	Imperceptible
R02	25	54	54	0	Imperceptible
R03	28	54 Note A	54	0	Imperceptible
R04	29	54 Note A	54	0	Imperceptible
R05	30	54 Note A	54	0	Imperceptible
R06	33	54 Note A	54	0	Imperceptible
R07	32	54 Note A	54	0	Imperceptible
R08	31	54 Note A	54	0	Imperceptible
R09	36	51	51.1	0.1	Not Significant
R10	36	51	51.1	0.1	Not Significant
R11	35	50	50.1	0.1	Not Significant
R12	35	50	50.1	0.1	Not Significant
R13	33	50	50.1	0.1	Not Significant
Loc.	**Scenario A – Typical Operation Night**				
	Predicted dB $L_{Aeq,T}$	**Background Level dB $L_{A90,T}$**	**Cumulative Noise Level dB(A)**	**Change in Noise Level (dB)**	**EPA Glossary of Impacts**
R01	23	35	35.3	0.3	Not Significant
R02	25	35	35.4	0.4	Not Significant
R03	28	38	38.4	0.4	Not Significant
R04	29	38	38.5	0.5	Not Significant
R05	30	38	38.6	0.6	Not Significant
R06	33	38	39.2	1.2	Not Significant
R07	32	38	39	1	Not Significant
R08	31	38	38.8	0.8	Not Significant
R09	36	38	40.1	2.1	Not Significant
R10	36	38	40.1	2.1	Not Significant
R11	35	40	41.2	1.2	Not Significant
R12	35	40	41.2	1.2	Not Significant
R13	33	40	40.8	0.8	Not Significant

Note A - Background level from Location A assumed due to influence of construction noise on background noise levels at this location during daytime periods.

9.97 Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is '*not significant'* at all locations for Scenario A – Typical Operation night-time periods. An '*imperceptible'* or '*not significant*' impact is also predicted at all locations assessed during daytime periods. In essence the existing soundscapes that are encountered at the nearest noise sensitive locations are predicted to remain unchanged in terms of ambient noise levels with the development of the data centre introducing a low level of plant noise at the nearest locations assessed. In terms of noise associated with day to day activities the associated effect is stated to be as follows:

Quality	***Significance***	***Duration***
Negative	*Not Significant*	*Long Term*

Additional vehicular traffic on public roads

9.98 In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: Considering 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. The resultant noise impact is ***neutral***, ***imperceptible*** and ***long-term***.

Vibration

9.99 There is no source of vibration associated with the day to day operation of the development that will give rise to impacts at nearby sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be:

Quality	***Significance***	***Duration***
Neutral	*Imperceptible*	*Long Term*

Remedial and mitigation measures

9.100 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

9.101 With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the Proposed Development. As an example, the following measures will be implemented on site:

- 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 critical sensitive locations; and
- all site access roads will be kept even so as to mitigate the potential for vibration from lorries.

9.102 Furthermore, a variety of practicable noise control measures will be employed, such as:

- 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.

9.103 We would recommend that vibration from construction activities to off-site residences be limited to the values set out in Table 9.7. 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%.

9.104 Appendix F.4 presents an indicative construction noise and vibration management plan that will be implemented in terms of the day to day operation of the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place that have an increased potential in giving rise to issues off site (Note: no rock breaking is anticipated as part of the Proposed Development).

Operational phase

Building services noise / emergency site operation

9.105 Noise from external plant will be minimised by the following measures:

- Purchasing low noise generating equipment, and;
- Incorporating appropriately specified in line attenuators for stacks and exhausts where necessary.

9.106 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.

Additional vehicular traffic on public roads

9.107 The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

Cumulative assessment

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

9.109 The noise criteria proposed for new building services plant items (i.e. chillers etc.) has been derived with consideration of existing site noise emissions levels to ensure that cumulative noise emissions do not exceed the relevant noise criteria.

9.110 The potential cumulative noise emissions from the Proposed Development and neighbouring Google Ireland Data Centre and Cyrus One Data Centre have been considered. Reference is made to Section 9 of the Google Ireland EIS (PM Group ref. IE0311190-22-RP-0001, Issue A) (Google EIS Table 9.12) and Section 10 of the Cyrus One EIA Report which presents noise predictions to nearby shared residential receptors.

9.111 The closest shared receptors to the two neighbouring sites are the receivers R2, R5 and R6. Table 9.17 presents the predicted cumulative noise levels to these two receivers and compares to the proposed noise criteria.

Table 9.17 Assessment of predicted noise levels at receptors for typical site operation

Receiver Reference (Ref. Figure 9.4)	Predicted Noise Level, (dB $L_{Aeq,T}$)				Noise Criteria (dB(A)) (Night)	Complies?
	Proposed Development	Cyrus One	Google Ireland	Cumulative		
R2 Note A	25	14	15	26	35	✓
R5 Note B	30	12	27	32	38	✓
R6 Note C	33	13	27	34	38	✓

Note A NSL R4 in Cyrus One assessment and NSL1 in Google assessment.
Note B NSL R1 in Cyrus One assessment and NSL6 in Google assessment.
Note C NSL R9 in Cyrus One assessment and NSL6 in Google assessment.

9.112 Predicted cumulative plant noise emissions are therefore within the adopted criteria.

Predicted impacts of the development

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

Construction phase

9.114 During the construction phase of the Proposed Development 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 (i.e. as per Table 9.5, 9.6), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.107), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be ***slight, negative*** and ***short-term*** in nature. Also, it is considered that as the Proposed Development progresses from initial ground works that construction noise impacts will reduce from slight to ***not significant.***

Operational phase

Building services noise / emergency site operation

9.115 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 ***negative***, ***not significant*** and ***long-term***.

Additional vehicular traffic on public roads

9.116 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 ***neutral, imperceptible*** and ***long-term.***

Residual impacts

9.117 The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* there is not a significant impact at residential locations, subject to the implementation of the mitigation measures outlined in Section 9.107.

9.118 The robust analysis of potential operational phase plant has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be a ***not significant, negative, long term*** impact at the closest residences identified on Figure 9.4. The predicted change in background noise level due to current application is the order of 1dB during night-time periods. Ambient noise levels are, and will continue to be, dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise).

9.119 In terms of the nearest commercial properties ***not significant, negative, long-term*** impacts are predicted as the character of the noise environment in the vicinity of this location will not be altered.

9.120 The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be an ***imperceptible, neutral, long-term*** impact off site noise sensitive locations considering existing traffic volumes on the local road network.

9.121 The cumulative effect with other developments in the vicinity is addressed in Chapter 16 of this EIA Report.

9.122 Interactions are addressed in Chapter 17 of this EIA Report.

Monitoring

9.123 It is required that the appointed contractor monitor levels of noise and vibration during the construction phase at nearby sensitive locations and/or development site boundaries.

Do-nothing scenario

9.124 The existing noise climate will remain unchanged on site and at nearby noise sensitive locations

10. AIR QUALITY AND CLIMATE

Introduction

10.1 This chapter evaluates the impacts which the Proposed Development may have on Air Quality & Climate as defined in the EPA Draft EIA Report Guidelines 2017 and the EPA Draft Advice Notes for EIS 2015.

10.2 Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulated model AERMOD. The AERMOD model has USEPA regulatory status and is one of the advanced models recommended within the air modelling guidance document 'Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)' published by the EPA in Ireland (EPA, 2020). Further information on the background of the AERMOD model can be found in Appendix G. The modelling of air emissions from the site was carried out to assess concentrations of nitrogen dioxide (NO_2) at a variety of locations beyond the site boundary.

10.3 The Proposed Development is to develop a two-storey data centre that will have a gross floor area of 80,269sqm on an overall site of 16.5 hectares. Building A will be located within the south-west corner of the site. It will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height above ground level. Building B will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data centre. Building C will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data centre.

10.4 The overall height of the data centre development is 19.85m above the finished floor level with plant extending above this main parapet height.

10.5 The Proposed Development will also include a permanent new two-storey 110kV GIS substation with associated transformer compound to the east of the overall site. The application will also include a single storey and temporary substation.

10.6 The dispersion modelling study consisted of the following components:

- Review of emissions data and other relevant information needed for the modelling study;
- Review of background ambient air quality in the vicinity of the facility;
- Air dispersion modelling of significant substances released from the site;
- Identification of predicted concentrations of released substances beyond the site boundary; 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.

Methodology

Criteria for rating of impacts

Ambient Air Quality standards

10.7 In order to reduce the risk to health from poor air quality, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 10.1).

10.8 Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants NO_2, PM_{10}, and $PM_{2.5}$ relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent

daughter directives (including 1999/30/EC and 2000/69/EC) and also includes ambient limit values relating to $PM_{2.5}$.

Table 10.1 EU Air Quality Standards 2011

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Critical limit for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$

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.

Dust Deposition Guidelines

10.9 The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in Table 10.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

10.10 With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

10.11 With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350mg/(m^2*day) averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the Bergerhoff limit of 350 mg/(m^2*day) be applied to the site boundary of quarries. This limit value shall be implemented with regard to dust impacts from construction of the Proposed Development.

Gothenburg Protocol

10.12 In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

10.13 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 2019 (EPA, 2019b) indicated that Ireland complied with the emissions ceilings for SO_2 and NH_3 but failed to comply with the ceiling for NO_X and NMVOCs. Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

Climate Agreements

10.14 Ireland ratified the United Nations Framework Convention on Climate Change in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002. For the purposes of the EU burden sharing agreement under Article 4 of the Doha Amendment to the Kyoto Protocol, in December 2012, Ireland agreed to limit the net growth of the six Greenhouse Gases (GHGs) under the Kyoto Protocol to 20% below the 2005 level over the period 2013 to 2020 (UNFCCC, 2012).

10.15 The UNFCCC is continuing detailed negotiations in relation to GHG reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP25) took place in Madrid, Spain from the 2nd to the 13th of December 2019 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The Paris Agreement is currently ratified by 187 nations and has a stated 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 greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions.

10.16 The EU, on the 23rd/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework". The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

10.17 In relation to the EU 20-20-20 targets for CO_2, Ireland has a target of a 20% reduction in non-Emission Trading Scheme (non-ETS) greenhouse gas emissions by 2020 relative to the 2005 levels. Latest Environmental Protection Agency (EPA) figures taken from 'Ireland's Final Greenhouse Gas Emissions 1990 – 2017' indicated that Ireland would exceed its 2017 target by 2.94 Mt CO_2eq (2019a). Projections to 2020 also look to be in exceedance of the initial targets (2019b).

10.18 The Climate Action and Low Carbon Development Act 2015 specifies plans to be drafted and approved by the Government in relation to climate change for the purpose of pursuing the transition to a low carbon, climate resilient and environmentally sustainable economy. The act required the establishment of the Climate Change Advisory Council and the creation and approval by the government of a National Mitigation Plan (to be published every five years), National Adaptation Framework and an Annual Transition Statement. The first National Mitigation Plan for Ireland was published in July 2017 and outlines the central roles of the key Ministers responsible for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture. This

first Plan outlines the initial foundations to be implemented to transition Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. The Plan also includes over 100 individual actions for various Ministers and public bodies to take forward.

10.19 In addition to the publication of the *National Mitigation Plan*, the government subsequently published a *Climate Action Plan* in 2019. The *Climate Action Plan* 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 *Climate Action Plan* 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.

Construction phase

Air Quality

10.20 The current assessment focused firstly on identifying the existing baseline levels of NO_2, PM_{10} and $PM_{2.5}$ in the region of the Proposed Development (as defined in Chapter 2 of this EIA Report) 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

10.21 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

10.22 Air dispersion modelling was carried out by AWN 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) (2010)".

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

10.24 The assessment was undertaken in order to quantify the impact of the Proposed Development and the existing baseline level of pollutants on ambient air quality concentrations. In addition to the assessment of the Proposed Development, cumulative effects have been included in the model to assess the combined impact from the Proposed Development and nearby IED Licenced facilities (Takeda and Pfizer).

10.25 To obtain all the meteorological information required for use in the model, data collected during 2015 - 2019 from the Met Éireann meteorological station at 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 meteorological year. This study adopted a conservative approach which will lead to an over-estimation of the actual levels that will arise.

10.26 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 G. 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.

10.27 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.

10.28 The AERMOD model incorporated the following features:

- A receptor grid and discrete receptors were identified at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids were based on a Cartesian grid with the site at the centre. The outer grid measured 5 x 5 km with the site at the centre and with concentrations calculated at 250m intervals. The inner grid measured 2 x 2 km with the site at the centre and with concentrations calculated at 50m intervals. Boundary receptor locations were also placed along the boundary of the site, at 25m intervals, giving a total of 2,395 calculation points for the model. The impact of the back-up diesel generators was also measured at nearby residential receptors which were added to the model as discrete receptors.
- 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 2015 – 2019 from the Met Éireann meteorological station at Casement Aerodrome as shown in Figure 10.1 (www.met.ie). 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 G.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.

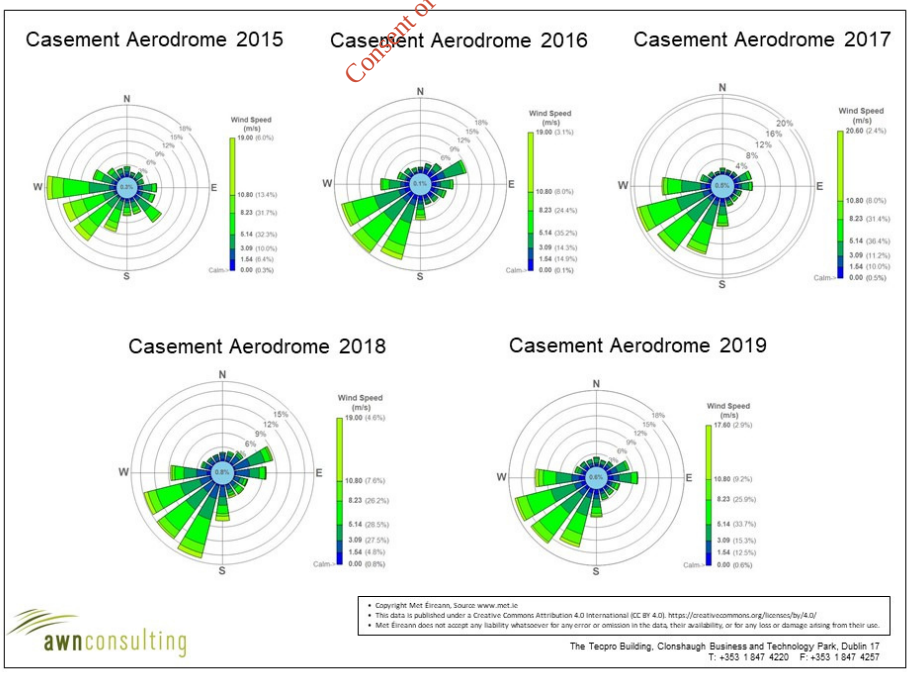

Figure 10.1 Casement Aerodrome Windrose 2015 - 2019

Process emissions

10.29 The Proposed Development will have 70 no. back-up generator stacks which were assumed to have a minimum height of 25m above ground level as a worst-case for the purpose of the air modelling assessment.

10.30 Building A will have a gross floor area of 28,573sqm and will include 26 no. emergency generators located at ground floor level within a compound to the northern side of the data centre with associated flues that will be 25m in height. Building B will be located to the north-west of the site, and to the immediate north of Building A and will have a gross floor area of 21,725sqm. It will include 18 no. emergency generators located at ground floor level within a compound to the northern side of the data centre. Building C will be constructed last and will be located to the eastern part of the site on a north-south axis and will have a gross floor area of 28,573sqm. It will include 26 no. emergency generators located at ground floor level within a compound to the western side of the data centre.

10.31 For the purpose of this assessment all back-up generators are assumed to be running simultaneously in the event of a power failure to the site. In order for the generators to be kept in good condition, ready to be started at full load during an emergency power failure, it is necessary to carry out a controlled maintenance programme, which includes periodic testing. The maintenance plan for the Proposed Development comprises the following two tests:

- **Test 1**: each generator will be periodically tested at up to 25% load for a maximum of 26 hours per year; and
- **Test 2**: each generator will be periodically tested at up to 90% load for a maximum of 4 hours per year.

10.32 The specific duration of each part of the testing regime may vary over time, however, for the purpose of this EIA, a more conservative testing was assumed during air dispersion modelling as outlined below:

- **Test 1**: testing once per week of all back-up generators at 25% load for a maximum of 30 minutes each, one generator at a time, sequentially; and
- **Test 2**: testing quarterly of all back-up generators on site at 90% load, for one full hour, one generator at a time, sequentially (assumed to be January, April, July and October for the purpose of this assessment).

10.33 Thus, the worst-case approach used in this study will lead to an over-estimation of the actual levels that will arise.

10.34 USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA, 2011). For modelling purposes only, a worst case/conservative figure of 72 hours in total per year of operation has been applied to the Proposed Development. However, in reality, and based on recent experience over the past number of years, generators are rarely used other than during testing and maintenance described above. As a result, the maximum hourly emission rates from all the back-up generators were reduced by a factor of (72/8760) to give an average hourly emission rate (in line with USEPA protocol) and the generators were modelled over a period of one full year.

10.35 A second methodology for modelling back-up generators has been published by the UK Environment Agency. The consultation document is entitled "Diesel Generator Short-Term NO_2 Impact Assessment" (UK EA, 2016). The methodology is based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value (18 exceedances are allowable per year before the air standard is deemed to have been exceeded). The assessment assumes a hypergeometric distribution to assess the likelihood of exceedance hours coinciding with the operational hours of the back-up generators. The 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. 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.

10.36 Both the methodology advised in the USEPA guidance as well as the approach described in the UK EA guidance have been applied in this study to ensure a robust assessment of predicted air quality impacts from the back-up generators. The methodology for converting NO_X to NO_2 was based on the ozone limiting method (OLM) approach based on an initial NO_2/NO_X ratio of 0.1 and a background ozone level of 60 µg/m^3 based on a review of EPA data for similar Zone A locations.

10.37 The modelling was undertaken to assess the impact to ambient air quality from the following emergency operations scenarios:

- **Proposed Development Scenario:** This comprises the Proposed Development and involved the emergency operation of 70 no. of diesel generators (including two catcher generators in case one of the generators fails). The scenario also included two different types of testing for all generators. The process emissions used for the Proposed Development are outlined in Table 10.2. In addition to the Proposed Development within the site, NO_2 emissions from two IED licenced facilities within close proximity of the site (Takeda and Pfizer) have been included in the impact assessment.

10.38 The back-up generators will be registered with the EPA as required in line with recent legislation in relation to the Medium Combustion Directive (2015/2193).

Table 10.2 Summary of process emission information for the Proposed Development

Stack Reference	Stack Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Volume Flow (Nm^3/hr at 15% Ref. O_2)	Exit Velocity (m/sec actual)	NO_x	
							Concentration (mg/Nm^3 at 15% Ref. O_2)	Mass Emission (g/s)
Emergency Operation and Test 2 for Back-up Diesel Generators for Proposed Development (90% load)	25m	0.5	0.20	754.2	20,382	46.01	775.9	0.050 Note 1 / 4.393 Note 2
Test 1 for Diesel Generators (25% load) for Proposed Development	25m	0.5	0.20	720.1	7,760	18.40	860.6	0.927 Note 4
Takeda Stack	15	0.56	0.25	533.15	5,850	12.9	140	0.23 Note 5
Pfizer A1-1	45	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 5
Pfizer A1-2	45	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 5
Pfizer A1-3	45	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 5

Note 1 Reduced emission rates based on USEPA protocol (assuming 72 hours / annum) used to model emissions during emergency operation of generators (90% load)

Note 2 Maximum emission rates for diesel generators (based on 90% load) used to model emissions during emergency operation of generators for UK EA assessment methodology and for Test 2 assumptions for USEPA assessment methodology

Note 3 Emission rates used to model emissions during Test 1 at 25% load assumed to occur once per week, per generator

Note 4 Emission rates used to model scheduled emissions including batch testing

Note 5 Continuous operation assumed 24 hours per day, 365 days per year

Climate & Transboundary Pollution

10.39 The back-up diesel generators modelled for the purpose of this assessment will only be used in the event of a power failure at the site. In reality and based on recent experience over the past number of years, generators are rarely used other than during testing and maintenance described in Section 10.31 and 10.32. During normal operations at the facility, the electricity will be supplied from the national grid so there will be no direct emissions of CO_2 or transboundary pollutants from the site.

10.40 The impact of the operational phase of the Proposed Development on climate was determined by an assessment of the indirect CO_2 emissions associated with the electricity supplied from the national grid. The details and results of the assessment are provided in Section 10.88.

Receiving environment

Air *Quality*

NO_2

10.41 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 in Ireland 2018" (EPA, 2019) details the range and scope of monitoring undertaken throughout Ireland.

10.42 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, 2020). 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, 2020).

10.43 With regard to NO_2, continuous monitoring data from the EPA (EPA 2020, 2019), at suburban Zone A background locations in Rathmines, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 16 - 20 µg/m^3 in 2018 (see Table 10.2). Sufficient data is available for the station in Ballyfermot to observe long-term trends since 2014 (EPA 2019), with annual average results ranging from 16 – 17 µg/m^3. Based on these results, an estimate of the current background NO_2 concentration in the region of the Proposed Development is 17 µg/m^3.

10.44 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 10.2 Trends In Zone A Air Quality - Nitrogen Dioxide (µg/m^3)

Year	Ballyfermot	Rathmines	Swords
2014	16	17	14
2015	16	18	13
2016	17	20	16
2017	16	17	14
2018	17	20	16
Average	**17**	**18**	**15**

PM_{10}

10.45 Continuous PM_{10} monitoring carried out at the Ballyfermot, Rathmines, Tallaght and Phoenix Park Zone A locations in 2014 - 2018 showed annual mean concentrations ranging from 11 to 14 µg/m^3, with at most 5 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m^3 (35 exceedances are permitted per year) (EPA, 2019). Based on this EPA data, an estimate of the background PM_{10} concentration in the region of the development is 14 µg/m^3.

$PM_{2.5}$

10.46 Continuous $PM_{2.5}$ monitoring carried out at two Zone A locations at Rathmines and Finglas in 2018 showed annual mean concentrations ranging from 8 to 9 µg/m^3. The $PM_{2.5}/PM_{10}$ ratio in Rathmines in 2018 was 0.6. Based on this information, a ratio of 0.6 was used to generate a background $PM_{2.5}$ concentration in the region of the Proposed Development of 8.4 µg/m^3.

Characteristics of the Proposed Development

Construction phase

10.47 The Proposed Development will comprise the construction of 3 no. data centres and associated ancillary development. The key civil engineering works which will have a potential impact on air quality and climate during construction are summarised below:

(i) During construction, an amount of soil will be generated as part of the site preparation works

and during excavation for construction of roads, car parking areas, foundations, installation of drainage services and ancillary infrastructure;
(ii) Following completion of the building shell, commissioning of the mechanical and electrical equipment is undertaken;
(iii) Infilling and landscaping will be undertaken. Spoil generated during site preparation will be re-used where possible;
(iv) Temporary storage of construction materials and fuels; and
(v) Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport.

10.48 As outlined in Section 10.60 – Section 10.70, a dust minimisation plan will be formulated for the construction phase of the Proposed Development to ensure no dust nuisance occurs at nearby sensitive receptors.

Operational phase

10.49 The key works which will have a potential impact on air quality and climate during operation of the Proposed Development are summarised below:

(i) The scheduled testing (Test 1 and Test 2) for maintenance of the back-up diesel generators in the data centre will release air pollutant emissions (primarily NO_x emissions);
(ii) The infrequent emergency operation of the back-up diesel generators for the data centre in the event of a power outage would release air pollutant emissions (primarily NO_x emissions). A review of operational data from similar operational data centres in Ireland indicates that it is highly unlikely that the back-up generators would be used for emergency operations for more than 24 - 48 hours per year.
(iii) Road traffic accessing the site will emit air pollutants and greenhouse gases. However, the operational phase of the Proposed Development is not expected to contribute a significant volume of additional traffic on the local road network (see Chapter 14). Therefore, no local air quality assessment of the traffic impact is required for this development; and
(iv) The indirect impact of emissions from electricity to operate the data centres will have an impact on climate and regional air quality. However, it is predicted that these will not be significant in relation to Ireland's national emission ceiling limits for CO_2, NO_X, SO_2 and NMVOCs.

Potential impacts of the Proposed Development

Construction phase

Air Quality & Climate

10.50 The overall development will include three data centres and a new two-storey 110kV GIS Substation with associated transformer compound to the east of the overall site. The 110kV Substation will be applied for under a separate Strategic Infrastructure Development application.

10.51 The application that is the subject of this assessment will also include a single storey and temporary substation. An MV connection to the east of the site will form a separate planning application.

10.52 The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions as a result of excavation works, infilling and landscaping activities and storage of soil in stockpiles. This leads to 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.

10.53 Fuels will be stored in sealed containers and emissions to air are likely to be minimal. Therefore, there is unlikely to be an impact on air quality as the result of the temporary storage of fuels for the construction phase.

10.54 Construction traffic would be expected to be the dominant source of greenhouse gas emissions as a

result of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development.

10.55 Initial commissioning activities will involve testing of the back-up generators on site in a similar manner to the operational phase testing, i.e. the first testing sequence will be commissioning of the standby generators. The operational modelling has considered testing of the generators on a weekly and quarter-yearly basis and this does not result in a significant impact to air quality. Therefore, it is predicted that the initial commissioning tests will result in an ***imperceptible*** impact to air quality in the ***short-term***.

10.56 It is important to note that 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 (see Section 10.61 – Section 10.71) 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 main construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a ***short-term*** and ***imperceptible*** impact on climate.

Operational phase

Air Quality

10.57 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 back-up diesel generators. A stack height review 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 beyond the site boundary.

Climate

10.58 The back-up diesel generators modelled for the purpose of this assessment will only be used in the event of a power failure at the site and for testing purposes. During normal operations at the facility, the electricity will be supplied from the national grid. Electricity to operate the facility will be purchased from the available energy suppliers including power stations and renewable generation sources such as wind power. The Electricity Supplier for the site currently holds a Commission for Regulation of Utilities (CRU) certified fuel mix disclosure, guaranteeing every megawatt-hour (MWh) that they supply in the market is generated from renewable sources.

10.59 Importantly, electricity providers form part of the EU-wide Emission Trading Scheme (ETS) and thus greenhouse gas emission from these electricity generators are not included when determining compliance with the targeted 20% reduction in the non-ETS sector. Thus, emissions from electricity generators will not affect the EU 20-20-20 target of a 20% reduction in non-Emission Trading Scheme (non-ETS) greenhouse gas emissions by 2020. Consequently, the Proposed Development will have no impact on whether Ireland meets the targets set for 2020. In terms of future obligations (after 2020), 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

10.60 Under the Do-Nothing Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (changes in road traffic, etc.) until such time as an alternative development consistent with the land use zoning is granted permission and constructed. Therefore, this scenario can be considered ***neutral*** in terms of both air quality and climate.

Remedial and Mitigation Measures

Construction phase

10.61 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, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

Site management

10.62 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.

10.63 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 westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

10.64 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 0.2mm/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 shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions outlined under the following:

10.65 The Principal Contractor or equivalent will 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 will also include head/regional office contact details;
- Community engagement shall 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
- The procedures put in place will be reviewed at regular intervals and monitoring conducted and

recorded by the principal contractor. It is recommended that reviews are conducted on a monthly basis as a minimum.

10.66 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

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

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

Land clearing / earth moving

10.68 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 shall be postponed until the gale has subsided.

Storage piles

10.69 The location and moisture content of storage piles are important factors which determine their potential for dust emissions. The following measures will be implemented to minimise dust formation from storage piles.

10.70 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

10.71 Spillage and blow-off of debris, aggregates and fine material onto public roads will 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

- At the main site traffic exits, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. 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

10.72 The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an 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 and ensure that construction phase dust impacts are negligible 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; and
- The specification of effective measures to deal with any complaints received.

Operational phase

10.73 The stack heights of the back-up diesel generators for the Proposed Development have been designed in a fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards beyond the site boundary (including background concentrations). No additional mitigation measures are proposed for the operational phase of the development.

Predicted impacts of the Proposed Development

Construction phase

Air quality

Dust and particulate matter

10.74 When the dust mitigation measures detailed in the mitigation section (Section 10.61 – Section 10.70) of this report are implemented, fugitive emissions of dust and particulate matter from the site will be ***neutral***, ***short to medium term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

Impacts on human health

10.75 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 ***neutral, short to medium term*** and ***imperceptible*** with respect to human health.

Climate

10.76 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 to medium term, negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2020 target.

Operational phase

Air Quality

USEPA Methodology

10.77 The NO_2 modelling results at the worst-case location at and beyond the site boundary are detailed in Table 10.4 based on the operation of the back-up diesel generations for 72 hours per year using the USEPA methodology outlined within the guidance document titled 'Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard' (USEPA, 2011) as well as considering two types of scheduled testing for all back-up generators from the Proposed Development.

10.78 The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the worst-case year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 65% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 85% of the annual limit value at the worst-case off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Proposed Development Scenario are illustrated as concentration contours in Figures 10.2 and 10.3.

Table 10.4 Dispersion Modelling Results – Emergency Operations Scenario

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 / 2015	34	99.8th%ile of 1-hr Means	93.2	127.2	200
	17	Annual mean	14.6	31.6	40
NO_2 / 2016	34	99.8th%ile of 1-hr Means	96.9	130.9	200
	17	Annual mean	15.0	32.0	40
NO_2 / 2017	34	99.8th%ile of 1-hr Means	91.3	125.3	200
	17	Annual mean	17.0	34.0	40
NO_2 / 2018	34	99.8th%ile of 1-hr Means	93.2	127.2	200
	17	Annual mean	14.7	31.7	40
NO_2 / 2019	34	99.8th%ile of 1-hr Means	94.4	128.4	200
	17	Annual mean	15.5	32.5	40

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

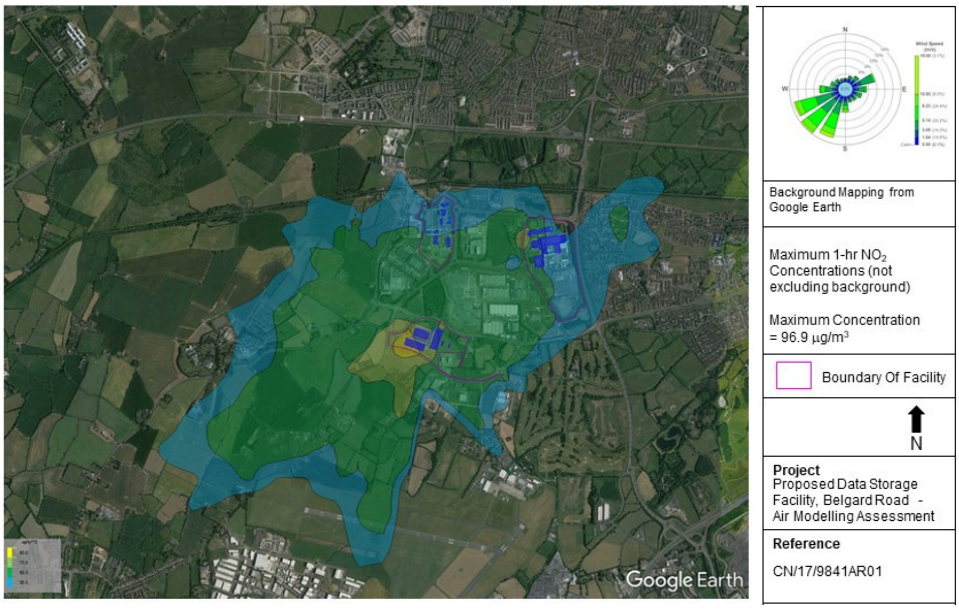

Figure 10.2 Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile)

Figure 10.3 Annual Mean NO_2 Concentrations

UKEA Methodology

10.79 The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the worst-case residential receptor for the Proposed Development Scenario. The hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 10.5. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the back-up diesel generators. The results indicate that in the worst-case year, the emergency generators for the Proposed Development can operate for up to 249 hours per year before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). Figure 10.4 shows the statistical distribution predicted for the 98th percentile (based on 249 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

Table 10.5 Hypergeometric Statistical Results at Worst-case Residential Receptor – NO_2

Pollutant / Meteorological Year	Hours of operation (Hours) (98thO%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98thO%ile) Note 1
NO_2 / 2015	304	**0.02**
NO_2 / 2016	304	
NO_2 / 2017	338	
NO_2 / 2018	249	
NO_2 / 2019	652	

Note 1 : Guidance Outlined In UK EA publication “Diesel Generator Short-term NO2 Impact Assessment” (EA,2016)

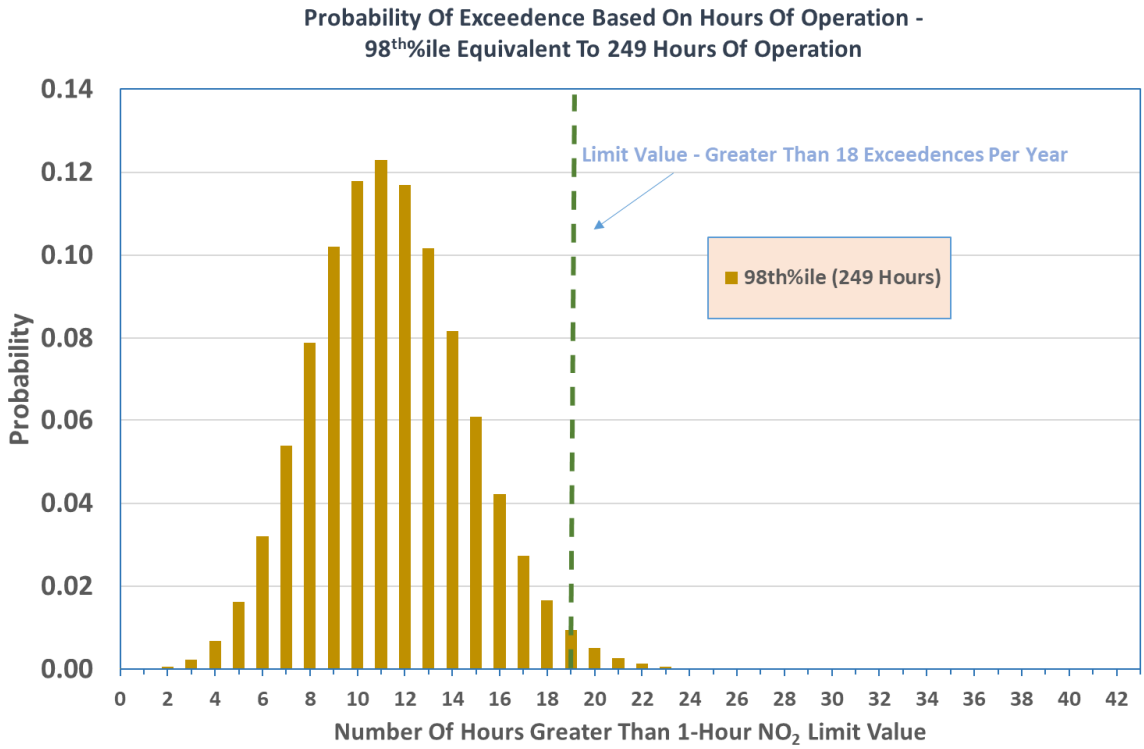

Figure 10.4 Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Proposed Development

Summary of modelling assessment

10.80 The modelling assessment has found that ambient NO_2 concentrations as a result of the Proposed Development Scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. The impacts to air quality from operation of the Proposed Development are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

Climate

10.81 The CO_2 emissions from electricity to operate buildings A, B and C will not be significant in relation to Ireland's national annual CO_2 emissions. A Report titled 'Energy In Ireland (2019 Report)' published by the Sustainable Energy Authority of Ireland (SEAI) states the average CO_2 emission factor for electricity generated in Ireland was 375 gCO_2/kWh in 2018. This average CO_2 emission factor is based on the national power generating portfolio. On the basis that the Proposed Development will consume 128 MW of power, this equates to 1,121 GWh annually based on the assumption of the national fuel mix. This translates to approximately 420,480 tonnes of CO_2eq per year which will have a ***long-term, negative*** and ***slight*** impact on climate.

10.82 Environmental Protection Agency (EPA) figures taken from 'Ireland's Final Greenhouse Gas Emissions 1990 – 2017' indicate that total CO_2 generation in Ireland was of the order of 60.74 million tonnes CO_2eq in 2017. The Proposed Development would contribute approximately 0.69% of Ireland's national annual CO_2 emissions assuming an electrical supply from a typical national grid source mix.

10.83 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 National Emission Ceiling Directive limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3 and $PM_{2.5}$. In relation to Ireland, 2020-2029 emission targets are 65% below 2005 levels for SO_2, 49% reduction for NO_X, 25% reduction for NMVOCs, 1% reduction for NH_3 and 18% reduction for $PM_{2.5}$. In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_X, 32% reduction for NMVOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

10.84 Assuming that 128 MW to operate buildings A, B and C is generated using the national fuel mix, the NO_X emissions associated with this electricity over the course of one year (i.e. 1,121 GWh based on 128 MW for 8,760 hours per annum) will equate to 374 tonnes per annum which is 0.57% of the National Emission Ceiling limit for Ireland up to 2020. Similarly, SO_2 emissions associated with this electricity over the course of one year (1,121 GWh) will equate to 141 tonnes per annum which is 0.34% of the National Emission Ceiling limit for Ireland up to 2020. Additionally, NMVOC emissions associated with this electricity over the course of one year (1,121 GWh) will equate to 425 tonnes per annum which is 0.77% of the National Emission Ceiling limit for Ireland up to 2020. Thus, the NO_X, SO_2 and NMVOC indirect emissions associated with the operation of the Proposed Development are ***long-term, negative*** and ***slight*** with regards to regional air quality.

10.85 As discussed in Chapter 2 of this EIA Report, the Electricity Supplier's fuel mix consists of energy from wind farms they own and operate, third party renewable energy projects that they have long term power purchase agreements in place with and Guarantees of Origin (GOs) as described in Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009.

Human health

10.86 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 back-up 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. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary. Further details of the potential impacts on human health associated with the Proposed Development are discussed in Chapter 5 of this EIA Report.

Monitoring

10.87 No monitoring is required.

Residual Impacts

10.88 Once the mitigation measures outlined in this chapter are implemented, the residual impacts on air quality or climate from the construction of the Proposed Development will be ***short to medium term*** and ***imperceptible*** and for the operational phases of the Proposed Development will be ***long-term, negative*** and ranging from ***imperceptible*** to ***slight***.

10.89 Interactions are addressed in Chapter 17 of this EIA Report. Cumulative effect assessments are addressed in Chapter 16 of this EIA Report.

11. LANDSCAPE AND VISUAL ASSESSMENT

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 Draft "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (*2017) are used in the assessment of the likely impacts. The criteria for rating the significance of impacts are as defined in table 11.1 below:

Table 11.1 Criteria for significance of effects under EPA Guidelines

EPA Rating	
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment without significant consequences
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with the existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

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

- Positive impact - a change which improves the quality of the environment.
- Neutral impact – No effects of effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
- Negative impact - a change which reduces the quality of the environment.

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

- Momentary Effects - lasting from seconds to minutes
- Brief Effects - lasting less than a day
- Temporary Effects - lasting less than a year
- Short-term Effects - lasting one to seven years
- Medium-term Effects - lasting seven to fifteen years
- Long-term Effects - lasting fifteen to sixty years
- Permanent Effects - lasting over sixty years

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 2019 by analysis of the proposals through photomontages, plans, aerial photographs, the tree survey by The Tree File Ltd., historic maps and by reference to the South Dublin County 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 Chapter 6 of this EIA Report.

Receiving environment

11.8 The site is situated on the western edge of the Grange Castle Business Park South. It is an irregular shaped area with the main section of the lands measuring 430m on its longest north south axis and

730m on its longest east west axis. The north, south and west edges of the site are relatively uniform in shape however the eastern boundary is very irregular being formed by a number of property boundaries, wayleaves and the corridor to contain an ESB connection. The total land area of the site measures 16.5 hectares.

11.9 The ground levels within the site area appear generally flat, however with a slow and gradual fall in a south to north direction. From the highest level in the south east (75.20m OD) near the access road the ground levels fall by over 7m towards the stream in the north of the site (68m OD at top of the bank). There are several small localised archaeological remnant mounds throughout the area associated with recent excavations. Other than these small mounds the slope across the Proposed Development site is quite consistent.

Figure 11.1 Proposed Development site context

11.10 The land use in most of the Proposed Development site is currently relatively poor grassland with some remnant agricultural hedgerow field boundaries along eastern and southern perimeters and a small section along the Old Nangor road. Some residences in the north-east and south-east have recently been demolished however some hardstanding and fragments of garden vegetation remains. Along the northern edge of the site the stream has been re-directed as part of the road widening works and is now a channel with no vegetation.

11.11 The lands are bounded on the south by the Grange Castle Business Park South internal access road. A combination of the New Nangor Road and a decommissioned road form the northern boundary of the Proposed Development site. To the west the site is bounded by the Baldonnel Road and in the east the boundary is formed by the adjoining property's fence and the existing hedgerow field boundary.

11.12 In the wider landscape the Proposed Development site is in a generally flat landscape on the edge of two landscape types. The landscape to the east and north is characterised by very large built developments and new tree lined roads. Between these built developments are some 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 generally that of a rural landscape typical of the area with medium to large field patterns and individual residences. The local landscape to the south east is dominated by the Casement Aerodrome.

11.13 There is very little vegetation on the site and the Tree Survey and Report, by the Tree File Ltd. that accompanies this planning application outlines that the tree cover on the site is primarily contained within the remnant garden boundaries in the north-eastern corner of the Proposed Development site. A total of 50% of the trees on site are found in the north-east corner including the only trees classed above category C. These are two semi-mature Ash trees growing out of an old field drainage ditch.

11.14 The hedgerows on site are from two different origins. The first is the thorn-based hedgerows which are remnants of the agricultural stock proof field boundaries such as along the eastern boundary of the Proposed Development site. The second type are the more managed and ornamental garden hedges that surround the vacant farmhouse and former house site along the northern boundary of the Proposed Development site. The tree survey report finds that due to the lack of management and subsequent deterioration the original Hawthorn is now very sparse in the thorn-based hedgerows, with the majority now infested by Bramble. This has led to most of these hedgerows being in a dilapidated state. This is except for the eastern perimeter boundary hedgerow which still has some structure and form.

Character of the Proposed Development site

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

- flat topography in the site and its surrounding environs;
- the realigned stream on the northern perimeter of the site;
- landscape history of agricultural use with grassland and a traditional hedgerow field boundary;
- the remnants of former residences and associated gardens;
- number of very large industrial buildings in the local landscape; and
- local roads and tree lined internal roads in the business park.

11.16 The Proposed Development site has the character of an agricultural field, however without the traditional hedgerow field boundaries and patterns found in the local landscape. The flat ground levels are characteristic of the wider landscape.

11.17 The surrounding environment with its contrast of new built structures and historic field patterns would be considered a 'transitional landscape'.

11.18 Through 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 significant change to the area in recent times. The majority of the hedgerows reflecting historic field patterns as recorded in the historic '6 inch' and '25inch' maps no longer exist. Only the eastern perimeter hedgerow and the few fragments of hedge along the original stream channel still exist. In the remainder of the Proposed Development site the field boundaries have been removed and the stream has recently been redirected as part of the upgrade to the Nangor Road (R134). The townland boundary hedgerow between Milltown and Ballybane once ran through the site but no longer exists.

11.19 The landscape of the Proposed Development site has no inherent aesthetic qualities of note. In the context of the surrounding landscape, landscape sensitivities and views, the northern and western sections of the site would be considered of no aesthetic value. The north eastern section of the Proposed Development site does hold some aesthetic value due to the trees, hedgerows and original alignment of the Baldonnel stream within this area. The aesthetic qualities provided are limited however as this landscape is small and degraded.

Existing views and visibility

11.20 The location from which the Proposed Development site is most visually prominent is from the New Nangor Road directly to the north of the site where the road abuts the site boundary for 470m. From this section of road the Proposed Development site is fully visible in the foreground as there is currently no vegetation due to the road widening works. While the Proposed Development site is visible in the foreground it is the existing Google data centre and the Cyrus One data centre that is under construction to the south that dominates this view. This view is expansive but due to the very flat topography and vegetation little of the wider landscape is visible. The Proposed Development site is also visible from the Grange Castle South Access Road to the south of the site. However here it is only visible for the section where it directly abuts the road due to the level of built development in this area.

11.21 Views of the Proposed Development site are possible from the Baldonnel Road from the section of the road closest to the site. The section of this road that abuts the site is only 120m in length and as

a result views of the Proposed Development site are more limited. The lands are also visible on the former Nangor Road that connects from the R120 to the Baldonnel Road (see View 3). These views are glimpsed views in which the Proposed Development site are not prominent.

11.22 Along the Adamstown Road (R120) west of the junction with the New Nangor Road (R134) there are some distant views offered towards the Proposed Development site where the hedgerow is thinner. These are views towards the Dublin mountains in which the site is identifiable but it forms only a small section of the background of the view. In areas from the Adamstown Road closer to the Proposed Development site it is not visible due to the local topography (the Griffeen River valley), vegetation and buildings and structures.

11.23 The Proposed Development site is not visible from the Kilmactalway/Castlebaggot direction other than restricted views from the section of the road in close proximity to the site. The Proposed Development 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

11.24 Within the South Dublin County Development Plan 2016-2020 there are no specific landscape objectives that apply to the Proposed Development site. There are a number of objectives that apply to the wider landscape within the County.

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 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

- 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.'*

11.25 There are no protected trees or tree groups within the Proposed Development site listed in the South Dublin County Development Plan 2016-2022.

11.26 There are no views or prospects that include the Proposed Development site listed in the South Dublin County Development Plan 2016-2022.

11.27 In the Landscape Character Assessment of South Dublin County Council (June 2016 updated), the Proposed Development site is 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 Proposed Development site are located in the east of the area within the border area between the Urban Fringe character type and the Limestone Farmland character type.

Characteristics of the Proposed Development

11.28 The details of the Proposed Development are fully detailed in paragraphs 2.11 of Chapter 2 of this EIA Report. The Proposed Development involves the following works that have the potential to impact on the landscape. 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:

- Proposed Development with a total gross floor of 80,269 that will include the construction of 3 no. two storey Data Centres, with a gross floor area of 79,771sqm plus ancillary elements;
- The maximum overall height of each data centre development apart from plant and flues is c. 19.85m above the finished floor level;
- External plant consisting of 70 no. Emergency generators with associated flues at 25m above ground level and 70 no. Ventilation shafts at 20m above ground level with associated diesel fuel tanks;
- Single storey and temporary 20kV substation (29sqm);
- 3 no. single storey MV buildings (each 249sqm - 747sqm in total) that manage the supply of electricity from the substations to each data centre;
- 8 no. prefabricated containerised electrical rooms (65sqm each and 520sqm overall) that are stacked in pairs to the immediate south of the temporary substation;
- Ancillary site development works, that will include attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the Baldonnel Stream. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gate, sprinkler tank house (72sqm), security hut (30sqm) and 150 no. car parking spaces and 78 no. sheltered bicycle parking spaces. The development will be enclosed with landscaping to all frontages including a wetland to the west.; and
- Creation of native woodlands, native woodland scrub corridors, native wetlands, native grassland meadow and earth modelling.

Cumulative development

11.29 A separate planning application will be made for the installation of a MV distribution cable that will be designed to support interim power demand to the first Data Centre (Building A) and will connect to existing infrastructure to the east.

11.30 It is proposed to provide permanent power supply to the site via a new two storey 110kV GIS Substation with associated transformer compound to the east of the overall site. These works and its HV connection to the existing Castlebaggot Substation to the immediate south-east and the Kilmahud Substation to the north will be applied for under separate applications. These works may be determined as Strategic Infrastructure Development (SID) by An Bord Pleanála through the statutory pre-application consultations with the Board. All these works have been cumulatively assessed under this Chapter of the EIA Report.

Potential impacts of the Proposed Development

Construction phase

11.31 The change of use of the Proposed Development 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

11.32 The proposed works as described in the 'Characteristics of the Proposed Development' and in more detailed as set out under Chapter 2 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

11.33 The mitigation of potential negative landscape and visual impacts has influenced the design and layout of the Proposed Development 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 colour palette chosen for the building aims to further reduce any visual impact of the building.

Predicted impacts of the Proposed Development

Impact on Landscape Character

Construction phase

11.34 As described under potential impact of the Proposed Development above, the initial construction operations created by the clearance 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 Proposed Development site from an agricultural field landscape type to a building site, to build the data storage facilities 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.

11.35 The introduction of the elements described under Potential impacts 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 local visual sensitivities. Furthermore, as the Proposed Development site is located within and adjacent to the existing Grange Castle Business Park with recent built developments, including the large data centres directly to the south, the visual elements associated with construction would be considered part of the existing urban landscape.

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

Operational phase

11.37 As described under potential impact of the Proposed Development above, the operational phase will give rise to a noticeable change in the landscape character.

11.38 The initial removal of an agricultural field landscape to be replaced with built development would be considered a negative impact on the landscape character. However, the landscape measures proposed in this section will significantly improve the quality of the landscape character in this area. The significant amount of native woodland, wetland and grassland habitats to be created would have a very positive impact on the landscape character of this area and the wider environment. 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 the level of this impact will continue to be reduced as the habitats establish and become integrated into the surrounding landscape.

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

11.40 The landscape proposals include the establishment of a significant level of native woodland, hedgerows and native wetland and grassland meadows. This landscape treatment will contribute positively to the landscape character of the area.

11.41 The overall impact on the landscape character would therefore be considered slightly positive due to the level of landscape and ecological enhancement proposed and restricting the built development to an area of the site which has little value in terms of landscape character

Impact on landscape planning

11.42 The Green Infrastructure objectives that apply to the Proposed Development site and its environs, described under section 11.24 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 treatment under the Proposed Development will create significant belts of native woodland linking the existing hedgerows and trees into a much larger ecological habitat, including a native wetland to the west of the site. Most of the existing trees and hedgerows will be retained and improved 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 Proposed Development site and create strong ecological corridors through the site and connecting to wider landscape. The proposal would be considered in accordance with these policy objectives.

Visual impact assessment from specific locations

View 1 – From the Grange Castle South Access Road

Figure 11.2 View 1 location map

Existing view

11.43 The view is from the southern edge of the Proposed Development site on the public footpath. Views in this vicinity towards the north are wide and expansive due to the flat topography and lack of any significant tree cover. There are no views of any value from this location. In this specific view towards the Proposed Development site the timber fence and existing Castlebaggot substation are prominent in the foreground. The Proposed Development site are visible in the centre of the view although mostly obscured by the timber fence. The trees in the north eastern part of the site are visible in this view, forming a small part of the backdrop and visual ridgeline

Figure 11.3 Existing view 1

Figure 11.4 Proposed view 1 on day 1 of operations

Visual impact of Proposed Development during construction

11.44 The Proposed Development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials, built structures will be partially screened from view by the existing vegetation and structures. Some of the visual elements associated with the building process will result in a visual intrusion into this view. However, the distance from the viewpoint to the main part of the Proposed Development site will limit the level of visual impact. The level of this impact will also be limited due to the construction works being located close to recently constructed large buildings where similar construction activities were recently part of the visual landscape most notably the large data centre being constructed to the south of the Proposed Development. The impact of the Proposed Development during construction on the view from this location would be considered negative, moderate in magnitude, and short-term in duration.

Visual impact of Proposed Development during operation

11.45 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The photomontage (Figure 11.4) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data centre buildings are visible in the centre of the view and it will alter the ridgeline of the view. The buildings are partially screened by the existing hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. The level of the proposed screening will increase over time as the new trees mature. The level of the visual impact is mitigated due to the number of large buildings in the local landscape most notable the large data centres and substation immediately adjacent to the Proposed Development. This development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered moderate and long-term in duration.

View 2 – From the entrance of Grange Castle South Business Park

Figure 11.5 View 2 location map

Existing view

11.46 The south-western edge of the Proposed Development site is 32m from this view location and the closest point of the proposed buildings is 168m from this view location. From this position expansive views are offered in most directions over the flat agricultural field landscape. Views of value in this vicinity are the long-distance views with the Dublin/Wicklow mountains visible in the background from some locations. Views to the mountains are to the south from this location. The assessed view is towards the north east where the Proposed Development site is visible in the centre beyond the Business Park entrance feature wall and fencing. The trees on site, combined with the trees in neighbouring lands and buildings in Profile Park, form the visual ridgeline of the view. The recently constructed Google data centre is visible to the right of this view.

Figure 11.6 Existing view 2

Figure 11.7 Proposed view 2 on day 1 of operations

Visual impact of Proposed Development during construction

11.47 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 where similar construction activities were recently part of the visual landscape most notably the large data centre adjacent to this scheme. The impact of the proposals during construction on the view from this location would be considered negative, significant in magnitude, and short to medium term in duration.

Visual impact of Proposed Development during operation

11.48 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The photomontage (Figure 11.7) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data centre buildings are prominent in the centre of the view, where it alters the ridgeline of the view. Buildings A and B are partially screened by the proposed earth berms and tree planting proposed as part of the scheme. However, the office section of the building is designed as a landmark elevation and it is intended that it will be viewed from this location. The building is set in a new feature landscape of wetland and tree copses visible on the left side of the view. The positive qualities of this view will mitigate the level of perceived negative impact from the alteration of an agricultural type landscape to a built development.

11.49 The level of the visual impact is also mitigated due to the number of large buildings in the local landscape most notable the large data centre immediately adjacent to this scheme and the localised nature of this view. This development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered moderate and long-term in duration

View 3 – From the junction of the R120 and the former Nangor Road at Clutterstown

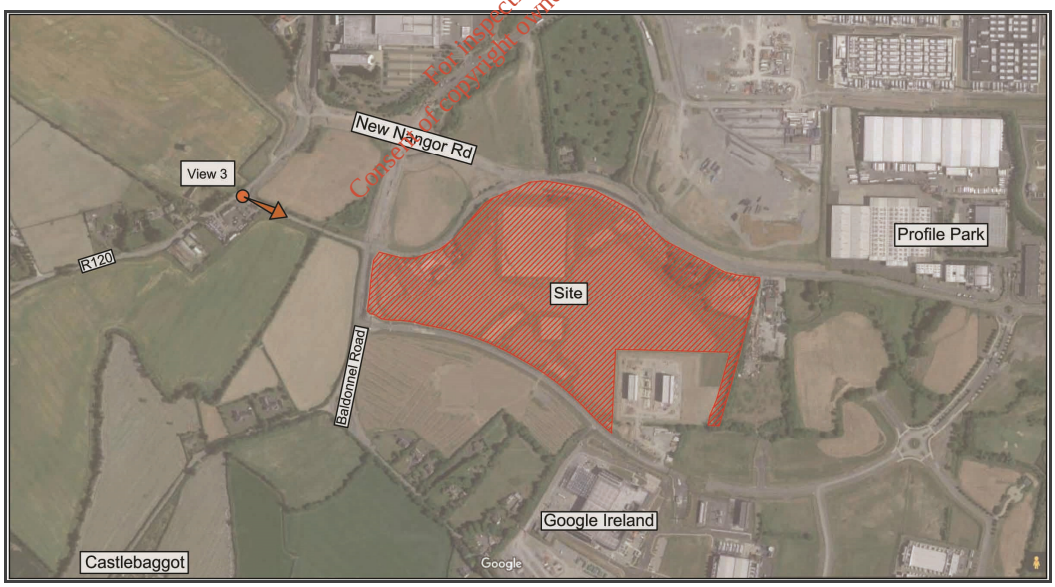

Figure 11.8 View 3 location map

Existing view

11.50 The north-western corner of the main Proposed Development site is 260m from this view location and the closest point of the proposed buildings is 408m from this view location. Views in this vicinity are mostly short-range views due to the surrounding ground levels, buildings and hedgerow vegetation. There are no views of any value from this location. In this specific view towards the site the railings, walls and signage associated with the car sales business is prominent in the foreground. The roadside hedgerow is also prominent on the left side of the view. These elements intrude into the wider view over the landscape creating a visual screen blocking any views the Proposed

Development site. The Castlebaggot Substation which abuts the site to the east is visible in the background of the view, forming a small part of the backdrop and visual ridgeline

Figure 11.9 Existing view 3

Figure 11.10 Proposed view 3 on day 1 of operations.

Visual impact of Proposed Development during construction

11.51 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 distance from the viewpoint will limit the level of visual impact. The magnitude of this impact will be further mitigated due to the construction works being located close to recently constructed large buildings where similar construction activities were recently part of the visual landscape most notably the large data centres adjacent to this scheme. The impact of the proposals during construction on the view from this location would be considered negative, slight in magnitude, and short to medium term in duration.

Visual impact of Proposed Development during operation

11.52 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The photomontage (Figure 11.10) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data storage facilities are visible in the centre of the view and it will alter the ridgeline of the view. The buildings are partially screened by the existing hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. The level of the proposed screening will increase over time as the new trees, planted as part of this application, mature. The level of the visual impact is mitigated by the small scale of the visual intrusion caused, the number of large buildings in the local landscape and the distance from the view location to the scheme. With the above considered the magnitude of the negative visual impact on this view would be considered slight and long-term in duration

View 4 – From the New Nangor Road to the north-west of the Proposed Development site

Figure 11.11 View 4 location map

Existing view

11.53 The northern edge of the Proposed Development site is 42m from this view location and the closest point of the proposed buildings is 110m from this view location. From this section of the public road expansive views are offered towards the south over the flat agricultural field landscape. Views of value in this vicinity are the long-distance views with the Dublin/Wicklow mountains visible in the background from some locations. However, the recent data centre development to the south of the Proposed Development site and the Castelbaggot Substation buildings obscure most of the mountains from this view. The Proposed Development site is visible in the centre of the view with the stone stub wall and railing prominent in the foreground. The recently constructed data centres are visually prominent in the centre of the view a distance back from the foreground.

Figure 11.12 Existing view 4

Figure 11.13 Proposed view 4 on day 1 of operations

Visual impact of Proposed Development during construction

11.54 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 where similar construction activities were recently part of the visual landscape most notably the large data centres adjacent to this scheme and on lands to the north, to the left of this view. The impact of the Proposed Development during construction on the view from this location would be considered negative, significant in magnitude, and short to medium term in duration.

Visual impact of Proposed Development during operation

11.55 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature due to the loss of an agricultural type landscape to a built development. The photomontage (Figure 11.13) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data centre is prominent in the centre of the view and it will alter the ridgeline of the view. The location and scale of the Proposed Development will result in a visual obstruction to the current open and expansive view. Most of the Proposed Development is screened by the proposed earth berms and tree planting proposed as part of the scheme. However partial or glimpsed views of Building B and A in the background are possible. The level of the proposed screening will increase over time as the new trees mature.

11.56 The Proposed Development is set in a new feature landscape of ponds, wildflower meadow and tree copses between the road and the large berm and woodland. The positive qualities of this view will mitigate the level of perceived negative impact from the alteration of an agricultural field to a built development.

11.57 The level of the visual impact is further mitigated due to the number of large buildings in the local landscape most notable the large data centres immediately adjacent to this scheme and in the centre of the existing view. There are also several large buildings in this vicinity and visible from this location to the left of this view (Microsoft Data Centres) and to the rear of this view (Cuisine de France). The impact is mitigated further by the close range and the localised nature of this view.

11.58 With the above considered the Proposed Development would therefore be considered as consistent with existing and emerging trends in the area. The magnitude of the negative visual impact on this view would be considered moderate and long-term in duration

View 5 – From the New Nangor Road to the north-east of the Proposed Development site

Figure 11.14 View 5 location nap

Existing view

11.59 The north-east corner of the main Proposed Development site is 49m from this view location and the closest point of the future substation is 200m from this view location and the closest proposed data centre is 280m from this location. Views of value in this vicinity are of the mature trees mostly located on the southern edge of the road and the expansive view over the flat agricultural landscape to the west.

Figure 11.15 Existing view 5

Figure 11.16 Proposed view 5 on day 1 of operations

Visual impact of Proposed Development during construction

11.60 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 partially screened from view by the existing vegetation. 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 screening provided by the existing trees and as the construction works are located close to recently constructed large buildings. Therefore, similar construction activities were recently part of the visual landscape most notably the large data centres immediately to the north (right) of the view. The impact of the proposals during construction on the view from this location would be considered negative, moderate in magnitude, and short to medium term in duration

Visual impact of Proposed Development during operation

11.61 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The photomontage (Figure 11.16) demonstrates accurately the extent of the alteration of the view on day 1 of operations. Building C of the Proposed Development is visible at the end of the road. Building C is partially screened by the existing hedgerow trees and by the proposed earth berms and tree planting proposed as part of the scheme. Building C screens views of Buildings A and B from this location. The level of the proposed screening will increase over time as the new trees mature. The level of the visual impact is mitigated due to the number of large buildings in the local landscape most notably the large data centre immediately adjacent to this scheme. The impact is also mitigated by the wetland that will be created at the western end of the site providing a visually attractive landscape area. This development would be considered as consistent with existing and emerging trends in the area. None of the visual sensitivities of views from this location would be affected by the Proposed Development. The magnitude of the negative visual impact on this view would be considered moderate and long-term in duration.

View 6 – From the Profile Park access road to the east of the Proposed Development site

Figure 11.17 View 6 location map

Existing view

11.62 The eastern edge of the Proposed Development site is 444m from this view location and the closest point of the future substation is 577m from this view location and the closest proposed data centre is 688m from this location. The view is not expansive due to the flat topography and the level of vegetation in the vicinity. Views of value in this location are views of the agricultural landscape with the Dublin and Wicklow Mountains in the background. The views of value are in the opposite direction to this view.

Figure 11.18 Existing view 6

Figure 11.19 Proposed view 6 on day 1 of operations

Visual impact of Proposed Development during construction

11.63 The Proposed Development will not result in any significant impact on this view during construction. The construction process, machinery, storage of materials, built structures will be mostly screened from view by the existing vegetation. Some of the visual elements associated with the building process will result in a visual intrusion into this view. However, the distance from the viewpoint will limit the level of visual impact. The impact of the Proposed Development during construction on the view from this location would be considered negative but not significant in magnitude, and short to medium term in duration.

Visual impact of Proposed Development during operation

11.64 The nature of the Proposed Development will result in an alteration to the existing view that would be considered negative in nature. The photomontage (Figure 11.19) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The Proposed Development is partially visible in the centre of the view, however it is mostly screened by the existing trees and other vegetation. The level of this screening will increase over time as the new trees, planted as part of this application, mature. The level of the visual impact is mitigated by the small scale of the visual intrusion caused, the number of large buildings in the local landscape and the distance from the view location to the scheme. The magnitude of the negative visual impact on this view would therefore be considered not significant and long-term in duration.

'Do nothing' scenario

11.65 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 fields 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

11.66 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

11.67 On completion of sections of the Proposed Development, 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 TRANSPORT

12.1 This chapter of the EIA Report 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.

Introduction

12.2 This Chapter of the EIA Report assesses any likely or significant impacts associated with traffic and transportation issues arising from the Proposed Development. The report presents an assessment of both the operational and construction stages of the Proposed Development. The focus of the assessment is however primarily on the operational stage, which is anticipated to have a greater impact on the prevailing environment than the construction stage. Relevant mitigation measures are also presented in this chapter.

12.3 This chapter has been prepared by Cronin & Sutton Consulting Engineers (CS Consulting). This assessment is based in part on the outcome of the Traffic Impact Assessment (TIA) prepared by CS Consulting and submitted separately as part of this planning application. Reference should be made to the TIA for full details of the traffic impact assessment methodology and other transport-related aspects of the proposed development.

Study methodology

12.4 Full detail of the methodology employed in determining the proposed development's potential impact on the surrounding road network is given in Sections 1, 3, 4, and 5 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application. In order to identify existing peak traffic flow hours on the surrounding road network, a 12-hour classified vehicular traffic count survey was undertaken on Tuesday the 17th of December 2019 by Irish Traffic Surveys (ITS), on behalf of CS Consulting. This survey was conducted between 07:00 and 19:00, at 9 no. existing and former junction locations along the R134 (Nangor Road), the R120 (Adamstown Road), and the L2001 (Baldonnel Road), in the vicinity of the Grange Castle Business Park. The weekday peak hour background traffic flows across all active survey sites were found to occur between 07:30 and 08:30 (AM peak hour) and between 16:30 and 17:30 (PM peak hour). The traffic survey is described in greater detail in Section 3 of the accompanying TIA.

Figure 12.1 Locations of traffic survey sites

12.5 Arrival and departure trip generation rates for the Proposed Development's operational phase have been derived from the recorded arrivals and departures at traffic survey location no. 5: the Grange Castle South Business Park access junction on Baldonnel Road (see Figure 12.1). This junction constitutes the principal vehicular access to 2 no. existing Google data centre facilities (see Figure 12.3), which have a combined GFA of approximately 37,300m^2 (excluding outbuildings).

12.6 The derived arrival and departure trip generation rates, for the AM and PM peak hour periods, are given in Table 12.1. For the purposes of calculating these trip rates, it has been assumed that all recorded light vehicle (car and LGV) trips were generated by the existing data centres, while all heavy vehicle (OGV and PSV) trips were generated by the active construction site. The derived trip rates were therefore obtained by excluding OGV and PSV trips, and dividing the car and LGV trips by the total GFA of the 2no. existing Google data centre facilities. The process of deriving these trip rates is described in greater detail in Section 4 of the accompanying TIA.

Table 12.1 Derived trip generation rates

Time Period	Arrivals (per 100m^2 Gross Floor Area)			Departures (per 100m^2 Gross Floor Area)		
	Cars	LGV	Total	Cars	LGV	Total
AM Peak 07:30-08:30	0.064	0.019	0.083	0.016	0.005	0.021
PM Peak 16:30-17:30	0.005	0.000	0.005	0.080	0.013	0.094
24 hours	0.496	0.214	0.710	0.496	0.214	0.710

Figure 12.2 Trip rate donor sites

12.7 Vehicular trip numbers for the Proposed Development's operational phase were calculated as a function of the derived trip rates given above and the total Gross Floor Area of the Proposed Development (excluding ancillary structures). The projected peak hour trip generation figures for the development as a whole are given in Table 12.2 as are the corresponding Annual Average Daily Traffic (AADT) figures.

Table 12.2 Projected operational phase trip generation

Time Period	Arrivals (Passenger Car Units)			Departures (Passenger Car Units)		
	Cars	LGV	Total	Cars	LGV	Total
AM Peak 07:30-08:30	51	15	66	13	4	17
PM Peak 16:30-17:30	4	0	4	63	11	74
24-hour AADT	391	169	560	391	169	560

12.8 The calculated AADT trip generation during the operational phase equates to 560no. vehicle arrivals and 560 no. vehicle departures in a 24-hour period. This provides a more robust estimate of trip generation than a calculation based solely on staff numbers or parking spaces. Given the projected maximum staffing levels of 150 no. staff present at any one time, the calculated trip generation would allow for a worst-case scenario whereby each staff member commutes to and from work by car (150 no. arrivals and 150 no. departures), also leaving the site by car on one occasion mid-shift and returning (a further 150 no. departures and 150 no. arrivals), in addition to which 260 no. trips to the site are made by visitors, deliveries, or other servicing vehicles.

12.9 Under normal operational conditions, all vehicular traffic to and from the Proposed Development shall travel via the Grange Castle South Business Park access road and its junction with Baldonnel Road (L2001). At this junction, it is assumed that all development traffic shall be distributed according to the directional splits recorded by the traffic survey. At the 2 no. roundabouts surveyed (survey location nos. 7 and 8), it has been assumed that all vehicular traffic to and from the development shall continue straight along Nangor Road (R134). At the remaining active surveyed junctions (see Figure 12.2), it is assumed that all development traffic shall be distributed according to the directional splits currently observed at these junctions. The peak hour directional splits at all relevant surveyed junctions are given in the Traffic Impact Assessment (TIA) prepared by CS Consulting and submitted separately in support of this planning application.

12.10 During construction of the Proposed Development, it is expected that vehicular traffic to and from the site shall reach a peak during the preliminary earthworks, which are required to raise the level of the site's southern portion. These works shall require the transport to site of approximately 95,000m^3 of fill material, equating to a total of approximately 7,900 HGV journeys to the site. Under a 'worst-case' scenario, it is possible that up to 10 no. delivery trips may be made to the site each hour during this phase (one HGV arrival and one HGV departure every 6 minutes). As shown in Table 12.3, this would equate to total heavy vehicle movements of 20 HGVs in each of the background peak hours, equivalent to 46 Passenger Car Units (PCU).

Table 12.3 Maximum construction phase trip generation

Time Period	Arrivals			Departures		
	Cars	HGV	Total PCU	Cars	HGV	Total PCU
AM Peak 07:30-08:30	100	10	123	0	10	23
PM Peak 16:30-17:30	0	10	23	100	10	123
24-hour AADT	300	100	530	300	100	530

12.11 It is also expected that some vehicular trips to and from the site shall be made by construction personnel commuting to and from work, with up to 350 no. car parking places potentially to be provided onsite within the construction compound. However, as the site working hours are expected to be from 07:00 to 19:00 (subject to planning conditions), the majority of these trips are expected to fall outside the background traffic peak hours. As a worst-case scenario, therefore, it is assumed that 50 no. cars of construction personnel shall arrive during the AM peak hour, and the same number

shall depart during the PM peak hour. During the most traffic-intensive phase of construction (the preliminary earthworks described above), no more than 100 no. construction cars will be active on site.

12.12 It is envisaged that all heavy construction traffic shall travel to the site from the N7 national road and from the M50 orbital motorway, via the R136 and R134 regional roads, and depart along these same routes.

12.13 A single active planning permission has been identified that has the potential to also significantly influence local traffic flows. This is the proposed CyrusOne data centre development (Reg. Ref. SD18A/0134 and SD19A/0300), currently under construction on lands facing the Proposed Development site, on the southern side of the Grange Castle South Business Park access road (see Figure 12.3). The projected operational traffic flows to be generated by this development during peak hours have been sourced from the EIA Report submitted under Reg. Ref. SD18A/0134.

Table 12.4 Committed development trip generation

Time Period	Arrivals (Passenger Car Units)	Departures (Passenger Car Units)
AM Peak	48	29
PM Peak	18	37
24-hour AADT	356	356

12.14 These peak hour committed development traffic flows have been distributed across the local road network in the same manner as those of the Proposed Development, and have been included in the background traffic flows for future assessment years.

12.15 The operational phase vehicular traffic generated by the Proposed Development shall result in minimal proportional increases in the total traffic flows at the majority of the surveyed junctions. Only at survey location no. 5 (the existing Grange Castle South Business Park access junction) shall total junction traffic movements increase by more than 5% in either of the peak hour periods as a result of operational traffic generated by the Proposed Development. The development's operation-related proportional increases in peak traffic flows at all active surveyed junction sites are given in sub-section 4.3 of the accompanying Traffic Impact Assessment report.

12.16 Likewise, construction phase vehicular traffic generated by the Proposed Development shall result in proportional increases in total traffic flows of more than 10% only at location no. 5 (the existing Grange Castle South Business Park access junction). The development's construction-related proportional increases in peak traffic flows at all active surveyed junction sites are given in sub-section 4.5 of the accompanying Traffic Impact Assessment report.

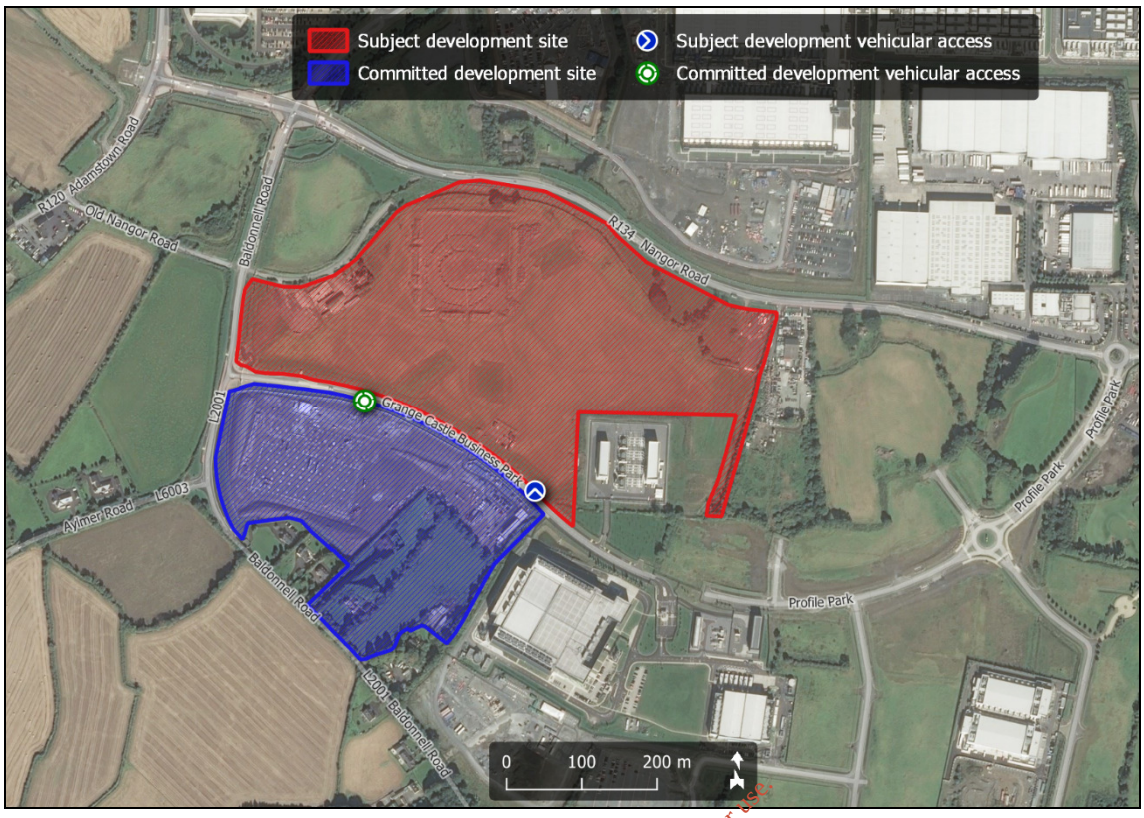

Figure 12.3 Relevant nearby committed development

12.17 The TII *Traffic and Transport Assessment Guidelines* (PE-PDV-02045) advise that Transport Assessments should generally be applied where traffic to and from a development is predicted to exceed 10% of the existing background traffic on the adjoining road (or 5% at sensitive locations). Within the scope of this report, therefore, only the existing Grange Castle South Business Park access junction has been subjected to detailed modelling (see Figure 12.4).

12.18 The operational performance of the existing Grange Castle South Business Park access junction was assessed using industry-standard PICADY software. Junction performance was assessed under the following scenarios:

- 2019 (baseline year) – surveyed traffic conditions;
- 2021 – year of peak construction activity
- 2028 (planned year of full completion) – with & without Proposed Development;
- 2033 (5 years after full completion) – with & without Proposed Development;
- 2038 (5 years after full completion) – with & without Proposed Development; and
- 2043 (design year) – with & without Proposed Development.

12.19 For future assessment years, the surveyed background traffic flows were further scaled up using standard TII growth factors. Traffic flows relating to the committed development described in paragraph 12.13 were included in the assessment of all future year scenarios.

12.20 Junction performance was assessed under the following criteria, for each junction approach arm:

- Degree of Saturation (the ratio of current traffic flow to ultimate capacity on a link or traffic stream);
- Mean Maximum Queue (the highest estimated mean number of Passenger Car Units queued in any lane of a junction approach link, averaged over the entire analysis period);
- Mean Delay per PCU (the average delay incurred by a vehicle on a junction approach); and
- Practical Reserve Capacity (the percentage by which the arriving traffic flow on any stream could increase before the junction as a whole would reach its effective capacity).

Figure 12.4 Location of modelled junction

12.21 The relevant junction performance assessment results are presented in greater detail within Section 5 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application, as are explanations of the assessment metrics employed.

Receiving environment

12.22 The receiving environment of the proposed development, as it relates to traffic and transport, is examined in Section 3 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application. This describes the surrounding road network, existing traffic flow patterns, recently completed and future proposed road improvements, and other nearby committed development.

12.23 Table 12.5 shows the PICADY modelling results for the baseline year 2019, at the existing Grange Castle South Business Park access junction on Baldonnel Road. These show that this junction currently operates within its effective capacity on all approaches during both the AM and PM peak periods, with negligible vehicle queues and minimal delays experienced on all junction approaches.

Table 12.5 Access junction assessment results for baseline year 2019 (no additional development)

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Baldonnel Road [L2001] (to north)	n/a	n/a	n/a	n/a	n/a	n/a	140	81
Grange Castle Business Park (to east)	2	11	0	0	9	8		
Baldonnel Road [L2001] (to south)	4	0	0	0	5	0		

Characteristics of the Proposed Development

12.24 A full description of the Proposed Development is set out in Chapter 2 of this EIA Report and has a gross floor area of 80,269sqm. Briefly, the Proposed Development comprises the construction of 3 no. two storey data storage facilities (Buildings A, B and C) with a combined gross floor area of 78,871sqm and other ancillary elements. Each of the three data storage facilities shall include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage space, office administration areas, and plant at roof level.

12.25 The Proposed Development shall also include the construction of an internal road network and circulation areas, a security hut at entrance, footpaths, and the provision of 150 no. car parking spaces and 78 no. cycle parking spaces. Vehicular, cyclist, and pedestrian access to the Proposed Development shall be via a new priority-controlled junction on the Grange Castle South Business Park access road, at the southern boundary of the development site (see Figure 12.5).

Figure 12.5 Site extent and local road network

12.26 It is intended that Buildings A, B, and C be constructed sequentially, and enter service on a phased basis. The Proposed Development's operational traffic impact has however been assessed on a cumulative basis, corresponding to the full operational status of all three data storage facilities.

12.27 Further detail of the development's proposed construction programme and phasing is provided in sub-section 4.2 of the Outline Construction Management Plan submitted separately in support of this planning application.

12.28 The details relating to the vehicular access design, internal layout, and servicing arrangements of the proposed development are described in Section 7 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application.

Sustainable transport modes

12.29 The Mobility Management Plan (MMP) Framework document submitted separately in support of this planning application outlines measures to assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys.

12.30 The existing provision of public transport services, bicycle infrastructure and pedestrian facilities in the vicinity of the development site is described in Section 4 of the MMP Framework document.

Staffing levels and parking provision

12.31 Once complete and fully operational, it is expected that the Proposed Development shall employ approx. 90 no. staff in total (30 no. staff per building) during a standard working day, and approx. 30 no. staff in total (10 no. staff per building) during a night shift. It is expected that an absolute maximum of 150 no. staff (50 no. staff per building) shall be present on site at any one time.

12.32 The Proposed Development's provision of car and bicycle parking (including disabled-accessible car parking spaces and electric vehicle charging facilities) is discussed fully in Section 6 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application.

12.33 The *South Dublin County Council Development Plan 2016–2022* does not specify any standard for the provision of car parking in data storage facility developments. The proposed development shall include a total of 150 no. car parking spaces, which shall be sufficient to provide onsite car parking for the maximum expected number of staff to be present at any one time. For the vast majority of the time, the car parking spaces shall not all be required by staff; sufficient car parking shall therefore also be available to cater for visitors when required.

12.34 The *South Dublin County Council Development Plan 2016–2022* requires that 5% of car parking spaces within any new development be suitable for use by persons with disabilities, in compliance with Part M of the Building Regulations. The proposed development shall include 9 no. disabled-accessible car parking spaces, equivalent to 6% of the total car parking provision. These spaces shall be located in proximity to building entrances.

12.35 The *South Dublin County Council Development Plan 2016–2022* does not specify any standard for the provision of bicycle parking in data storage facility developments. The proposed development shall include a total of 78 no. covered bicycle parking spaces, located in 3 no. clusters (each of 13no. Sheffield stands) close to building entrances. This quantum of bicycle parking provision is sufficient to allow cycle parking for as many as 87% of the staff to be present during a normal working day, or for 52% of the maximum number of staff expected to be present at any one time. Lockers, showers and changing facilities shall be provided within the development for staff travelling by bicycle.

12.36 The *South Dublin County Council Development Plan 2016–2022* stipulates that "all developments shall provide facilities for the charging of battery operated cars at a rate of up to 10% of the total car parking spaces", and that all remaining parking spaces "should be constructed to be capable of accommodating future charging points, as required". Within the proposed development, 16no. car parking spaces shall be equipped with electric vehicle (EV) charging points, equivalent to 11% of the total car parking provision. All other car parking spaces within the development shall be 'future-proofed' through the inclusion of redundant cables or ducting to allow the rapid future installation of additional EV charging points.

Potential impacts of the Proposed Development

12.37 Table 12.6 shows the PICADY modelling results for the design year 2043, based upon the projected traffic flows for this year (including other committed development) but not including traffic related to the Proposed Development. These show that the existing Grange Castle South Business Park access junction on Baldonnel Road shall continue to operate within its effective capacity on all approaches, with vehicle queues and delays similar to those currently occurring.

12.38 Under a Do-Nothing scenario, background traffic growth and the addition of vehicular traffic related to committed developments (excluding the Proposed Development) are therefore likely to have a long-term slight adverse impact on the operational efficiency of the existing junction assessed. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, traffic signalling redesign, or changes in general traffic flow restrictions) have the potential to improve the operational efficiency of these junctions.

Table 12.6 Do-Nothing access junction assessment results for design year 2043

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Baldonnel Road [L2001] (to north)	n/a	n/a	n/a	n/a	n/a	n/a	67	70
Grange Castle Business Park (to east)	17	34	0	1	12	11		
Baldonnel Road [L2001] (to south)	16	0	0	0	6	0		

Construction phase

12.39 Table 12.7 shows the PICADY modelling results for the projected peak in construction-related vehicular traffic at the development site, expected to occur in the year 2021. The projected traffic flows for this year include other committed development, as well as traffic related to the Proposed Development. These results show that the existing Grange Castle South Business Park access junction on Baldonnel Road shall continue to operate within its effective capacity on all approaches, with vehicle queues and delays slightly higher than those currently occurring. Full results for all assessment years and scenarios are presented in the Traffic Impact Assessment report prepared in support of this planning application.

Table 12.7 Do-Something access junction assessment results for year 2021 (construction phase)

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Baldonnel Road [L2001] (to north)	n/a	n/a	n/a	n/a	n/a	n/a	47	22
Grange Castle Business Park (to east)	25	60	0	1	14	19		
Baldonnel Road [L2001] (to south)	27	0	1	0	8	0		

12.40 During the construction phase, the Proposed Development is therefore likely to result in a short to medium term slight adverse impact on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Baseline scenario. This impact should be considered fully reversible, as it shall be confined to the duration of construction activity on the Proposed Development site.

12.41 During the development's construction phase, the worst-case scenario from a traffic and transport perspective would be an accumulation of inbound construction traffic (e.g. large deliveries or concrete mixer trucks) unable to enter the construction site and consequently obstructing traffic within the Grange Castle Business Park or along Baldonnel Road.

Operational phase

12.42 Table 12.8 shows the PICADY modelling results for the design year 2043, based upon the projected traffic flows for this year that include both other committed development traffic and operational traffic related to the Proposed Development. These show that the existing Grange Castle South Business Park access junction on Baldonnel Road shall continue to operate within its effective capacity on all approaches, with vehicle queues similar to those currently occurring and vehicle delays approximately 50% greater than those currently occurring. Full results for all assessment years and scenarios are presented in the Traffic Impact Assessment report prepared in support of this planning application.

12.43 When compared to the Do-Nothing scenario shown in Table 12.6, the results given in Table 12.8 show that vehicular traffic related to the development in its operational phase shall have an overall slight impact upon the operation of the existing junction assessed. Development traffic shall result in an increase of at most 17 percentage points in the degree of saturation on any junction approach during the peak hour periods, and shall not be the cause of any junction approach exceeding either effective capacity or ultimate capacity. Mean maximum vehicle queues shall not be measurably increased on any junction approach, and mean vehicle delays shall be increased by at most 4 seconds.

12.44 During the operational phase, the Proposed Development is therefore likely to result in a long-term slight adverse impact on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Do-Nothing scenario. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, traffic signalling redesign, or changes in general traffic flow restrictions) have the potential to improve the operational efficiency of these junctions generally, as well as to reduce vehicle trips to/from the Proposed Development.

Table 12.8 Do-Something access junction assessment results for design year 2043 (operational phase)

Junction Approach Arm	Degree of Saturation (%)		Mean Maximum Queue (PCU)		Mean Delay per PCU (seconds)		Practical Reserve Capacity (%)	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Baldonnel Road [L2001] (to north)	n/a	n/a	n/a	n/a	n/a	n/a	51	35
Grange Castle Business Park (to east)	23	51	0	1	13	15		
Baldonnel Road [L2001] (to south)	23	0	0	0	7	0		

12.45 The relevant junction performance assessment results are presented in greater detail within Section 5 of the Traffic Impact Assessment (TIA) submitted separately in support of this planning application, as are explanations of the assessment metrics employed.

12.46 During the development's operational phase, the worst-case scenario from a traffic and transport perspective generally corresponds to the cumulative effect described in paragraphs 12.54 and 12.55.

Human health and risk of accidents

12.47 The vehicular traffic flows that shall be generated by the Proposed Development may result in corresponding changes to noise and air quality levels in the vicinity of the surrounding road network. The natures and extents of these changes, and their potential to impact upon human health, are examined in Chapters 9 and 10 of this EIA Report.

12.48 A substantial proportion of the road network surrounding the development site has in recent years

been significantly improved, including the widening and realignment of roads (see sub-section 3.3 of the accompanying Traffic Impact Assessment report). In the 12-year period from 2005 to 2016 (inclusive), 15 no. road traffic collisions were recorded on the local road network within 1.5km travel distance of the Proposed Development access location. However, all but two of these occurred along road links that have since been realigned or otherwise improved (in particular the former alignment of the Old Nangor Road), and therefore cannot be used to give an indication of current collision risk.

12.49 In this 12-year period, the following 3 no. collisions were recorded on nearby road links that have not since been improved:

- 2 no. collisions on Peamount Road, to the south-west of Adamstown Road Road;
- 2 no. collisions on Aylmer Road, to the south-west of Baldonnell Road; and
- 1 no. collision on Baldonnell Road, to the south-east of its junction with Aylmer Road.

12.50 As an indicative estimate, the existing risks of a road traffic collision occurring on these road links in any given year is therefore approximately:

- 16.7% on Peamount Road;
- 16.7% on Aylmer Road; and
- 8.3% on Baldonnell Road.

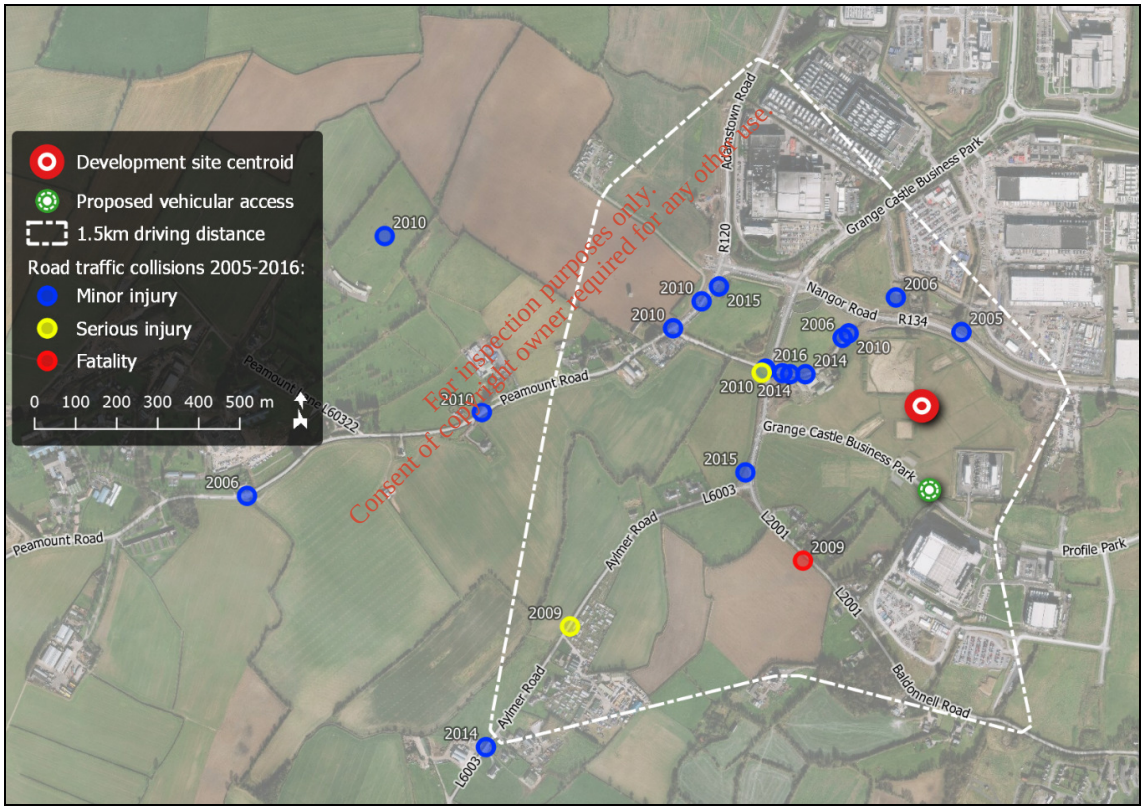

Figure 12.6 Recorded road traffic collisions 2005-2016

12.51 In its operational phase, the Proposed Development is forecast to result in the following increases in 2-way Average Annual Daily Traffic (AADT) flows on the above road links, compared to the surveyed 2019 flows:

- 1.8% AADT increase on Peamount Road;
- 4.0% AADT increase on Aylmer Road; and
- 3.8% AADT increase on Baldonnell Road.

12.52 Applying these increases to the existing collision risks on these road links, it may be estimated that the Proposed Development shall result in approximate annual collision risk increases of:

- 0.3 percentage points on Peamount Road (from 16.7% risk annually to 17.0%);

- 0.7 percentage points on Aylmer Road (from 16.7% risk annually to 17.4%); and
- 0.3 percentage points on Baldonnell Road (from 8.3% risk annually to 8.6%).

12.53 The above represents a simplified risk calculation; other mechanisms besides traffic volumes also influence the risk of collisions, and these are highly specific to immediate road conditions. As an indicative estimate of wider influence, however, this is sufficient to demonstrate generally that the Proposed Development shall not significantly increase the risk of road traffic collisions on the surrounding road network.

Cumulative effect

12.54 As is standard practice in the assessment of traffic impact, the vehicular traffic generation of other adjacent committed development has been included by default in the operational assessments conducted both under the Do-Nothing scenario and the Do-Something (operational phase) scenario. The cumulative effect of the Proposed Development, in conjunction with other committed development and predicted background traffic growth, is therefore represented by the difference between the assessment results given in Table 12.5 (the Baseline scenario) and those given in Table 12.7 (the design year assessment with the Proposed Development in place).

12.55 The cumulative increase in vehicular traffic flows is therefore likely to result in a long-term slight negative impact on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Baseline scenario. This impact should be considered reversible to a degree, as any future measures that reduce local vehicular traffic volumes (e.g. improvements in public transport or cycling infrastructure, traffic signalling redesign, or changes in general traffic flow restrictions) have the potential to improve the operational efficiency of these junctions generally, as well as to reduce vehicle trips to/from the Proposed Development.

Remedial and mitigation measures

Construction phase

12.56 During the construction phase of the development, the following measures will be put in place to reduce the impact on the surrounding environment:

1. The contractor will be required to provide wheel cleaning facilities, and regular cleaning of the sites construction and main access road will be carried out;
2. Temporary car parking facilities for the construction workforce will be provided within the site and the surface of the car park will be prepared and finished to a standard sufficient to avoid mud spillage onto adjoining roads; and
3. Monitoring and control of construction traffic will be ongoing during construction works. Construction traffic will be managed to avoid unnecessary trips during peak hours.

12.57 The lead contractor appointed for the construction of the development shall be required to prepare a Construction Management Plan, including a plan for the scheduling and management of construction traffic that details the measures to be taken to mitigate the risk of such events. Approved routes for construction vehicle traffic shall be agreed with South Dublin County Council.

Operational phase

12.58 As described in the Mobility Management Plan (MMP) Framework document prepared in support of this planning application, a Mobility Management Coordinator shall be appointed for the Proposed Development, with the remit to implement and oversee an ongoing Mobility Management Plan (MMP). This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys.

12.59 As also described in the accompanying MMP Framework, the development site is situated within a 10-minute walk of an existing high-quality bus route linking Grange Castle with Dublin City. The site is also within a 12-minute bicycle journey of Adamstown railway station. As described in the Traffic Impact Assessment report prepared with this planning application, the development shall include a relatively high provision of bicycle parking, which shall serve to encourage bicycle journeys by both

development occupants and visitors.

Residual impacts

12.60 In terms of traffic and transport considerations, the residual impact of the Proposed Development is equivalent to the operational impact described in paragraphs 12.43 and 12.56.

Monitoring

12.61 As described in the accompanying MMP Framework document, a Mobility Management Coordinator shall be appointed for the Proposed Development, with the remit to implement and oversee an ongoing Mobility Management Plan (MMP). In conjunction with this, the Mobility Manager shall be responsible for monitoring the travel habits of development occupants and visitors.

12.62 An MMP is a dynamic process whereby a package of measures and campaigns is identified, piloted, and then monitored on an ongoing basis. The MMP will identify specific targets against which the effectiveness of the plan can be assessed at each review; these will typically take the form of target modal splits for journeys to and from a site. The Mobility Management Coordinator shall gather data on travel patterns, for instance by conducting periodic travel surveys of development occupants.

13. CULTURAL HERITAGE

Introduction

13.1 Irish Archaeological Consultancy Ltd has prepared this chapter to assess the impact, if any, on the archaeological, architectural, and cultural heritage resource of a proposed industrial development located in the townlands of Milltown, Ballybane and Aungierstown and Ballybane, Dublin 22 (ITM 703155/730896, Figure 13.1). The assessment has been undertaken by Faith Bailey and Jacqui Anderson of IAC Archaeology.

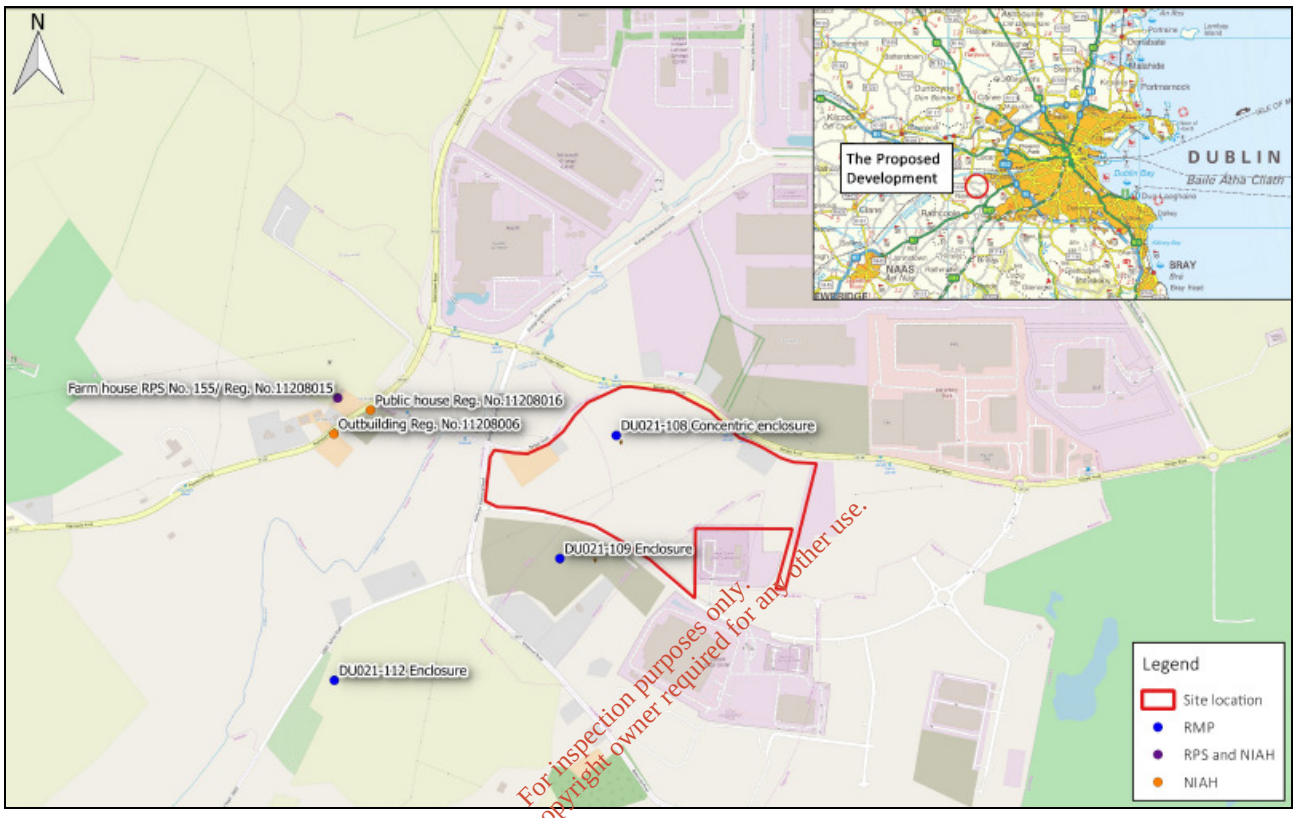

Figure 13.1 Site location showing recorded archaeological and architectural sites

Methodology

13.2 Research for this report was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical and cartographic sources. The second phase involved a field inspection of the site.

Desktop study methodology

13.3 The desktop study involved a review of the following documents:

- *Record of Monuments and Places for County Dublin;*
- *Sites and Monuments Record for County Dublin;*
- *National Monuments in State Care Database;*
- *Preservation Orders List;*
- *Topographical files of the National Museum of Ireland;*
- *Cartographic and written sources relating to the study area;*
- *South Dublin County Development Plan 2016–2022;*
- *Aerial photographs;*
- *Excavations Bulletin (1970–2019); and*
- *National Inventory of Architectural Heritage.*

13.4 **Record of Monuments and Places (RMP)** is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

13.5 **Sites and Monuments Record (SMR)** holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Culture, Heritage and the Gaeltacht (DoCHG) – www.archaeology.ie.

13.6 **National Monuments in State Care Database** is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

13.7 The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

13.8 **Preservation Orders List** contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

13.9 **The topographical files of the National Museum of Ireland** are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

13.10 **Cartographic sources** are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- *Down Survey Maps of the Barony of Newcastle and the Parish of Kilmactalway, c. 1655*
- *Rocque's An Actual Survey of County Dublin, 1760*
- *Taylor's Map of the Environs of Dublin, 1816*
- *Ordnance Survey Maps of Dublin, 1843 and 1906–9*

13.11 **Documentary sources** were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the Proposed Development site.

13.12 **Development Plans** contain a catalogue of all the Protected Structures and archaeological sites within the county. The South Dublin County Development Plan (2016–2022) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the Proposed Development site.

13.13 **Aerial photographic coverage** is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

13.14 **Excavations Bulletin** is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2019.

13.15 **The National Inventory of Architectural Heritage (NIAH)** is a state initiative established under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures.

Field inspection methodology

13.16 Field inspection is necessary to determine the extent and nature of archaeological and historical remains, and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

13.17 The archaeological and architectural field inspection entailed –

- *Walking the Proposed Development and its immediate environs.*
- *Noting and recording the terrain type and land usage.*
- *Noting and recording the presence of features of archaeological or historical significance.*
- *Verifying the extent and condition of any recorded sites.*
- *Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.*

Guidance and Legislation

13.18 The following legislation, standards and guidelines were consulted as part of the assessment.

- *National Monuments Acts, 1930-2014;*
- *The Planning and Development (Strategic Infrastructure) Bill, 2006;*
- *Planning and Development Act, 2000;*
- *Heritage Act, 1995;*
- *Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;*
- *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIA Report) (EPA 2017). Dublin: Government Publications Office;*
- *Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);*
- *Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);*
- *Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands; and*
- *Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Local Government (Planning and Development) Act 2000.*

Types of impact

13.19 The impact definitions considered under this chapter as per draft EPA Guidelines 2017 (pg 23, 2017), are as follows:

Imperceptible - An effect capable of measurement but without noticeable consequences

Not significant - An effect which causes noticeable changes in the character of the environment but without noticeable consequences

Slight - An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate - An effect that alters the character of the environment in a manner that is consistent with existing or emerging trends.

Significant - An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Very Significant - An effect which, by its character, magnitude, duration or intensity alters the majority of a sensitive aspect of the environment.
Profound - An effect that obliterates sensitive characteristics.

Receiving environment

Archaeological and Architectural Background

13.20 The Proposed Development site is located in the townlands of Milltown, Ballybane and Aungierstown and Ballybane, County Dublin. There is one recorded monument within the Proposed Development site, an enclosure (DU021-108). A second enclosure (DU021-109) is located to the immediate south of the Proposed Development site and a third enclosure (DU021-112) is located c. 500m southwest of the site. Both DU021-108 and DU021-109 have been subject to archaeological excavation and have been fully preserved by record. There are no National Monuments or sites subject to preservation orders within the vicinity of the Proposed Development site. There is one protected structure in the environs of the site: a farm house (RPS 155/ NIAH Reg. No. 11208015), located c. 357m west of the Proposed Development site. A total of three structures are included in the NIAH in the vicinity of the Proposed Development site, including the protected structure. None of these protected structures are within the Proposed Development site.

Prehistoric Period

Mesolithic Period (c. 7000–4000 BC)

13.21 Although recent discoveries have suggested the possibility of human activity in the southwest of Ireland as early as the Upper Palaeolithic (Dowd and Carden 2016), the Mesolithic period is the first time for which there is widespread evidence of human occupation. Mesolithic people led a mobile lifestyle, hunting, foraging and fishing for sustenance and migrating to exploit seasonal resources. As a result, coastal and riverine resources were of particular importance to these communities. Such transient ways of life leave little trace in the archaeological record. Often the only indication of Mesolithic activity are scatters of flint implements and debitage. Occasionally shell middens have been found to date to this period. Although Mesolithic activity has been identified in County Dublin, there are no recorded sites of Mesolithic date within the vicinity of the Proposed Development site.

Neolithic Period (c. 4000–2500 BC)

13.22 The Neolithic period began with the introduction and adoption of agriculture to Ireland. This period was revolutionary. Neolithic groups turned to cereal cultivation and the rearing of stock to support themselves. There was no longer a need to move frequently and as a result settlement became more permanent. Pottery was being produced possibly for the first time. A new preoccupation with claiming territory to farm contributed to the megalithic tomb tradition that emerged in the Neolithic. There are four main types of megalithic tombs; court cairns, portal tombs, passage tombs and the later wedge tombs of the early Bronze Age. These monuments served as tombs for the dead, ceremonial centres for the living and territorial markers in the landscape. They would have required significant organisation and cooperation to construct. The Proposed Development site would have remained favourable for settlement into the Neolithic period although there are no recorded Neolithic sites in the vicinity of the site.

Bronze Age Period (c. 2500–800 BC)

13.23 The Bronze Age was marked by the widespread use of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The megalithic tomb tradition went into decline and ended by the middle Bronze Age and the burial of the individual became typical. Cremated or inhumed individuals were often placed in a cist, which is a stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several smaller lintels (Buckley and Sweetman 1991). Barrows and pit burials are also funerary monuments associated with this period.

13.24 Another site type thought to reveal of glimpse of domestic life at this time is the burnt mound or *fulacht fia*. A common site within the archaeological record, they are normally interpreted as temporary cooking sites but it has been suggested that they may have had other functions such as brewing, dyeing and bathing. They survive as low mounds of charcoal-enriched soil mixed with an

abundance of heat-shattered stones. They are usually horseshoe-shaped and located in low-lying areas near a water source and are often found in clusters. Even when levelled by an activity such as ploughing, they are identifiable as burnt spreads in the landscape (Brindley and Lanting, 1990).

13.25 Two *fulachaí fia* and associated features such as troughs, pits and stakeholes were excavated c. 320m north-northeast of the Proposed Development site under licence 13E0471 (Bennett 2016:083, 2017:411). Nine cremation pits of Bronze Age date were identified in two clusters and excavated under licence 14E0453, c. 488m east-northeast of the Proposed Development site (Bennett 2016:084). A *fulacht fia* (DU017-084) is also recorded c. 1km northeast of the site. There was further Bronze Age activity noted c. 1.14km northeast of the Proposed Development site, where a ring-barrow (DU017-080) was excavated. Taken together, this evidence suggests the vicinity of the Proposed Development site was settled and utilised by Bronze Age communities.

Iron Age Period (c. 800 BC – AD 400)

13.26 The Iron Age was traditionally seen as a period for which there was little evidence in comparison to the preceding Bronze Age and the succeeding early medieval period. However, development-led excavation in recent decades and projects such as the Late Iron Age and Roman Ireland Project have added significantly to our knowledge of the Irish Iron Age. In Europe, there are two stages to the Iron Age, the earlier Hallstatt and the later La Tene. While in Ireland, evidence of a Hallstatt phase is rare, and the La Tene phase is reflected strongly in the style of metalwork of this period. It is clear that there was significant contact and interaction between the Continental Europe, Britain and Ireland at this time. There are no recorded sites of Iron Age date in the vicinity of the Proposed Development site.

Early Medieval Period (AD 400–1100)

13.27 The early medieval period is depicted in the surviving sources as largely rural characterised by the basic territorial unit known as *túath*. Byrne (1973) estimates that there were probably at least 150 kings in Ireland at any given time during this period, each ruling over his own *túath*, of between 1,700 and 3,300 subjects according to most recent estimates (Stout 2017). One of the most common indicators of settlement during this period is the ringfort. Ringforts were often constructed to protect rural farmsteads and are usually defined as a broadly circular enclosure. They are typically enclosed by an earthen bank and exterior ditch and range from 25m to 50m in diameter. Ringforts can be divided into three broad categories – univallate sites, with one bank or ditch; multivallate sites with as many as four levels of enclosing features and platform or raised ringforts, where the interior of the ringfort has been built up. Multivallate ringforts are generally believed to reflect the higher status of the occupants (Edwards 1996). Many sites recorded as enclosures may represent ringforts or similar sites.

13.28 An enclosure (DU021-108) is recorded within the Proposed Development site. This site was initially identified through aerial photography and geophysical survey. The presence of a circular double-ditched enclosure was confirmed by testing. This site, designated AH1, was excavated under licence 17E0590 in 2019 and is believed to date to the early medieval period. A second enclosure (AH2) was also excavated to the southeast of AH1. No datable finds were recovered from this feature, and it is possible that it may date to the early medieval period or be prehistoric in nature. Post-excavation analyses for both enclosures are ongoing.

13.29 A second enclosure (DU021-109) is recorded to the immediate south of the Proposed Development site. The site was identified through geophysical survey (Licence Ref.: 15R0116) undertaken by Earthsound (2015) and Leigh (2016); previous testing carried out by ACSU (2016) and pre-excavation works (Licence Refs.: 17E0591) carried out by Rubicon Heritage (2017). It was subject to full archaeological excavation during 2018. The enclosure consisted of a multivallate enclosure with inner circular ditch and outer kidney-shaped ditch. A dense cluster of internal features were identified as well as features between the two enclosing ditches. The site was provisionally dated to the early medieval period based on the artefacts recovered which included a baluster headed pin from the 10th century AD.

13.30 This period was also characterised by the introduction of Christianity to Ireland. Early churches tended to be constructed of wood or post-and-wattle. Between the late 8th and 10th centuries, mortared stone churches gradually replaced these earlier structures. Many of the sites, some of which were monastic foundations, were probably originally defined by an enclosing wall or bank

similar to that found at the coeval secular sites. This enclosing feature was probably built more to define the sacred character of the area of the church than as a defence against aggression. An inner and outer enclosure can be seen at some of the more important sites; the inner enclosure surrounding the sacred area of church and burial ground and the outer enclosure providing a boundary around living quarters and craft areas. Where remains of an enclosure survive, it is often the only evidence that the site was an early Christian foundation. An ecclesiastical enclosure (DU021-003003) is recorded c. 774m south of the Proposed Development site at Kilmactalway.

Medieval Period (AD 1100–1600)

13.31 The beginning of the medieval period was characterised by political unrest that originated from the death of Brian Borumha in 1014. In AD 1171, Dublin was besieged and taken by Diarmait MacMurchada and his Leinster forces supported by a force of Anglo-Norman knights led by Strongbow (Richard Fitz-Gilbert de Clare) and Raymond le Gros. Diarmait MacMurchada, deposed King of Leinster, sought the support of mercenaries from England, Wales and Flanders to assist him in his challenge for kingship. Norman involvement in Ireland began in AD 1169, when Richard de Clare and his followers landed in Wexford to support MacMurchada. Two years later de Clare (Strongbow) inherited the Kingdom of Leinster and by the end of the 12th century the Normans had succeeded in conquering much of the country (Stout and Stout 1997). The initial stage of the invasion of the country was marked by the construction of motte and bailey castles, which were later replaced with stone castles.

13.32 In the later medieval period, a total of seven tower houses were constructed in the wider environs of the Proposed Development site. These include Grange Castle (DU017-034), from which the area takes its name, Kilbride Castle (DU021-004), c. 782m southeast of the Proposed Development site and Nangor Castle (DU017-037), c. 1.2km to the east.

Post-medieval Period (AD 1600–1900)

13.33 With the onset of the 18th century, the political climate settled and this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. The nearest large demesne landscape to the Proposed Development site is Castle Bagot, c. 380m to the south of the site. The principal building survives however the parkland has lost much of its character. A small demesne associated with Milltown House is located c. 205m west of the Proposed Development site. While the main building has been demolished, an outbuilding survives and is listed in the NIAH (NIAH Reg. No. 11208006), c. 344m to the west.

13.34 A public house dating to between 1780 and 1810, is also listed in the NIAH, c. 280m west of the Proposed Development site (NIAH Reg. No. 11208016). However, this structure has been demolished and is no longer extant.

13.35 A vernacular farm house (RPS 155/ NIAH Reg. No. 11208015) is recorded c. 357m west of the Proposed Development site. Its dates to the 18th century and consists of a four-bay, two-storey structure with associated outbuildings. It is visible on the first edition OS map of 1843.

Previous Archaeological Investigations

13.36 A number of previous archaeological investigations have taken place within the Proposed Development site and the surrounding environs. Archaeological features were identified in a geophysical survey undertaken by Earthsound in 2015 and Leigh in 2016 (Licence Ref: 15R0116) and confirmed by archaeological test trenching undertaken by ACSU in October 2016 (Licence Ref: 16E0531*)* and pre-excavation works undertaken by Rubicon Heritage in 2017 (Licence Ref: 17E0578). These features, which were subject to archaeological excavation during 2019, included a bivallate enclosure (AH1), numerous related features and a series of post-medieval agricultural

features, designated Area 1 (Figure 13.1). The outer ditch of the enclosure measured approximately 90m in diameter by 4m in width by 1.2m in depth (minimum), whilst the inner enclosing ditch measured approximately 48m in diameter by 4.40m in width by 1.45m deep (minimum) (Bayley 2018). Large sections of these ditches had been re-used as modern drainage features, with ceramic or plastic drains noted at the base. A large area in the eastern part of the site appeared to have been quarried in recent decades. A number of pits were identified within the interior of the enclosure, one of which was enclosed by four linear features which may represent evidence of a wind-break or structure (Bayley, pers. comm.).

Figure 13.2 Previously excavated areas within the Proposed Development site (after Google Earth 2018)

Figure 13.3 Mid-excavation aerial photograph of Area 1, facing northwest

13.37 Area 2, also excavated during 2019, (Figures 13.1 and 13.3) consisted of a roughly circular enclosure or ring ditch measuring approximately 27.5m north–south by 26m east–west, 1.2–1.4m in width and 0.65m in depth (minimum). Three features within the enclosed area and an external figure-of-eight kiln were also identified (Delaney and Bayley 2019a). The kiln is of a type commonly dating to the early medieval period. However, it is unclear if the enclosure was contemporary with the kiln and no date has yet been established for the enclosure. Post-excavations analyses are ongoing.

Figure 13.4 Mid-excavation aerial photograph of Area 2 and Area 5 South, facing west

13.38 The focus of the excavations in Area 5 were five linear ditches, identified in the geophysical survey and testing (Delaney and Bayley 2019b, Figures 13.2 and 13.4). These features were excavated in two cuttings. Four of these ditches were oriented northeast–southwest, with the fifth running northwest–southeast at the north-eastern end of the southern cutting. In Area 5 north, it was determined that large portions of these linear ditches had been disturbed and recut by modern drainage activity and very little of the original fabric of the ditches remained in-situ. The exception was in the north-west corner of the cutting, where one 10m length of the ditch appeared to be relatively undisturbed. One sherd of medieval pottery was recovered from the fill of this portion of the ditch. An additional north-northeast–south-southwest oriented ditch was identified in the north-eastern part of Area 5 north. Sixteen sherds of medieval pottery were recovered from the fill of this ditch. In Area 5 south, the linear ditches that were identified by the geophysical survey were noted, but as with the ditches in Area 5 north, it appears that these were recut at least once and re-used as drainage features, with no traces of the original ditch or fills surviving. A dog-leg shaped kiln, possibly dating to the early medieval period was identified adjacent to the northern ditch. A modern drainage ditch was recorded at the north-eastern end of the cutting and another northeast-southwest oriented linear feature, interpreted as an agricultural furrow, was also identified within the site area.

13.39 Archaeological monitoring was carried out within the Proposed Development site, immediately to the north of the road to the south (Licence Ref.: 18E0484, Bennett 2018:538). In addition to the linear features previously identified by Rubicon Heritage, a sub-circular deposit was noted which yielded a possible granite quernstone fragment. A total of 60 sherds of pottery were recovered during the monitoring, 41 of which were confirmed to be medieval in date.

13.40 An enclosure was also excavated to the immediate south of the Proposed Development site during 2017. The enclosure consisted of a multivallate enclosure with inner circular ditch and outer kidney-shaped ditch. A dense cluster of internal features were identified as well as features between the two enclosing ditches. The site was provisionally dated to the early medieval period based on the artefacts recovered which included a baluster headed pin from the 10th century AD.

13.41 Archaeological monitoring at the site of a geophysical anomaly, c. 231m to the northwest of the Proposed Development site identified a modern pit and spread of stone but nothing of archaeological significance (Licence Ref.: 06E1161, Bennett 2006:581).

13.42 Archaeological testing was also carried out under licence 19E0370 for the Grange Castle West Access Road, c. 248m northwest of the Proposed Development site (Kavanagh and Piera 2019). A number of areas of archaeological significance were identified. These comprise an enclosure consisting of two concentric enclosing ditches (AA1), a possible kiln (AA2) and a pit filled with charcoal and heat shattered stone, likely associated with burnt mound activity (AA3). Phase 2 testing identified a further three areas of archaeological significance, which were designated as Archaeological Areas 4–6. These comprise a cluster of ditches and linear features (AA4), two linear ditches (AA5 and AA6).

13.43 Monitoring was carried out as part of the construction of the Grange Castle Link Road, c. 277m west of the Proposed Development site. Nothing of archaeological significance was identified as the area was heavily disturbed by a previous realignment of the River Griffeen (Licence Ref.: 06E0777, Bennett 2006:659).

13.44 Archaeological investigation of features discovered during geophysical survey c. 320m north-northeast of the Proposed Development site, identified two main areas of archaeological significance (Licence Ref.: 13E0471, Bennett 2016:083, 2017:411). Area 11 consisted of a number of associated enclosures. The earliest enclosure comprised a penannular ditch with finds including iron knives, quernstones and cow skulls. This enclosure was dated to cal. AD 656–727 and 737–768. This first enclosure was enclosed by a second penannular ditch. There was a D-shaped enclosure attached to the southern extent of the second enclosure, within which the burial of a male and female, aligned north–south was identified. A pit containing the articulated remains of a sheep or goat was also identified within the enclosure. There were also two concentric ditches with associated kiln, postholes and stakeholes. The remains of a wattle fence were identified within a recut ditch within the enclosure. Area 9 consisted of two *fulachtaí fia* including associated troughs, pits and stakeholes.

13.45 Archaeological monitoring took place at a site on Nangor Road, c. 373m southeast of the Proposed Development site under licence 12E067 (Bennett 2012:188). Nothing of archaeological significance was identified.

13.46 A dumbbell-shaped kiln and nine Bronze Age cremation pits were excavated under licence 14E0453, c. 488m east-northeast of the Proposed Development site (Bennett 2016:084).

Cartographic sources

Down Survey Maps of the Barony of Newcastle and the Parish of Kilmactalway, c. 1655

13.47 There is little detail provided for the Proposed Development site in these early maps. A water mill is depicted on the river at Milltown to the west. The accompanying terrier details a castle, a mill and 'some cabins' were present at Milltown. It is likely the Proposed Development site was in use as agricultural land at this time.

Rocque's An Actual Survey of County Dublin, 1760 (Figure 13.5)

13.48 By the time of this mapping in 1760, the Proposed Development site is open agricultural land. A small group of structures is depicted at Milltown. Grange Castle (DU017-034) and Nangor (DU017-037) are shown as well as the church at Kilmactalway (DU021-003001), annotated as in ruins.

Taylor's Map of the Environs of Dublin, 1816 (Figure 13.5)

13.49 There is little detail of the Proposed Development site shown in this mapping. The village of Milltown has expanded to the west. A small number of structures are shown in the area of Ballybawn, in the vicinity of the Proposed Development site. Grange Castle (DU017-034) and Nangor (DU017-037) are shown again. The Castle Bagot demesne is shown for the first time.

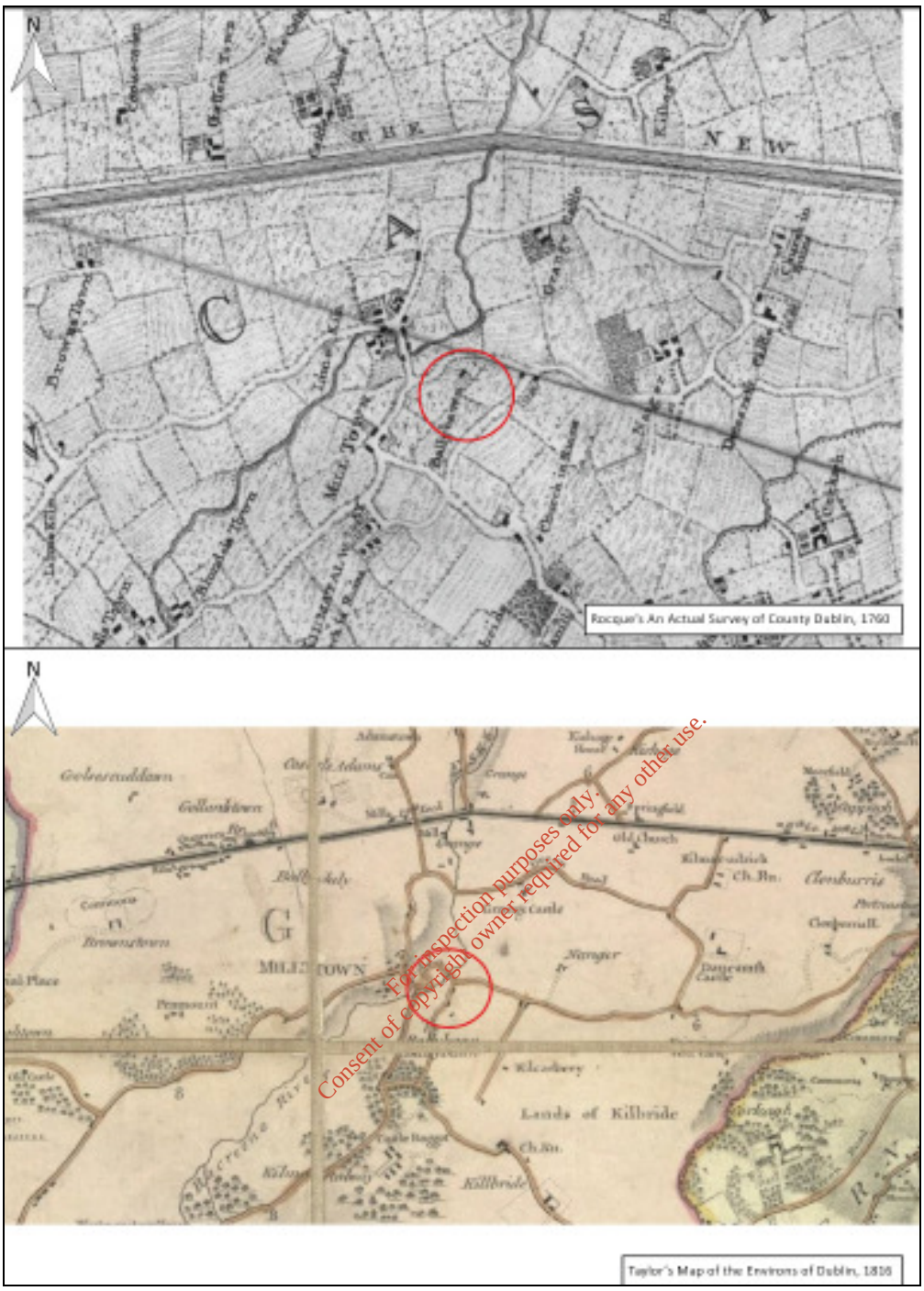

Figure 13.5 Extracts from historic maps Rocque (1760) and Taylor (1816) showing the approximate location of the Proposed Development site

First edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 13.6)

13.50 By the time of this mapping in 1843, the Proposed Development site is located within an agricultural landscape. A small structure is present in the south of the Proposed Development site. To the west, Milltown House, a very small demesne is marked. The farm house (RPS 155/NIAH Reg. No.11208015) is shown, c. 357m west of the Proposed Development site. The townland boundaries between Milltown and Ballybane and between Ballybane and Aungierstown and Ballybane are shown along with a number of field boundaries.

Ordnance Survey Map, 1906–9, scale 1:2,500 (Figure 13.6)

13.51 There are no significant changes to the Proposed Development site or the immediate surroundings depicted in this mapping.

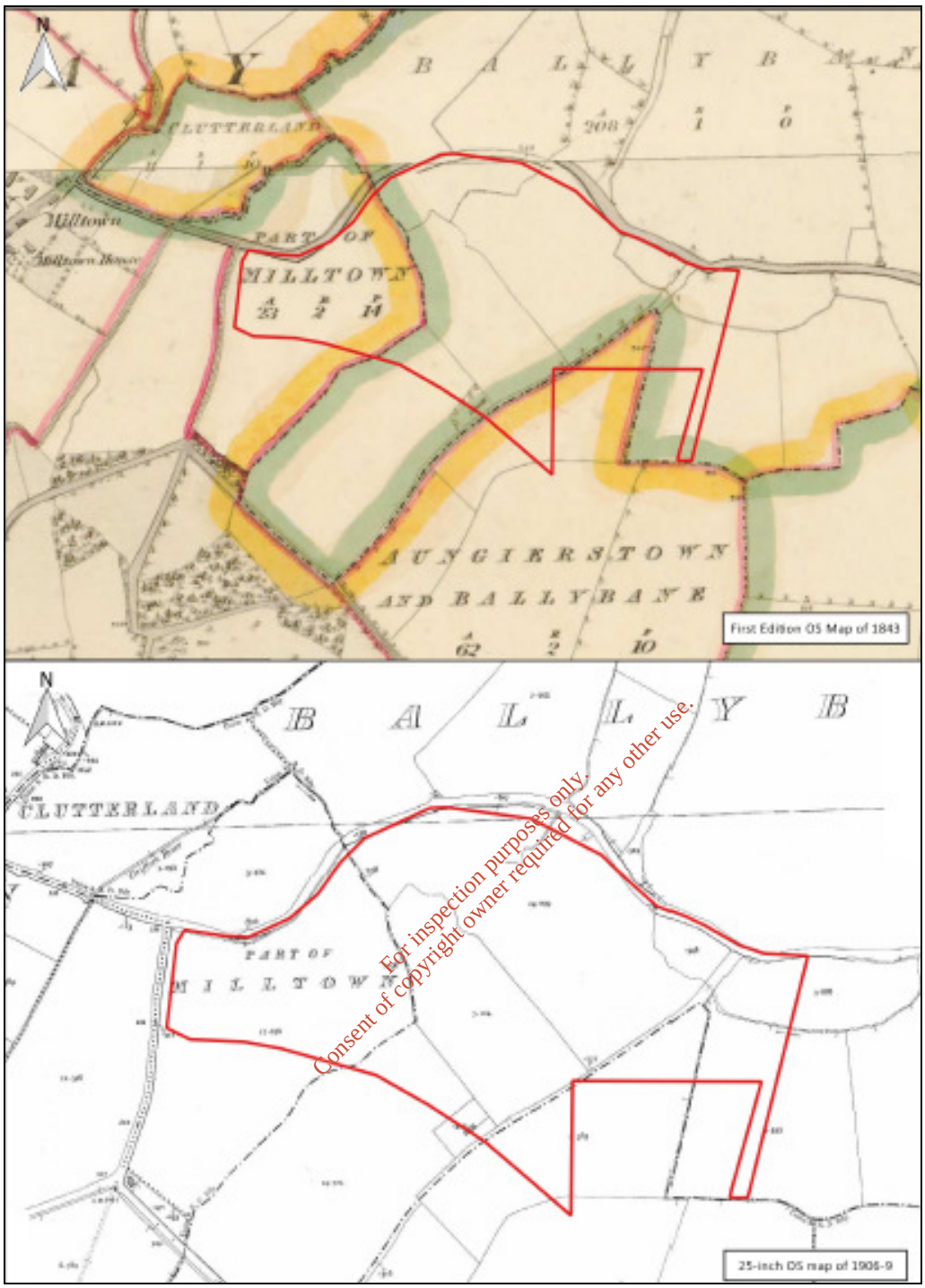

Figure 13.6 Extracts from historic OS maps of 1843 and 1906-9 showing the Proposed Development site

Aerial Photography

13.52 The earliest available aerial photography for the Proposed Development site dates to 1995 (OSI). It shows the enclosure (DU021-108) as a clear cropmark and to the south, enclosure DU021-109 is also visible. The townland boundary between Milltown and Ballybane is partially intact and appears to be adapted to a drainage feature. The townland boundary respects/incorporates the outer ditch of the bivallate enclosure (DU021-108). Numerous former field boundaries, some corresponding to those shown on the historic OS mapping and the townland boundary between Ballybane and Aungierstown and Ballybane, are also discernible. By the 2005 imagery, the surviving townland boundary has been removed, likely as a result of land improvement as the site is situated in an agricultural landscape. By 2016, the Grange Castle South Access Road, which runs directly to the south of the Proposed Development site, has been constructed (Google Earth 2016). The Google Earth imagery of 2017 shows the extent of the test trenches excavated by ACSU and in the satellite imagery from 2018, the locations of the excavations at Area 1, Area 2 and Area 5 are visible as well as the archaeological works to the immediate south of the Proposed Development site. No

previously unrecorded features of archaeological potential were identified within the Proposed Development site or its environs.

Topographical Files

13.53 Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area. A review of the topographical files for the study area revealed that no stray finds have been recorded for the Proposed Development site or the surrounding environs.

County Development Plan

Record of Monuments and Places

13.54 The South Dublin County Development Plan (2016–2022) recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2014). The development plan lists a number of aims and objectives in relation to archaeological heritage (Appendix I).

13.55 It is a policy of the South Dublin County Development Plan (2016–2022) to promote the in-situ preservation of archaeology as the preferred option where development would have an impact on buried artefacts. Where preservation in situ is not feasible, sites of archaeological interest shall be subject to archaeological investigations and recording according to best practice, in advance of redevelopment.

13.56 There is one recorded monument within the Proposed Development site and a further two in the vicinity of the site. All three records represent enclosures with DU021-108 and 109 having been subject to full archaeological excavation (preservation by record).

Table 13.1 Local recorded monuments

SMR No.	Classification	Location	Distance to Development
DU021-108	Enclosure	Ballybane	Within site
DU021-109	Enclosure	Ballybane	Immediately south
DU021-112	Enclosure	Kilmactalway	c. 500m southwest

Record of Protected Structures

13.57 The South Dublin County Development Plan (2016–2022) recognises the statutory protection afforded to all protected structures under the Planning and Development Act. The plan also lists a number of aims and objectives in relation to architectural heritage (Appendix I).

13.58 There is one protected structure (RPS 155) within the environs of the Proposed Development site, a farm house c. 357m to the west. The site is also listed in the NIAH (Reg. No. 11208015).

Architectural Conservation Areas

13.59 There are no Architectural Conservation Areas within the receiving environment of the Proposed Development site.

National Inventory of Architectural Heritage (NIAH)

13.60 A review of both the architectural survey and garden survey was undertaken as part of this assessment. An area up to 500m that surrounds the Proposed Development site was examined in order to identify any buildings or areas of architectural significance. The results of this survey are summarised below.

Building Survey

13.61 There are three structures listed in the NIAH for the vicinity of the Proposed Development site, one of these is also a protected structure.

Table 13.2 Structure listed in the NIAH in the vicinity of the Proposed Development site

NIAH Reg. / RPS No.	Classification	Location	Distance to development
11208016	House	Milltown	c. 280m west
11208006	Outbuilding	Milltown	c. 344m west
11208015/ 155*	Farm house	Milltown	c. 357m west

*Also recorded as a protected structure

Garden Survey

13.62 There are no designed landscapes in the immediate vicinity of the Proposed Development site.

Cultural Heritage Background

Toponomy of Townlands

13.63 Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site, and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is Irish Local Names Explained by P.W Joyce (1870). A description and possible explanation of each townland name in the environs of the Proposed Development site are provided in the below table.

Table 13.3 Local townlands

Placename	Derivation	Possible meaning
Milltown	-	Anglicised name relating directly to the presence of a mill.
Ballybane	*An Baile Bán*	The white homestead
Aungierstown and Ballybane	-	Aungier's Town/The white homestead
Kilmactalway	*Cill Mhic Thalmhaigh*	Mac Shalwy's Church
Clutterland	*Talamh Chlutair*	The land of le Clutere/ Clutere/ Clouter

Townland boundaries

13.64 The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun* land and meant 'the land forming an estate or manor' (Culleton 1999, 174).

13.65 Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (ibid. 179).

13.66 The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

13.67 In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (ibid.). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and

north, east, south and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

13.68 Although not usually recorded as archaeological monuments in their own right, townland boundaries are important as cultural heritage features as they have indicated the extents of the smallest land division unit in the country—the townland—which have been mapped since the 19th century. It remains unclear how old these land units actually are, though it has been convincingly argued that they date to at least the medieval period and may be significantly older than this (McErlean 1983; MacCotter 2008).

13.69 The townland boundary between Milltown and Ballybane runs through the Proposed Development site. It is visible in aerial photography in 1995 and 2000 (OSI) but was removed thereafter. It can be seen in the aerial imagery that the boundary curves to respect or incorporate the southwest of the enclosure (DU021-108). The townland boundary between Ballybane and Aungierstown and Ballybane is also partially within the Proposed Development site. This boundary is no longer extant but is visible as a crop mark in the landscape on the aerial photographic coverage (Google Earth 2019).

Cultural heritage sites

13.70 The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. No specific cultural heritage sites have been identified during the course of this assessment that relate to the Proposed Development site; however, the archaeological and architectural sites within the study area identified in Sections 13.33 to 13.60 should also be considered as cultural heritage.

Field inspection

13.71 The Proposed Development site is currently primarily grassland. In the south of the site, a former compound is present (Figure 13.4). This was established during 2019 to facilitate the excavation of AH1, AH2 and AH5, as shown in Figure 13.1. A strip of land within the Proposed Development site bordering the road to the south has been previously disturbed by cable laying associated with the ESB substation to the southeast (Figure 13.5). This area was previously archaeologically monitored under licence 18E0484. The majority of the undisturbed areas of the Proposed Development site lie in the east and west of the Proposed Development site (Figures 13.6 and 13.7). In addition, in the northwest of the Proposed Development site, a derelict farm house and agricultural yard is extant (Figure 13.8). In this area, the yard is surfaced with concrete and contain sheds and stables (Figure 13.9). A significant amount of debris and rubble is also present in this area (Figure 13.10). The house in the northeast of the Proposed Development site, visible on aerial photography, has been demolished (Figure 13.11).

13.72 To the west of the Proposed Development site, the protected structure (NIAH Ref. 11208015/ RPS 155), is extant, as is the outbuilding listed in the NIAH (NIAH Ref. 11208006) (Figures 13.12 and 13.13). However, the former public house (NIAH Ref. 11208016) is no longer extant (Figure 13.14). The site is now in use as a car dealership and gym. Aerial photography suggests this building was removed sometime between 2005 and 2009.

Figure 13.7 Former compound within Proposed Development site, facing northeast

Figure 13.8 Disturbed ground in south of the Proposed Development site, facing west

Figure 13.9 Undisturbed area in the east of the Proposed Development site, facing east

Figure 13.10 Undisturbed area in the west of the Proposed Development site, facing west-southwest

Figure 13.11 Farm house, facing northeast

Figure 13.12 Stables, facing south

Figure 13.13 Rubble in northwest of the Proposed Development site, facing northwest

Figure 13.14 Site of former house in the northeast of the Proposed Development site, facing south

Figure 13.15 Farm house (NIAH Ref. 11208015/ RPS 155), facing west

Figure 13.16 Outbuilding (NIAH Ref. 11208006), facing southeast

Figure 13.17 Site of demolished public house (NIAH Ref. 11208016), facing southeast

Conclusions

13.73 The Proposed Development site is located in the townlands of Milltown, Ballybane and Aungierstown and Ballybane, County Dublin. There is one recorded monument within the Proposed Development site, an enclosure (DU021-108). A second enclosure (DU021-109) is located to the immediate south of the Proposed Development site and a third enclosure (DU021-112) is located c. 500m southwest of the site. Both DU021-108 and 109 have been subject to full archaeological excavation (preservation by record).

13.74 There is one protected structure in the environs of the Proposed Development site, a farm house (RPS 155/ NIAH Reg. No. 11208015), located c. 357m west of the Proposed Development site. A total of three structures are included in the NIAH in the vicinity of the Proposed Development site, including the protected structure. No specific cultural heritage sites have been identified, with the townland boundaries that formerly traversed the site having been removed in the recent past.

13.75 Extensive archaeological investigations have taken place within the Proposed Development site and the surrounding environs in recent years. The enclosure (DU021-108) within the site was defined using geophysical survey and targeted test trenching and designated AH1. It was subsequently subject to pre- excavation works and later fully excavated and recorded, under licence 17E0590 in 2019. It consisted of a double-ditched enclosure and associated features with post-excavation works currently ongoing. Two additional areas within the Proposed Development site have been subject to excavation. AH2 consisted of an enclosure or ring-ditch, a number of internal features and a figure-of-eight kiln (excavated under licence 17E0591), and AH5 which consisted of a number of disturbed linear features of possible medieval date, based on the retrieval of medieval pottery from some of the features, excavated under licence 17E0578.

13.76 The enclosure (DU021-109) to the immediate south of the Proposed Development site was also identified in geophysical survey and archaeological testing. The site consisted of a multivallate enclosure of probable early medieval date based on the discovery of 10th century finds and was fully excavated in 2018.

13.77 Cartographic analysis and aerial photographic coverage suggest the Proposed Development site was formerly in use as agricultural land. A small structure is shown in the south of the Proposed Development site in the first edition OS map of 1843. Aerial photography shows the enclosures DU021-108 and DU021-109 as well as the AH2 enclosure or ring-ditch.

13.78 No specific cultural heritage sites were identified in the vicinity of the Proposed Development site, with the townland boundaries which ran through the site, removed in the recent past.

Characteristics of the Proposed Development

13.79 The proposal is to develop 3 no. two-storey data centres with associated other prefabricated containerised data storage rooms, MV room, security hut, sprinkler room and temporary substation with a gross floor area of 80,269sqm. In order to facilitate this development, it is required to demolish the existing two storey farmhouse and associated buildings known as Ballybane, Old Nangor Road, Dublin 22 that is positioned along the Old Nangor Roar to the north-west of the site.

13.80 The full description of the characteristics of the development are outlined in Chapter 2 of this EIA Report.

Potential impacts of the Proposed Development

Construction phase

Archaeology

13.81 While the Proposed Development site has been subject to extensive archaeological testing and subsequent excavation in a number of areas (AH1, 2 and 5), there is potential for isolated archaeological features to survive beneath the existing ground level outside the footprint of the test trenches and the excavated areas. Ground disturbances associated with the Proposed Development site have the potential to directly and negatively impact on any such remains. Dependant on the nature, extent and significance of archaeological deposits, impacts may range from moderate negative to significant negative.

Architecture

13.82 No potential negative impacts upon the architectural resource are predicted as a result of the construction of the Proposed Development.

Cultural Heritage

13.83 No potential negative impacts upon the cultural heritage resource are predicted as a result of the construction of the Proposed Development.

Operational phase

13.84 No significant impacts during operation are predicted upon the archaeological, architectural and cultural heritage resource.

'Do nothing' scenario

13.85 If the Proposed Development were not to proceed, there would be no negative impact on the archaeological, architectural or cultural heritage resource.

Remedial and mitigation measures

Construction phase

Archaeology

13.86 It is recommended that archaeological monitoring of topsoil stripping associated with the construction of the Proposed Development be carried out in all areas outside the footprint of the previously excavated areas. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

Architecture

13.87 As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.

Cultural Heritage

13.88 As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.

Operational phase

13.89 There are no mitigation measures required for the operational phase of the Proposed Development in relation to the archaeological, architectural and cultural heritage resource.

Predicted impacts of the Proposed Development

Construction phase

13.90 Should the mitigation measures, recommended above, be carried out fully and successfully there will be no predicted residual impact to the archaeological, architectural and cultural heritage resource by the Proposed Development. The implementation of mitigation measures detailed in this chapter, will ensure that the effect is ***neutral*** and ***imperceptible***.

Operational phase

13.91 There are ***no predicted impacts*** for the operational phase of the Proposed Development upon the archaeological, architectural and cultural heritage resource.

Residual impact assessment

13.92 Subject to the implementation of appropriate archaeological mitigation measures, ***no residual impacts*** on archaeological, architectural and cultural heritage are predicted.

14. WASTE MANAGEMENT

14.1 This chapter has been prepared to address the issues associated with waste management during the construction and operational phases of the Proposed Development.

14.2 A site-specific outline 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 Appendix J. The C&D WMP has been prepared in accordance with the '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

Methodology

14.3 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 14.9 – 14.12 below), 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 J: C&D WMP.

14.4 This Chapter is based on the Proposed Development, as described in Chapter 3 and considers the following aspects:

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

14.5 A desktop 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.

14.6 Estimates of 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 *National Waste Reports*, data recorded from similar previous developments, Irish and US EPA waste generation research, other available research sources.

14.7 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 14.61 – 14.69 below.

14.8 A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 8: Land, Soils, Geology and Hydrogeology. Chapter 8 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

14.9 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).

14.10 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. The most recent policy document *A Resource Opportunity – Waste Management Policy in Ireland* was published in 2012 and stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention.

14.11 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.

14.12 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

14.13 In terms of waste management, the receiving environment is largely defined by South Dublin 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.

14.14 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.

14.15 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 October 2019 identifies that Ireland's current progress against this C&D waste target is at 71% 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 45%. Both of these targets are required to be met by 12 December 2020 in accordance with the requirements of the Waste Framework Directive.

14.16 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.

14.17 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).

14.18 In terms of physical waste infrastructure, three municipal solid waste landfills remain operational in the Eastern Midlands Region (EMR) and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the EMR including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

Characteristics of the Proposed Development

14.19 The proposed development is described in detail in Chapter 3 of this EIA Report. The aspects relevant to this chapter are described in the following sections.

Demolition phase

14.20 There will be waste materials generated from the demolition of the existing abandoned dwelling building. 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.

14.21 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 J. 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	30.5	0	0.0	85	25.9	15	4.6
Concrete, Bricks, Tiles, Ceramics	172.9	30	51.9	65	112.4	5	8.6
Plasterboard	13.6	30	4.1	60	8.1	10	1.4
Asphalts	3.4	0	0.0	25	0.8	75	2.5
Metals	50.9	5	2.5	80	40.7	15	7.6
Slate	27.1	0	0.0	85	23.1	15	4.1
Timber	40.7	10	4.1	60	24.4	30	12.2
Total	**339.0**	-	**62.5**	-	**235.4**	-	**41.0**

Construction phase

14.22 Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will generate c. 55,814m^3 of excavated material, as advised by CS Consulting. It is currently proposed that all excavated material will be reused on site.

14.23 The importation of c. 41,500m^3 of fill materials will be required for construction of foundations and other ground preparation works.

14.24 If any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*.

14.25 A geotechnical site investigation was conducted at the site in May 2019 by IGSL Limited on behalf of O'Connor Sutton Cronin. The ground investigation report shows there was no evidence of subsurface contamination encountered during the site investigation works.

14.26 In the event that excess soils/stones 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.

14.27 If any excavated material requires removal from site and 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 by the receiving facility.

14.28 Any surplus material deemed to be waste that requires removal from site for offsite reuse, recovery and/or disposal and any potentially contaminated material (in the unlikely event that it is encountered), should be segregated, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* using the *HazWasteOnline* application (or similar approved classification method). If the material is to be disposed of to landfill, it will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* and landfill specific 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.

14.29 Soils/stones that are not required and/or suitable for reuse on-site, may be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

14.30 During the construction phase, waste produced will include surplus steel and metal materials and broken/off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials are also likely to be generated.

14.31 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.

14.32 Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific outline C&D WMP included as Appendix J of the Appendix document attached to this 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.

14.33 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.

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	1574	10	157	80	1259	10	157
Timber	1336	40	534	55	735	5	67
Plasterboard	477	30	143	60	286	10	48
Metals	382	5	19	90	343	5	19
Concrete	286	30	86	65	186	5	14
Other (includes cabling, ducting, conduits, packaging and plastics)	715	20	143	60	429	20	143
Total	**4770**		**1083**		**3239**		**448**

14.34 It should be noted that the waste volumes outlined above, as well as any excavated material described throughout this chapter, will be generated across the phased construction period, over a period of approximately 8 years. The appointed contractor(s) will be required to prepare a detailed Construction Environmental Management Plan (CEMP) based on the submitted C&D Waste Management Plan prior to commencement of construction which may refine the above waste estimates.

Operational phase

14.35 An Operational Waste Management Plan (OWMP) will be developed prior to commencement of operations. The plan will seek to ensure the facility contributes to the targets outlined in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021. Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed development are summarised below.

Segregation of waste materials onsite

14.36 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. 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	On-site Storage/Treatment Method (anticipated)	Method of Treatment or Disposal (offsite)
Packaging Waste	N	Segregated bins/skips	Recycle
Office Waste	N	Segregated bins/skips	Recycle
General Non-Hazardous Waste	N	Segregated bins/skips	Recovery
Empty Containers	N	Segregated bins/skips	Disposal to landfill
Canteen/Kitchen Waste	N	Segregated bins for compost, mixed recyclable and general waste	Compost food waste. Recycle mixed dry recyclable waste. Recovery of other general waste
Non-hazardous WEEE	N	Segregated bins for waste electric and electronic equipment	Recovery
Landscaping waste	N	Composting bins	Vendor managed
Waste Oil	Y	Oil drum in external waste storage area	Vendor managed
Waste sludge from oil separator	Y	Storage tank connected to oil separator	Vendor managed
(Wet) Batteries	Y	Specialised container in waste storage area	Return to supplier
(Dry) Batteries	Y	Specialised container in waste storage area	Vendor managed

Note: none of the vendor managed waste will be stored on site

Management of wastes moving offsite

14.37 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

14.38 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).

14.39 Waste sludge from the petrol interceptors will be pumped out/removed as required by a suitably permitted/licenced contractor.

Potential impacts of the Proposed Development

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

Construction phase

14.41 The proposed development will generate a range of non-hazardous and hazardous waste materials during construction. Construction activities will inevitably generate quantities of waste from surplus soils/stones, where materials are oversupplied, incorrect materials delivered, or materials are cut to size on-site. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste.

14.42 Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. Dedicated areas for waste skips and bins will be identified in the construction compound and across the site, as required. The dedicated waste storage areas will be easily accessible to waste collection vehicles.

14.43 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.

14.44 All waste contractors collecting waste from the site must hold a valid collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). All waste materials will be managed in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

14.45 Construction wastes will be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, recycling, recover and/or disposal. There are numerous licensed waste facilities in the Leinster 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 construction waste materials at facilities in the region. Where possible, waste will be segregated into recyclable and recoverable materials. The majority of construction materials are either recyclable or recoverable.

14.46 Recovery and recycling of construction waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The use of recycled materials, where suitable, reduces the consumption of natural resources.

14.47 There is a quantity of soil and stone which will need to be excavated to facilitate the proposed development (c. m^3). It is currently anticipated that all of the excavated material will be reused onsite

for landscaping. In the event that potentially contaminated material is encountered, correct classification and segregation of the excavated material will ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on the health and safety of workers as well as on the receiving environment, both on and off-site. Excavation will be monitored to identify any contaminated material. Contaminated material will be removed off-site for appropriate treatment and/or disposal.

14.48 Reuse of excavated material onsite will reduce consumption of natural quarry resources. The opportunities for other waste materials to be reused off-site will provide positive impacts in the resourcing of materials for other developments and reduce the requirement for raw material extraction.

14.49 The potential effect of construction waste generated from the proposed development is considered to be ***medium-term, negative*** and ***not significant.***

Operational phase

14.50 The nature of the development means that 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 into recycled products (e.g. paper mills and glass recycling).

14.51 Dedicated waste storage areas are provided for storage of waste pending collection by nominated waste contractors. 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.

14.52 Waste collection vehicles will be required to service the development on a regular basis to remove waste. All waste contractors collecting waste from the site must hold a valid collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO) and waste will only be brought to suitably registered/permitted/licenced facilities. 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.

14.53 The potential impact of operational waste generation from the development is considered to be ***long-term, negative*** and ***not significant.***

Do-Nothing Scenario

14.54 If the proposed development was not to go ahead there would be no additional construction or operational waste generation at the site until such time as an alternative development consistent with the land use zoning is granted permission and constructed.

Remedial and Mitigation Measures

14.55 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

14.56 A project specific outline 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.

14.57 The project engineers, CS Consulting, have estimated that c. m^3 of soil/stones will be generated from the excavations required to facilitate construction. The main contractor will endeavor to ensure that surplus material is reused on site. It is not anticipated that there will be surplus material that will require removal from site. In the unlikely event that there is surplus material that is not required for reuse onsite, it 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.

14.58 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.

14.59 In the unlikely event that there are excess soils/stones requiring removal from site, any nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, which 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 done in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)* as previously referred to in Section 14.27 and detailed in the C&D WMP (Appendix J).

14.60 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

14.61 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 areas of the site.

14.62 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.

14.63 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.

14.64 This section describes the predicted impact of the proposed development following the implementation of the remedial and mitigation measures.

Construction phase

14.65 A carefully planned approach to waste management as set out in Sections 14.22 – 14.34 and adherence to the outline C&D WMP during the construction and demolition phase and provided the mitigation measures are implemented as set out under Sections 14.56 – 14.60, will ensure that the impact on the environment will be ***medium-term, neutral*** and ***imperceptible***.

Operational phase

14.66 During the operational phase, a structured approach to waste management as set out in Sections 14.35 – 14.39 will promote resource efficiency and waste minimisation. Provided a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, neutral*** and ***imperceptible***.

Residual impact assessment

14.67 Adherence to the mitigation measures outlined in Sections 14.61 – 14.63 will ensure that there are no significant impacts on resource or waste management from the proposed development. The management of waste during the operational phase in accordance with these mitigation measures will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy. The residual impact will be ***neutral*** and ***imperceptible***.

Cumulative Effect

14.68 The cumulative effect of the Proposed Development with any/all relevant other planned or permitted developments (as detailed in Chapter 4) are discussed in Section 14.69 and Sections 14.70 – 14.71 below for construction and operational phases respectively and are also set out under the Cumulative effect assessment chapter of this EIA Report (Chapter 16).

Construction phase

14.69 The construction of the proposed development and other surrounding proposed and permitted developments require site clearance, excavations and levelling which will generate a requirement for soil removal and/or import. The proposed development requires a net import of soil which is readily available. 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 ***medium-term*** and ***imperceptible.***

Operational phase

14.70 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.

14.71 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 ***long-term*** and ***imperceptible.***

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 being purchased by UBC Properties LLC (the applicant) from SDCC following the planning application being made. A letter from SDCC confirming consent for making this planning application is included as part of the application package and is appended to the planning application form. A further letter from SDCC in relation to the use of SDCC land for a future construction compound for Building C in circa 6 years-time is also appended to the planning application form.

15.8 The Proposed Development site is primarily greenfield and is bound by the New Nangor Road to the north; by the realigned Baldonnel Road to the west; the Grange Castle South Access Road that provides access off the Baldonnel Road into Grange Castle South Business Park to the south; and a

car dealership and agricultural lands to the east. The Proposed Development site includes one abandoned and unoccupied residential property that will be demolished as a result of the Proposed Development.

15.9 Access to the site will be via the R134 New Nangor Road and the Baldonnel Road that provide access to a purpose built access road that will link into this network that has recently been constructed into the Grange Castle South Business Park. The site will be fully secured with a high security fence, CCTV and surveillance systems. There is good visibility on approach to both access points 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 Services Report, prepared by CS 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 Castlebaggot substation and the Kilmahud substation will facilitate the permanent electricity supply connection to the Proposed Development. An MV connection to enable temporary power to the Proposed Development, will be subject to a separate planning application, and will connect to the east and then via existing connections to the Grange Castle Substation. The MV works within the site will include the horizontal drilling and laying of cabling within ducting under the Baldonnel Stream.

Telecommunications

15.12 A fibre optic cable distribution network will be installed within the site for the entire Proposed Development to serve Buildings A, B and C. 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. The cabling works within the site will include the horizontal drilling and laying of cables under the Baldonnel Stream.

Surface water infrastructure

15.13 There is existing surface water drainage system running along the R134, Baldonnel Road and the Grange Castle South access road. An open stream bounds the site to the north and the site is serviced by a surface water sewer to the west. The stream to the north has a South Dublin County Council requirement of a 10m Riparian corridor along the length of the stream. This equates to a 10m wide zone on either side of the top of the banks of the stream. No development is therefore permitted in this zone. The CS Consulting Site Specific Flood Risk assessment and the Engineering Services Report review the existing and proposed surface water environment and accompanies the planning application for the Proposed Development.

Foul drainage infrastructure

15.14 Drainage records from Irish Water indicate a number of foul sewers in the vicinity of the Proposed Development site. These include a 375mm foul sewer crossing the subject lands to the northern side of the Proposed Development site; a 225mm foul sewer along the southern boundary that turns north and outfalls into a 375mm sewer; and to the north west of the site both 375mm sewers converge into a 450mm foul sewer.

15.15 All foul effluent generated at the Business Park within which the Proposed Development site is located is directed via gravity and regional pumping stations to the regional Wastewater Treatment Plant at Ringsend in Dublin for ultimate disposal. The Proposed Development will not impact upon the capacity of this Wastewater Treatment Plant. 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.

15.16 A pre-connection enquiry (PCE) form was submitted to Irish Water in January 2020 which addressed wastewater discharges (and water demand) for the development of the indicative masterplan for overall landholding. The waste water infrastructure 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.

15.17 The overall wastewater discharge associated with the Proposed Development is outlined in the PCE that accompanies the planning application documentation as part of the CS Consulting Engineers submission. Further detail in relation to wastewater discharge is presented in the CS Consulting Engineering Services Report, and Chapter 8 Hydrology. Beyond cooling system condensate, there are no additional proposed process water emissions.

Water supply

15.18 The Proposed Development site has numerous existing potable water services running across and along the boundary of the site. These include a 110mm diameter pipe crossing the northern part of the Proposed Development site; a 4" (100mm) uPVC main and 700mm ductile iron main running along the western boundary of the Proposed Development site; and a 500mm ductile iron main to the south of the Proposed Development site. As with foul infrastructure, 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 Several existing wayleaves traverse the site, as illustrated on the site location map prepared by Henry J Lyons Architects which accompanies the planning application. The 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.

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 to serve Buildings A, B and C. 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 for the Grange Castle Business Park 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 a single storey and temporary MV 20kV substation (22sqm) that will be operated by ESB and will be located to the south-east of Building A and to north-west of the security hut at the entrance. The Proposed Development also includes the installation of a MV distribution cable to the boundary of the site that will connect via new cabling that will be subject of a separate planning application to a point to the east of the Proposed Development site. The new cabling within the site will include the drilling and laying of ducts and cables under the Baldonnel Stream. The MV cabling outside the site will be designed to support interim power demand to the first Data Storage Facility (Building A). Subject to a grant of planning permission the temporary ESB substation is proposed to commence in the first quarter of 2021, and with a construction period of three months.

15.24 The power supply to the overall development of the entire site will be provided via a new two storey 110kV GIS Substation with associated transformer compound to the east of the overall site and to the immediate east of Building C and do not form part of the Proposed Development. This will be connected via an 110kv transmission line from Kilmahud substation to the north; and via a 110kV transmission line from the Castlebaggot substation to the immediate south-east of the application site. The applications for the provision of the substation and transmission lines, which do not form part of this application, may be determined as Strategic Infrastructure Development (SID) through the pre-application consultations with An Bord Pleanála.

15.25 Subject to a grant of planning permission for this Substation and underground cabling connections the construction work for this element, whilst not forming part of the Proposed Development, is targeted to commence in the first quarter of 2021 with a construction period of c. 12 months.

15.26 In the event of a loss of power supply to the site (i.e. temporary grid blackout), the 70 no. diesel powered back-up generators will be activated. These generators are designed to automatically activate and provide power to the Proposed Development pending restoration of mains power. (An uninterruptible power source (UPS) system is also provided for the short-term transition from mains power to back-up generators). 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 128MW.

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 Services Report by CS Consulting Engineers states that the Proposed Development of the site must restrict post development run-off rates to the pre-development, greenfield rates of 2.01l/sec/Ha. In practice to accommodate this requirement, on site storage will be provided to temporarily store rainwater generated on site. These 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 areas, (four in total with a combined capacity of 10,385m^3), are being proposed. The ponds have been sized to accommodate the predicted storm water volumes generated during a 1-in-100 year storm event, increased by 10% for the predicted effects of climate change as detailed within the Engineering Services Report by CS Consulting Engineers. Three of the proposed attenuation ponds will drain to the north and outfall into the existing Baldonnel stream, while one of the ponds will drain to the west and into an existing storm sewer.

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. The proposed attenuation ponds will receive storm water which has passed through gully's (to aid in the removal of debris) and suitably sized oil separators will be placed to ensure any hydrocarbon pollution is removed prior to storm water entering the attenuation zones. This will ensure that the quality of the surface water discharge is controlled prior to attenuation and discharge off site. Further details on these are provided in the Engineering Services Report by CS Consulting Engineers that accompanies the planning application. A further stage to improve overall storm water quality is the construction of 'forebays' through which storm water will pass to further aid in the removal of deleterious material in line with best practice. All four proposed attenuation ponds have suitably sized forebays to achieve this requirement.

15.31 To further enhance the ecological nature of the proposed scheme the proposed attenuation areas have been designed to operate as detention ponds, so the attenuation areas will retain water all year round. This will allow for greater biodiversity connectivity within the Proposed Development Site as outlined in Chapter 6 - Biodiversity.

15.32 Full details of the surface water infrastructure are provided within the Engineering Services Report, prepared by CS Consulting Engineers that accompanies the planning application.

Foul drainage infrastructure

15.33 Domestic effluent arising from occupation of the data storage facility buildings will be collected in foul sewers within the site and discharged to the existing foul drainage network. The proposed layout of the various units requires that a number of connections to the existing foul infrastructure are proposed. (refer to CS Consulting Drawings for details of same.) 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 business park's network and ultimately discharges to the municipal Waste Water Treatment Plant (WWTP) at Ringsend.

15.34 In addition, occasional discharge of water vapour from the data storage facility buildings cooling system will be required during hot/dry weather when temperatures exceed 27℃ (a maximum of 4 days per year based on historical weather data). Residual cooling water, associated with the evaporative cooling process, is to be discharged from the air handling units into the foul network, although this is an occasional occurrence.

15.35 Based on the nature and extent of the Proposed Development, the expected daily dry weather flow (DWF), for domestic effluent has been calculated as 7.776m^3/day. The peak design flow is 0.54l/s. As noted the occasional additional water vapour run off would contribute an additional 6.0l/sec as a peak flow.

15.36 The overall wastewater discharge associated with the Proposed Development is outlined in the Pre-Connection Enquiry (PCE) and presented in the Engineering Services Report by CS 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

15.37 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 metred 150mm uPVC connection from

the existing 500mm Ductile Iron main to the south of the subject lands. The proposed main, hydrants, values and bedding details are all designed to Irish Water standards.

15.38 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 Services Report *by CS Consulting Engineers*, a PCE was submitted to IW which addressed water and wastewater demand for the development of the indicative masterplan for the overall landholding. Further discussions are ongoing with Irish Water. The overall water demand associated with the Proposed Development is outlined in this report and the PCE. This and further detail in relation to water supply is presented in the CS Consulting Engineers *Engineering Services Report*, Chapter 8 Hydrology and this Chapter.

Potential impacts of the Proposed Development

Construction phase

Power and electrical supply

15.39 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.

15.40 As the construction of the temporary 20kV substation and associated 8MVA (20kV) electricity connection are entirely within the red line boundary, it is not anticipated that this would have any offsite impact. 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.

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

Telecommunications

15.42 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, including the provision of such infrastructure under the Baldonnel Stream, for the entire Proposed Development to serve Buildings A, B and C. 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

15.43 To the south of the Proposed Development site there is two storm water sewers, 450mm in diameter. They drain from east to west combine and turn north ultimately discharging into the Griffeen River. The Proposed Development site does not contain any existing surface water drains and currently drains into the Baldonnel Stream that is located along the northern part of the site. This stream drains from east to west and outfalls into the Griffeen River.

15.44 As there is potential for direct run-off to a watercourse present on the site, 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.

15.45 The length of the construction period (8 years) will mean that all the proposed attenuation ponds will be in place prior to the commencement of works in relation to Building B in Q2 of 2023. However, prior to that modelling carried out by RPS Consulting Engineers (see Flood Risk Assessment by CS Consulting Engineers for full details) indicates the potential for overland flow entering the site from the south. As part of the design a 450-diameter pipe will be installed at the south of the site to address this possible overland flood route. The flood route water is then conveyed and passed through the site via the 450 diameter pipe and discharged to the Baldonnel Stream. This mitigation for overland flow will be in place during the construction phase.

15.46 In order to mitigate any impact on surface water runoff a new surface water drainage network with attenuation ponds to the west, north and east will be constructed as part of the Proposed Development. The full proposed attenuation system will be in place prior to the construction of Building B and therefore will be operational during the construction phase of the Proposed Development.

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

Foul drainage infrastructure

15.48 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.

15.49 The connection to the existing foul drainage network is entirely within the red line boundary of the site. The connection to this sewer would not have any offsite impact.

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

Water supply

15.51 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. This will be provided by a temporary connection into the existing live watermain that traverses along the southern 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.

15.52 As the connection works are entirely within the red line boundary, this 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

15.53 The Proposed Development will have a maximum operational electrical demand of 48MW for Building A and C, and 32MW for Building B, with an overall maximum operational demand for the development of 128MW. It has been confirmed by discussions with Eirgrid that there is sufficient power available from the existing area network for the Proposed Development.

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

Telecommunications

15.55 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

15.56 It is proposed to collect the surface water runoff from the Proposed Development and discharge an attenuated flow via the four proposed attenuation ponds and their associated forebays to the Baldonnel Stream and the existing surface water drainage network.

15.57 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 2.0 l/s/ha as determined in the Engineering Services Report by CS Consulting Engineers. This runoff rate will not be exceeded, as addressed in Chapter 8 (Hydrology) and the Engineering Services Report.

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

Foul drainage infrastructure

15.59 It is proposed to collect the foul sewerage from the Proposed Development and discharge via 225mm pipes into the existing foul network at two locations to the west and east of the Proposed Development site. The proposed western outfall will cater for foul flows from Blocks A, B & 50% of Block C. while the second outfall to the east will cater for 50% of Block C & the welfare facilities associated with the permanent 110kV GIS Substation. The wastewater discharged from the site will ultimately discharge to the Ringsend WWTP and will not materially impact on its capacity.

15.60 As detailed in Chapter 2, residual cooling water, associated with the evaporative cooling process, is to be discharged from the air handling units to the foul network. Based on the nature and extent of the Proposed Development, the expected daily dry weather flow (DWF), for domestic effluent has been calculated as 7.776m^3/day. The peak design flow is 0.54l/s. As noted the occasional additional water vapour run off would contribute an additional 6.0l/sec as a peak flow.

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

Water Supply

15.62 The water supply will be sourced from mains water supply via a metred 150mm uPVC connection from the existing 500mm Ductile Iron main to the south of the Proposed Development site. The design requires a peak water demand of up to 0.5 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.

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

Remedial and mitigation measures

Construction phase

15.64 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

15.65 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

the construction of the temporary substation and MV distribution cable is completed, ESB Networks will be mobilised to complete the commissioning in accordance with the ESB Network requirements.

15.66 As stated in Chapter 2, once installation is complete, minimal access to the temporary substation and MV distribution cable route is required by personnel, there are no likely significant effects as a result of commissioning. As such, no remedial or mitigation measures are required in relation to power supply for the construction phase.

Telecommmunications

15.67 A fibre optic cable distribution network will be installed within the site for the Proposed Development to serve Buildings A, B and C. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

15.68 No remedial or mitigation measures are required in relation to telecommunications.

Surface water infrastructure

15.69 Run-off water containing silt will be contained on site and treated (using a siltbuster or temporary on-site settlement ponds/tanks as outlined in paragraph 15.44) 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

15.70 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 to medium term construction phase.

15.71 As the construction works for the new foul drainage network are entirely within the Proposed Development site, it would not have any offsite impact. 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.

15.72 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.

15.73 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

15.74 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 elsewhereto 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

15.75 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.

15.76 A number of sustainability measures have been incorporated into the design of the Proposed Development including the installation of an array of photovoltaic panels on the roof and the use of direct drive EC fans for facilitating air supply and extract systems. These will feed back into the electrical supply for the building, serving lighting, office area general services and office IT equipment. The *Energy Statement* that accompanies this planning application also describes how waste heat associated with the facility could be utilised with a future district heating scheme developed by others. Further detail is provided in the *Energy Statement* which accompanies the planning application.

Telecommunications

15.77 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

15.78 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 of 2 l/s/ha. The attenuation storage is provided via 4 no. proposed attenuation ponds and forebays with a c. 9,377m^3 capacity. The forebays allow small intensity rainfall events to be stored separated from the main water body. This allows for any detritus material to be removed from the water and aids in particulate removal, increasing overall storm water quality prior to disposal.

15.79 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, CS Consulting Engineers, using the methodology set out in the Engineering Services Report. A Class 1 Bypass Oil Separator will be used to treat runoff prior to discharging from site.

15.80 In addition, rainfall which passes through the back-up generator exhaust stacks will discharge to a new Class 2 petrol interceptor before connecting to the foul drainage network for the Proposed Development. The Class 2 petrol interceptor is located downgradient of foul drain which collects the rainwater which passes through the backup generator stacks.

Foul drainage infrastructure

15.81 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.

15.82 Irish Water have agreed in principal that the wastewater requirements for the Proposed Development can be accommodated, subject to application. No remedial or mitigation measures are required in relation to foul drainage infrastructure.

Water supply

15.83 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

15.84 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

15.85 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

15.86 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).

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

Foul drainage infrastructure

15.88 As the construction works are entirely within the Proposed Development site, it not anticipated that this would have any offsite impact. 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.

15.89 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

15.90 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.

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

Predicted impact – construction phase

15.92 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

15.93 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.

15.94 As detailed in Chapter 2 (Description of the Proposed Development) a number of sustainability measures have been incorporated into the design of the Proposed Development including the installation of an array of photovoltaic panels on the roof. These will feed back into the electrical supply for the building, serving lighting, office area general services and office IT equipment.

15.95 The *Energy Statement* 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 *Energy Statement* in accordance with the Energy Efficiency Directive 2012/27.

15.96 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

15.97 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

15.98 On-site water storage is and will be provided at each of the proposed data storage 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

15.99 The operator has engaged with Irish Water 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

15.100 The Proposed Development will incorporate SuDS in the form of attenuation, forebays and swales. The project engineers, CS Consulting Engineers, have determined the allowable discharge rate from the site will be 2.0l/s/ha., 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 interceptors and a hydrodynamic solid separator to remove any hydrocarbons and screen rubbish, debris and sediment from the surface water.

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

Predicted impact – operational phase

15.102 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

15.103 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.

15.104 The cumulative effect is assessed in Chapter 16 of this EIA Report.

15.105 Interactions are addressed in Chapter 17 of this EIA Report.

16. CUMULATIVE EFFECTS

Introduction

16.1 This chapter of the EIA Report considers the potential cumulative effects on the environment of the Proposed Development with other future developments on the site (permanent 110kV GIS Substation) and the cumulative effects with other developments including the MV connection to the east, and particularly the ongoing construction of the Cyrus One data centre to the immediate south of the Proposed Development site, in the locality (including, as far as practically possible, planned and permitted developments).

16.2 Cumulative effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative effects can be thought of as occurring through two main pathways: first, through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects.

16.3 The cumulative effects are analysed in this chapter in compliance with the requirements of the EPA Draft EIA Report Guidelines 2017. Cumulative effects are defined in these Guidelines as "*the addition of minor or significant effects, including effects of other projects, to create larger, more significant effects".*

16.4 The Proposed Development, as described in Chapter 2 Description of the Proposed Development, will comprise 3 no. new two storey data centres and associated ancillary development on the site. This chapter considers the potential cumulative effect of the provision of the MV works required to connect the temporary power supply; as well as the permanent power supply to the site that will be provided by a new 110kV GIS Substation with associated transformer compound to the east of the Proposed Development site. The 110kV GIS Substation will be connected via underground cables to the existing Castlebaggot Substation to its immediate south and to the Kilmahud Substation to the north. The underground cables are also cumulatively assessed under this chapter. Permission for the 110kV GIS Substation and underground cabling works will be applied for under separate application(s) and accompanying EIA Report(s). These works may be determined as Strategic Infrastructure Development (SID) by An Bord Pleanála through the statutory pre-application consultation process with the Board.

16.5 Subject to planning approval and expected construction programme, it is expected that the MV works will be in place within a year of the commencement of development on the site; and permanent power supply via the 110kV GIS Substation will be in place prior to commencement of construction of Building B. Subject to a grant of planning permission, construction work on the permanent power supply connection works and 110kV GIS Substation is anticipated to commence during Q1 2021 with approximately 12 months for both the construction phase and commissioning phase prior to commencement of full operations. The effect of the construction period would be short to medium term in nature.

16.6 A list of other developments in the area that have been granted planning permission in the past five years, due to the length of a standard permission, is provided in Chapter 4 – Planning and Development Context. This chapter considers the potential cumulative effect of the Proposed Development with other data centre developments in close proximity to the Proposed Development site.

16.7 The potential cumulative effects are considered for each environmental aspect in the followings Sections of the EIA Report.

Population and human health

Construction phase

16.8 The Proposed Development will create on average 250 jobs with up to 150 additional jobs during the main construction phases as well as creating additional spin-off employment in the area during the eight year construction phase. As the future and planned 110kV GIS Substation and cabling works will be built cumulatively with the Proposed Development and may also overlap with the construction

of the Cyrus One development to the south, the cumulative effect in terms of employment will be not significant, short to medium term but positive in nature.

16.9 The potential cumulative effect of the Proposed Development with the future and planned MV connection, 110kV GIS Substation and cabling works, and adjacent developments, on population and human health in terms of air quality and climate and noise and vibration are discussed in the relevant sections of Chapter 5 - Population and human health. There is no significant cumulative effect associated with the Proposed Development, MV connection, the future and planned 110kV GIS Substation and cabling works, and adjacent developments, on human health.

Operational phase

16.10 The Proposed Development will create up to 300 jobs once in operation. These with other jobs being created by other adjacent data centre and other developments will have a slight, long term positive impact on employment in the area.

16.11 As demonstrated by the noise modelling results presented in Chapter 9 - Noise and Vibration, the predicted cumulative noise emissions associated with the Proposed Development; MV connection; 110kV GIS Substation as well as the adjacent Cyrus One and Google Ireland data centres during the operational phases are compliant with the adopted day and night time noise limit values that are set out under Table 9.17 in Chapter 9 – Noise and Vibration that have taken due consideration of the effect on human health.

16.12 Furthermore, any change in noise levels associated with additional vehicles during the Operational Phase as set out in Table 12.2 of Chapter 12 – Traffic and Transportation at road junctions in the vicinity of the Proposed Development will be imperceptible due to the low level of traffic the Proposed Development in combination with other projects will generate. In essence, the noise levels that are encountered at the nearest noise sensitive locations will be within relevant noise criteria as set out in Chapter 9.

16.13 The predicted noise levels at the nearest noise sensitive receptors (identified in Figure 9.4) are within the relevant adopted daytime and evening limits that have been adopted by SDCC within the Grange Castle area.

16.14 The cumulative effect of the Proposed Development; MV connection and permanent 110kV GIS Substation with other IED licence facilities in the area have been described in Chapter 10 - Air Quality and Climate. Air dispersion modelling was undertaken to assess the cumulative effect with reference to EU ambient air quality standards which are based on the protection of human health.

16.15 As demonstrated by the air dispersion modelling results, emissions from the Proposed Development; MV connection and the future planned 110kV GIS Substation in combination with the IED facilities, assuming scheduled testing as well as emergency operation of the back-up generators relating to the Proposed Development as outlined in Chapter 10, will be compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant effect on human health.

16.16 There is no predicted significant cumulative effect on population and human health associated with the construction or operational phase of the Proposed Development when it is considered with the MV connection; 110kV GIS Substation and cabling works and other plans or projects, once appropriate mitigation measures as set out under Chapter of this EIA Report are put in place for the development. As the Proposed Development will have a positive effect on the immediate hinterland and the Dublin Region resulting from increased employment and the associated economic and social benefits, it is concluded that once appropriate mitigation measures are put in place any cumulative effects on population and human health will be ***positive*** and ***long-term*** and ranging from ***imperceptible*** to ***slight***.

Biodiversity

16.17 As part of the Screening for an Appropriate Assessment (AA), in addition to the proposed works, other relevant projects and plans in the region were also considered as set out under Chapter 4 of the EIA Report and also as set out in the AA document itself. This step aims to identify at an early

stage any possible significant cumulative effects of the Proposed Development with other such plans and projects on the Natura 2000 sites and the biodiversity of the Proposed Development site and surrounding area.

Construction phase

16.18 The proposed MV connection outside the Proposed Development site will not have any cumulative effects on species or habitats due to the minimal biodiversity value of any potential route.

16.19 As the proposed 110kV GIS Substation will be constructed within the Proposed Development site that was surveyed and assessed for this development, there will not be any cumulative effects on species or habitats. Proposed connections, including the MV connections, to existing infrastructure will require minor works along existing roads i.e. the installation of ducts into trenches. Given the industrial nature of the surrounding lands and the level of construction going on within other areas of Grange Castle Business Park, the local fauna are likely to be habituated to a degree to human and vehicle related disturbance and will not be effected in any significant way by these works.

16.20 The surrounding lands are largely zoned as '*EE- Enterprise and Employment'* in the *South Dublin County Council Development Plan 2016-2022* (South Dublin County Council, 2016). There are numerous granted planning permissions for industrial developments in the vicinity of the Proposed Development site, as listed in Chapter 4 of the EIA Report. The Cyrus One permitted development is likely to be in construction at the same time as the Proposed Development. In this case, there is potential for cumulative effects to arise on water quality in the downstream surface water environment, disturbance to fauna and habitat loss, as a consequence of the Proposed Development acting cumulatively with other plans and projects. These potential cumulative effects would be temporary and occur at a local or county geographical scale.

Operational phase

16.21 The Proposed Development will not individually or in combination with another plan or project be likely to have a significant effect on a European site. Furthermore, as outlined in the AA Screening accompanying this application for the Proposed Development (Scott Cawley Ltd., 2020) the potential effects associated with the operational phase of the Proposed Development do not have the potential to affect the conservation objectives supporting the qualifying interest (QI)/ special conservation interests (SCI) of any European sites. As the Proposed Development will not have any effects on the QIs/SCIs or conservation objectives of any European sites, there is no potential for the MV connection, 110kV GIS Substation, and any other plan or project to cumulatively result in likely significant effects on any European sites. It is concluded that once appropriate Biodiversity mitigation measures as set out under Chapter 6 are put in place any cumulative effects on biodiversity will be ***neutral*** and ***long-term*** and ***slight***.

Land, Soils, Geology and Hydrogeology

16.22 The anticipated cumulative effects of the Proposed Development, MV connection and the proposed 110kV GIS substation and associated cabling, and other nearby development are addressed below. They are broadly the same as those anticipated for the Proposed Development as set out in Chapter 7.

Construction phase

16.23 In relation to the potential cumulative effect on the geological or hydrogeological environment during the construction phases, those key engineering works which would have additional effects above and beyond those already described in Chapter 7 include:

- Construction of cumulative development will require additional removal of topsoil and subsoil cover and will further increase the vulnerability of the underlying bedrock. As such, the mitigation measures outlined in Chapter 7 for the Proposed Development will apply to the proposed MV connection and 110kV GIS Substation development. Capping of significant areas of the sites by hardstand/ buildings following construction and installation of drainage will minimise the potential for contamination of groundwater;

- Run-off containing large amounts of silt could cause damage to surface water systems and receiving watercourses. Run-off for the proposed 110kV GIS substation development will therefore need to be managed using the methods described for the Proposed Development; and
- Contamination of soils and groundwater underlying the site from accidental spillage and leakage from construction traffic and construction materials may occur unless project-specific Construction Environmental Management Plans (CEMPs) are put in place and complied with. It is proposed that project-specific CEMP's will be put in place for the future proposed 110kV substation, HV connection and MV connection development.

Operational phase

16.24 In relation to the potential cumulative effects from the operational phase of the Proposed Development the following would apply:

- Overall increase in hardstanding: Cumulatively these developments will result in localised reduced recharge to ground and increase in surface run-off. The aquifer underlying the site is locally important and is classified as *Dinantian Limestones (Calp)* (see Figure 7.4 in Chapter 7). Any effects on this aquifer will not arise due to the implementation of mitigation measures as outlined under Chapter 7.
- Based on site specific and regional geological investigations there is circa 3-5 metres of overburden overlying the bedrock aquifer classifying it as "High" to "Extreme" vulnerability (GSI classification). Despite this, the effect is considered to be imperceptible provided that SuDS is incorporated into the design of each of the developments as set out under Chapter 7.
- Accidental releases from fuel storage/unloading could contaminate groundwater or soil environments unless mitigated adequately i.e. bunded tanks and delivery areas. Any effects on groundwater will not arise due to the implementation of mitigation measures as outlined under Chapter 7 and the CEMP;
- Localised accidental discharge of hydrocarbons could occur in car parking areas and along roads unless diverted to surface water drainage system with petrol interceptors. The implementation of mitigation measures outlined in Chapter 7 and Chapter 3 will address this matter; and
- There will be a loss of potential agricultural land, however, the area of development is small in the context of the overall agricultural land available in the region and the site will be already secured and unavailable for agricultural use, subject to grant of permission for the Proposed Development.

16.25 The residual cumulative effect on land, soils, geology and hydrogeology for the construction and operation phases of the Proposed Development together with the MV connection, and permanent 110kV GIS Substation will be ***long-term***, ***neutral*** in terms of quality and of ***imperceptible*** significance, once the appropriate mitigation measures are put in place for each development on the site.

Cumulative Effects relating to Other Developments

16.26 In terms of the effect on land, soils, geology and groundwater, the cumulative effects which are relevant to the Proposed Development; MV connection and the 110kV GIS Substation as well as permitted developments, as outlined in Chapter 4, in the vicinity are:

- Overall loss of agricultural soils: Development of the area will result in a not significant effect on agricultural soils. As this area has been zoned for development (enterprise and employment uses) this is consistent with the intended development of the area and is small in scale relative to Ireland's overall agricultural soil resources;
- Overall increase in hardstanding: Cumulatively these developments will result in localised reduced recharge to ground and increase in surface run-off. The aquifer underlying the area of these developments is locally important. Based on site specific and regional geological investigations there is circa 3-5 metres of overburden overlying the bedrock aquifer classifying it as "high" / "Extreme" vulnerability (GSI classification). As such, the effect is considered to be imperceptible provided that SuDS is incorporated into the design of each of the developments; and
- Increase in potential for contamination of the underlying aquifer during construction and operation: 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 effect on the receiving water environment in accordance with the relevant legislation (primarily the Local Government (Water Pollution) Act, 1977 as amended) such that they would be required to manage runoff and fuel leakages. Overall, cumulative development in the Grange Castle area is predicted to have an ***imperceptible, long term*** effect on land, soils and geology and hydrogeology. Provided sufficient mitigation measures are in place at both the Proposed Development site and future planned Substation site the overall effect on land, soil, geology and hydrogeology will be ***neutral***.

Hydrology

16.27 The anticipated cumulative effects of the Proposed Development, MV connection and the proposed 110kV GIS Substation development and its grid connections within the proposed site boundary are addressed below. They are similar to those anticipated for the Proposed Development as set out in Chapter 8 but on a slightly larger scale.

Construction phase

16.28 In relation to the potential cumulative effect on hydrology during the construction phases, the construction works which would have potential cumulative effects include:

- 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. However, there are no notable surface water features onsite. Internal site drainage consists of a number of disconnected ditches with no direct hydrological pathway to offsite surface water bodies;
- Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads; and
- 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.

Operation phase

- 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 i.e. bunded tank;
- 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.

16.29 Mitigation measures as described in Chapter 8 will need to be utilised for any future development on the site in the form of the planned future permanent 110kV GIS Substation on the site. A CEMP will be put in place and complied with for this development.

16.30 The surface water and foul drainage infrastructure and water supply requirements for the Proposed Development have been designed to accommodate the proposed 110kV substation. As noted in Chapter 3 (Description of the Proposed Development), Chapter 16 (Material Assets) and the *Engineering Planning Report – Drainage and Water Services* prepared by CS Consulting Engineers, a PCE form was submitted to Irish Water (IW) January 2020 which addressed water and wastewater demand for the development of the site.

16.31 The residual cumulative effect on water and hydrology for the construction and operation phases of the Proposed Development, MV connection and the permanent 110kV GIS Substation is anticipated to be ***long-term***, ***neutral*** in terms of quality and of ***imperceptible*** significance, once appropriate mitigation measures are put in place for each development.

Cumulative effects relating to other developments

16.32 The effect of the development has been considered in relation to other developments currently permitted within the vicinity of the site (see Chapter 4). In terms of water, the cumulative effects which are relevant to the Proposed Development, MV connection, the permanent 110kV GIS substation and permitted developments in the form of the Cyrus One, Google and Microsoft developments in the vicinity are:

- Increase in hard standing: This will result in localised reduced recharge to ground and increase in run-off rate. However, each permitted development are required by the Local Authority and IW to comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) and Local Authority and IW requirements by providing suitable attenuation on site to ensure greenfield runoff rates and ensure that there is no increase in likely flood impact.
- Increase in potential for contamination of watercourses during construction and operation: 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 effect on the receiving water environment in accordance with the relevant legislation (Local Government (Water Pollution) Act, 1977 as amended) such that they would be required to manage runoff and fuel leakages.; and
- Increase in wastewater loading and water supply requirement: Each development will require approval from the IW confirming available capacity in the water and wastewater infrastructure.

16.33 Overall, the effect on the hydrological environment as a result of the Proposed Development and wider developments in the area is predicted to be ***long term imperceptible*** and ***neutral***, provided the mitigation measures set out under Chapter 8 are in place at the development.

Noise and vibration

Construction phase

16.34 During the construction phase of the proposed development there will be some cumulative effect on nearby noise sensitive properties due to noise emissions from site traffic and construction activities relating to the Proposed Development and the Cyrus One site.

16.35 Due to the additional distance to the site under consideration here cumulative construction noise and/or vibration would not be expected to be a material issue. The application of noise limits and hours of operation (i.e. as per Table 9.5, 9.6), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.107), will ensure that the cumulative effect of noise and vibration is kept to a minimum. Any construction noise effects will be ***slight, negative*** and ***short-term*** in nature. Also, it is considered that as the proposed development progresses from initial ground works that cumulative construction noise effects will reduce from slight to ***not significant.***

Operational phase

16.36 The environmental noise survey as detailed in Chapter 9 and Appendix F takes account of noise emissions from existing developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network. The noise criteria proposed for plant items (i.e. chillers etc.) has been derived with consideration of existing site noise emissions levels to ensure that cumulative noise emissions do not exceed the relevant noise criteria as set out in Chapter 9.

16.37 The potential cumulative noise emissions from the Proposed Development and neighbouring Google Ireland Data Centres and Cyrus One Data Centre have been considered. Reference is made to Section 9 of the Google Ireland EIS (PM Group ref. IE0311190-22-RP-0001, Issue A) (Google EIS Table 9.12) and Section 10 of the Cyrus One EIAR which presents noise predictions to nearby shared residential receptors. The conclusions of these are set out under Chapter 9 of this EIA Report.

16.38 The closest shared receptors to the two Cyrus One and Google sites are the receivers R2 (a private residence to the south west of the site at a distance of some 250m from the site boundary), R5 (a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the

Cyrus One facility under construction, some 250m from the site boundary) and R6 (a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 270m from the site boundary). Table 9.17 of Chapter 9 presents the predicted cumulative noise levels to these three receivers and compares to the proposed noise criteria. Predicted cumulative plant noise emissions are indicated as being within the adopted criteria. Once the mitigation measures outlined in Chapter 9 are implemented there will be no significant cumulative effect as a result of the Proposed Development.

16.39 The predicted noise effect of the Proposed Development and cumulative development at the nearest noise sensitive locations is ***negative***, ***not significant*** and ***long-term*** for typical operations during daytime and night-time periods.

Air quality and Climate

Construction phase

16.40 With appropriate construction dust mitigation measures in place the cumulative effects to air quality and climate from simultaneous operation of the existing developments assessed under Chapter 10 that are consistent emission points, and the construction of the Proposed Development, including the future planned 110kV GIS Substation and its cable connection works, and the neighbouring data centres that may be under construction or in operation in the vicinity of the site are deemed to be ***neutral***, ***short-term*** and ***not significant*** for dust and particulate matter; ***neutral, short to medium term*** and ***imperceptible*** with respect to human health; and ***short-term, negative*** and ***not significant*** in relation to Climate and Ireland's obligations under the EU 2020 target.

Operational phase

16.41 The air dispersion modelling assessment detailed in Chapter 10 of this EIA Report assessed the effect to air quality and climate from the construction of the Proposed Development individually and the cumulative effect with the nearby IED Licenced facilities (Takeda and Pfizer). These two facilities were assessed due to them being the only consistent emission points requiring such a licence within the Grange Castle Business Park. The 110kV GIS Substation, and the underground cables that will connect from the Castlebaggot and Kilmahud substations will, once construction is complete, result in no cumulative effects to air quality or climate during the operational phase of the Proposed Development.

16.42 The cumulative assessment indicates that the ambient ground level NO_2, NO_X, SO_2 and NMVOC concentrations are within the relevant air quality standards as set out in more detail in Chapter 10 of this EIA Report at all locations at or close to the Proposed Development site. The cumulative effects to air quality from operation of the proposed development are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of air quality.

16.43 During normal operations at the facility, it will be ensured that the electricity supplier for the site currently holds a Commission for Regulation of Utilities (CRU) certified fuel mix disclosure, guaranteeing every megawatt-hour (MWh) that they supply in the market is generated from renewable sources. As the site will run on reviewable energy, the cumulative effects to climate from simultaneous operation of the existing developments assessed under Chapter 10, and Proposed Development on the site and the neighbouring data centres in the vicinity of the site are deemed ***long-term, slight*** in terms of significance and ***negative*** in terms of quality.

Landscape and visual assessment

Construction phase

16.44 The construction of the Proposed Development 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 construction of the MV connection will extend the works beyond the Proposed Development site, but will be short term in nature. The construction of the 110kV GIS Substation, and the underground cables, will not extend the construction period beyond that planned for the Proposed Development. The visual elements associated with this construction would be considered

part of the existing and evolving urban landscape. The trenches associated with the cabling will have temporary and neutral impact outside of the Proposed Development site.

16.45 The cumulative negative visual effect on the landscape character during the construction phase of development would be considered **moderate** in magnitude and **short to medium term** in its duration.

Operational phase

16.46 The Proposed Development will comprise the construction of 3 no. data centres on the site and associated ancillary development as outlined in Chapter 2, Description of Proposed Development. The Proposed Development will further extend the high-quality campus character of the Grange Castle Business Park.

16.47 The 110kV GIS Substation is located to the east of Building C and to the north of the existing Castlebaggot Substation and therefore it will be located within and adjacent to the existing Grange Castle Business Park and the Proposed Development site. The Proposed Development with the associated MV connection and other cable installation and 110kV GIS Substation, as well as surrounding and permitted development, following the implementation of the landscape mitigation that includes landscape bunds and planting to all boundaries that will be in place prior to the commencement of Building B, will have a ***long term, slight to moderate*** *and* ***neutral*** cumulative effect on the landscape.

Traffic and transportation

Construction phase

16.48 The predicted impact of construction traffic associated with the Proposed Development in conjunction with the construction traffic associated with the MV connection and 110kV GIS Substation and associated cabling works and adjacent projects, particularly the ongoing development of the Cyrus One site to the south, will result in a ***short to medium*** term ***slight negative*** impact on the operational efficiency of the existing Grange Castle South Business Park access junction. This impact will be fully reversible, as it will be confined to the duration of construction activity on the Proposed Development site.

Operational phase

16.49 The traffic and transportation effects of the Proposed Development were assessed taking the cumulative traffic effects, including effects associated with the relevant neighbouring developments and the MV connection, 110kV GIS Substation and grid connection.

16.50 The cumulative effect of the Proposed Development, in conjunction with the future planned MV connection, 110kV GIS Substation and associated cabling as well as other planned and permitted development, and allowing for predicted background traffic growth, is therefore represented by the difference between the assessment results given in Table 12.5 (the Baseline scenario) and those given in Table 12.7 (the design year assessment with the Proposed Development in place) as set out in Chapter 12 of this EIA Report.

16.51 The cumulative increase in vehicular traffic flows as set out in Table 12.7 is therefore likely to result in a long-term slight negative effect on the operational efficiency of the existing Grange Castle South Business Park access junction, in comparison to the Baseline scenario. This effect will be mitigated, as any future infrastructure improvements occur and as measures proposed under the Mobility Management Plan (MMP) submitted with the planning application is implemented. The MMP seeks to reduce local vehicular traffic volumes by increasing use of public transport or use of cycling infrastructure) and with infrastructure improvements will improve the operational efficiency of these junctions generally, as well as to reduce vehicle trips to/from the Proposed Development.

Cultural heritage

Construction phase

16.52 The Proposed Development site has been subject to extensive archaeological testing and subsequent excavation in a number of areas as detailed under Chapter 13 of this EIA Report. The testing and excavation included the site of the 110kV GIS Substation. There is potential for isolated archaeological features to survive beneath the existing ground level outside the footprint of the test trenches and the excavated areas. The trenches required for the MV connections and cable connections to the future planned 110kV GIS Substation from the Kilmahud and Castlebaggot substations were not subject to these excavations as they lay outside the Proposed Development site and will be subject to further investigations under applications made for these works.

16.53 Ground disturbances associated with the Proposed Development site, MV connection and 110kV GIS Substation and its associated cabling works, and planned and permitted adjacent developments have the potential to directly and negatively impact on any archaeological remains. However, a range of mitigation measures outlined in Chapter 12, that will be proposed as part of the future planned MV connection and 110kV GIS Substation and conditions and mitigation measures associated with the Cyrus One and other permitted developments, have been recommended and agreed in advance with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht, the South Dublin County Archaeologist or the Conservation Officer. It is proposed to monitor construction activity and preserve any identified archaeological features by record.

16.54 The cumulative effects on archaeological, architectural and cultural heritage are not considered to alter the impact under Chapter 12 of the EIA Report. Dependant on the nature, extent and significance of archaeological deposits, the cumulative effect of the Proposed Development site, MV connection and 110kV GIS Substation and its associated cabling works, and planned and permitted adjacent developments will remain at being ***moderate*** to ***significantly negative***. No cumulative effects upon the architectural or cultural resource are predicted as a result of the construction of the proposed development.

Operational phase

16.55 No significant impacts during operation are predicted upon the archaeological, architectural and cultural heritage resource as a result of the cumulative effect of the Proposed Development with the MV connection and 110kV GIS Substation and its associated cabling works, and planned and permitted adjacent developments.

Waste management

Construction phase

16.56 The construction of the Proposed Development, MV connection and the future planned 110kV GIS Substation and cabling works, and other proposed and permitted developments such as the Cyrus One development, require site clearance, excavations and levelling which will generate c. 33,930m^3 of excavated material the majority of which will be reused on site. The Proposed Development cumulatively with the other developments as outlined above will also generate other waste material as set out in Chapter 14 as a result of demolition, on site activities and construction activities.

16.57 Provided mitigation measures set out in this EIA Report under Chapter 14 and the Cyrus One EIA Report that formed part of the application for this neighbouring development are implemented during construction of the proposed development, the cumulative effect in terms of waste will be ***neutral***, ***short to medium-term*** and ***imperceptible.***

Operational phase

16.58 The operation of the Proposed Development, MV connection and 110kV GIS Substation and associated cabling works, as well as associated permitted or existing development, will generate requirements for 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 into recycled products (e.g. paper mills and glass recycling).

16.59 Dedicated waste storage areas are provided for storage of waste pending collection by nominated waste contractors. If waste material is not managed and stored correctly, it will 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.

16.60 Waste collection vehicles will be required to service the Proposed Development, 110kV GIS Substation and surrounding development on a regular basis to remove waste. All waste contractors collecting waste from any of these sites must hold a valid collection permit to transport waste and waste will only be brought to suitably registered/permitted/licenced facilities. All waste 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.

16.61 The predicted cumulative effect of operational waste generation from the Proposed Development, MV connection, 110kV GIS Substation and associated cabling and surrounding development is considered to be neutral compared to the Predicted impact of the Proposed Development which is ***long-term, negative*** and ***not significant.***

Material assets

Construction phase

16.62 The construction phase of the Proposed Development will cumulatively with the MV connection and 110kV GIS Substation and associated cabling, as well as planned and permitted development will have a ***short to medium term, neutral and imperceptible*** effect on power and electrical supply; telecommunications; surface water infrastructure; foul drainage infrastructure and water supply. This is further detailed within Chapter 15 of this EIA Report.

Operational phase

16.63 The location of the Proposed Development within the Grange Castle Business Park South means that it is well placed to access existing water and drainage utilities and, therefore, will not have any significant effect above and beyond what is described in the earlier sections and will not effect on capacity for off site development.

16.64 The Applicant has and continues to engage with Irish Water to ensure that there is capacity to cater for the water supply and wastewater for the Proposed Development and future planned 110kV GIS substation as well as planned and permitted developments. As noted in Chapter 2 (Description of the Proposed Development), (Chapter 15 (Material Assets) and the *Engineering Service Report* prepared by CS Consulting Engineers, a PCE form was submitted to IW in January 2020 which addressed water and wastewater demand for the Proposed Development.

16.65 The Proposed Development will have a maximum operational electrical demand of 126MW. As stated in Section 14.7.2, 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 connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

16.66 The construction phase of the Proposed Development will, cumulatively with the MV connection, 110kV GIS Substation and associated cabling, as well as planned and permitted development that include the Cyrus One development, have a ***long-term, neutral, not-significant*** effect on power and electrical supply during the operational phase.

16.67 The cumulative effect of the Proposed Development with the above listed developments on surface water infrastructure; foul drainage infrastructure and water supply will be ***long-term***, ***neutral*** and ***imperceptible*** for the operational phase.

16.68 There will be ***no predicted*** cumulative effect of the Proposed Development with the above listed developments on telecommunications.

16.69 The cumulative effects associated with material assets relating to the Proposed Development, with future planned 110kV GIS substation as well as planned and permitted developments will be ***long-term, neutral*** and ***not significant.***

17. INTERACTIONS

17.1 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.

17.2 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.

17.3 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.

DISCUSSION – POSITIVE IMPACTS

17.4 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

17.5 The proposed development will create up to 300 no. permanent full-time jobs (excluding maintenance contractors and visitors) and up to 400 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

17.6 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

17.7 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

17.8 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

17.9 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 3 (Description of the Proposed Development) and Chapter 8 (Hydrology) will ensure the effect will be ***short to medium term, imperceptible*** and ***neutral***.

Biodiversity

17.10 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

17.11 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

17.12 Archaeological assessment and investigation of the Proposed Development site has identified features of archaeological interest on the site. These have been subject to a comprehensive programme of archaeological investigation and excavation under licence as set out under Chapter 13 (Cultural Heritage) of this EIA Report. Further, aspects of the Proposed Development have 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

17.13 As detailed in Chapter 14 (Waste Management), c. 41,500m^3 of excavated soil may be generated from the site preparation, excavations and levelling works required to facilitate construction. It is anticipated that all of this soil will be reused on site. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 14 and the requirements of the C&D Waste Management Plan (included as Appendix 14.1), will ensure the effect is ***long-term, imperceptible*** and **neutral.**

Hydrology on:

Population and Human Health

17.14 The Proposed Development will generate wastewater emissions (foul water) from the site. This will discharge via a new 225mm diameter connection to the external foul water system to the west and to the east of the site and ultimately discharge to the Local Authority wastewater treatment plant (WWTP) at Ringsend in Dublin. The Ringsend WWTP will provide treatment for wastewater emissions, the effect is considered to be ***long-term, imperceptible*** and ***neutral***.

Land, Soils, Geology and Hydrogeology

17.15 As there is potential for direct run-off to a watercourse present on the site, 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 of 2.0l/s/ha. for the site. The effect will be ***short to medium term***, ***imperceptible*** and ***neutral***.

Biodiversity

17.16 The Proposed Development will result in increased surface water run-off. Any surface water run-off will be attenuated to the greenfield runoff rate of 2.0l/s/ha. for the site. Surface water will be discharged offsite via the 4 no. attenuation ponds and their associated forebays with three of the proposed attenuation ponds draining to the north and outfall into the existing stream, while one of the

ponds will drain to the west and into an existing storm sewer. The hydrocarbon interceptors, hydrodynamic solid separator, attenuation storage and flow control device ensure emissions are controlled. The nearest European designated site is located c. 5.2km 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. 15.5km 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

17.17 Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors and hydrodynamic solid separator 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

17.18 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

17.19 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

17.20 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 negligible. 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 centres 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.

Material Assets on:

Population and Human Health

17.21 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

17.22 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

17.23 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

17.24 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. As the area is already in a developing commercial/industrial area the overall operational noise levels will not change significantly.

Air Quality and Climate on:

Landscape

17.25 The Proposed Development will include a series of generator flues that will be paired and attached along the northern elevation of Buildings A and B, and along the western elevation of Block C. The uppermost part of the flues, at 25m in height, will extend above each data centre, and will be visible from some vantage points – either against the sky or against a backdrop of landscape depending on the relative elevation of the vantage point.

17.26 The site is part of a developing 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

17.27 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

17.28 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 Chapter 9. The effect will be ***slight, negative*** and ***short to medium term*** in duration***.***

Landscape and Visual on:

Population and Human Health

17.29 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 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

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

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

APPENDICES

Data Centre Development
Grange Castle South Business Park

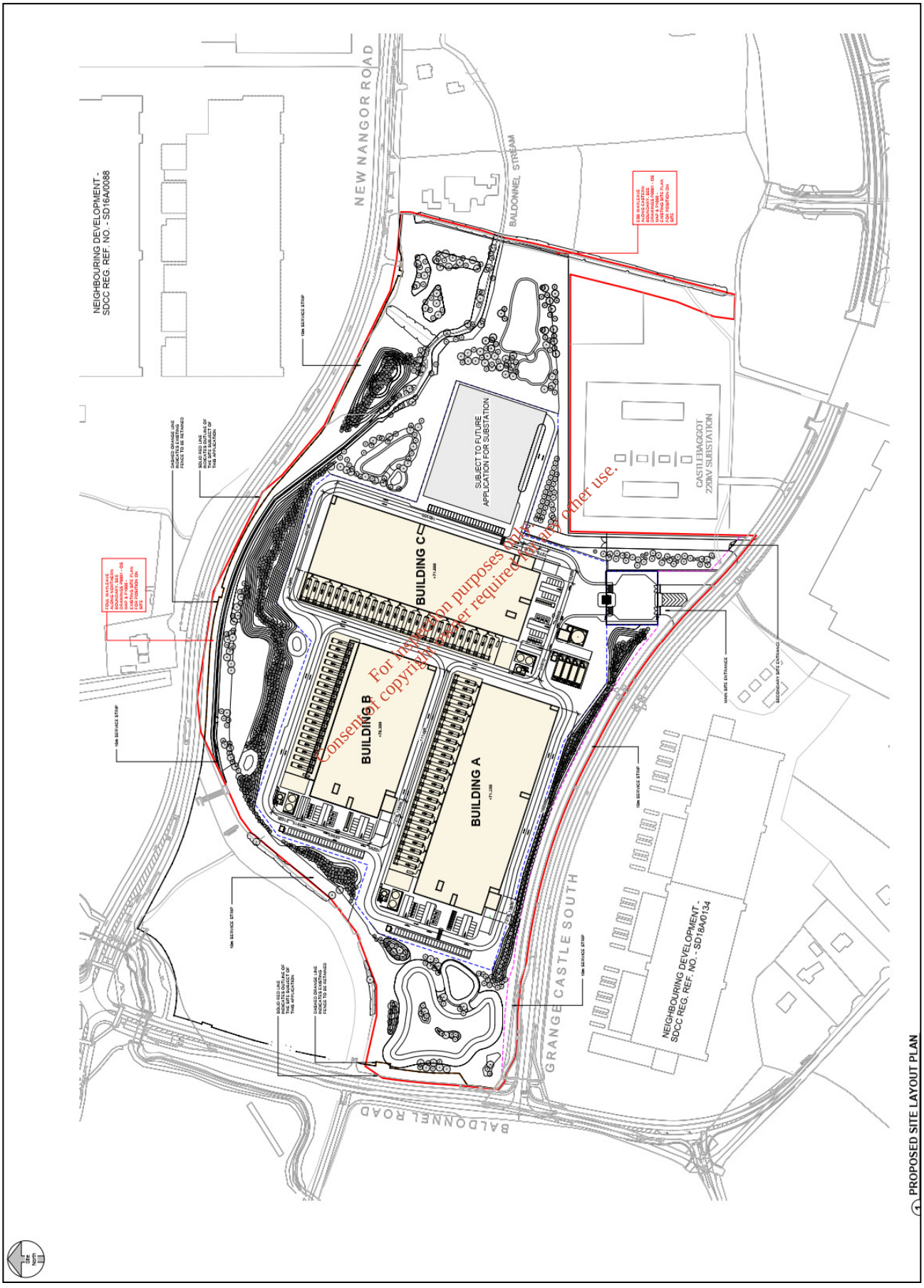
April 2020

MARSTON
PLANNING CONSULTANCY

CONTENTS

APPENDIX A

Proposed site layout plan (not to scale)



APPENDIX B EVALUATION OF ALTERNATIVE SITES

Environmental Criteria	Option 1 Grange Castle South	Option 2 Orbital Park, Naas	Option 3 Navan
Human Health & Population	**Human Health & Population**	**Human Health & Population**	**Human Health & Population**
Health Impacts	The site is considered to be a low sensitivity environment for human health impacts for construction and operations.	The site is considered to be a low sensitivity environment for human health impacts for construction and medium sensitivity for operations.	The site is considered to be a low sensitivity environment for human health impacts for construction and medium sensitivity for operations.
Economic Impact	There will be increased employment associated with both the construction and operation of three data centres on this site. There is no conflict with existing economic activities. The nearest tourism/amenity is Corkagh Park (c. 2km east of the site), and it will not be impacted by a data centre on these lands.	There will be increased employment associated with both the construction and operation of a data centre on this site. There is no conflict with existing economic activities. The nearest tourism/amenity is the River Liffey, which will not be impacted by a data centre on these lands.	There will be increased employment associated with both the construction and operation of a data centre on this site. There is no conflict with existing economic activities. The nearest tourism/amenity is the Boyne River and the Navan Rugby and Tennis Clubs all of which will not be impacted by a data centre on these lands.
Biodiversity	**Biodiversity**	**Biodiversity**	**Biodiversity**
Designated Conservation Areas	There are 5 sites within a 15km radius of the site, of which the Rye Water Valley/Carton SAC is the closest, 5.2km from the proposed site. There is no connectivity with the 5 European sites, however via the Baldonnel stream there is connectivity with South Dublin Bay SAC and SPA, North Dublin Bay SAC and North Bull Island SPA which are c. 28km downstream of the site. The potential for adverse effects on the European sites considered are unlikely given the following; • There is a high degree of natural attenuation and mixing in the natural watercourses between the site and Dublin Bay, and • The project will be connected to municipal sewers, and there will be no uncontrolled surface water discharge to the River Boyne.	There are 6 sites within a 15km radius of the site, of which the Mouds Bog SAC is the closest, 5km to the west of the proposed site. There are no vectors or pathways to this site. There is also no connectivity with the remaining 5 sites. The potential for adverse effects on the European sites considered are unlikely given the following; • There is a high degree of natural attenuation and mixing in the natural watercourses between the site and Dublin Bay, and • The project will be connected to municipal sewers, and there will be no uncontrolled surface water discharge to any of the protected sites.	There are 2 sites within a 15km radius of the site; River Boyne and Blackwater SAC and SPA 0.7km and 0.8km from the proposed site respectively. There is a pathway to the River Boyne and River Blackwater SAC or SPA. The potential for adverse effects on the European sites considered are unlikely given the following; • There is limited hydrological connectivity with a good degree of mixing and attenuation between the project site and the River Boyne, and • The project will be connected to municipal sewers, and there will be no uncontrolled surface water discharge to the River Boyne.
Habitat Evaluation	The site is an area of low local ecological value and, as such, is predicted to have a neutral and imperceptible effect on biodiversity.	The site is an area of low local ecological value and, as such, is predicted to have a neutral and imperceptible effect on biodiversity.	The site is an area of low local ecological value and, as such, is predicted to have a neutral and imperceptible effect on biodiversity.
Land, Soils, Geology & Hydrogeology	**Land, Soils, Geology & Hydrogeology**	**Land, Soils, Geology & Hydrogeology**	**Land, Soils, Geology & Hydrogeology**
Geological Heritage	There is no potential for impact on any geological heritage site (3 no. geological heritage sites within 3.5km of the subject lands).	There is no potential for impact on any geological heritage site. The nearest geological heritage site is St. Patrick's Well, which is located c. 2.6Km to the north-west of the site.	There is no potential for impact on any geological heritage site The nearest geological heritage sites are the Boyne Valley and Tara Mine, which are located approximately 2.5Km to the north-northeast and 3.0Km to the northwest of the site respectively.
Contaminated Land	There are no licensed landfills or section 22 illegal landfills within 500m of the site.	There are no licensed landfills or section 22 illegal landfills within 500m of the site.	There are no licensed landfills or section 22 illegal landfills within 500m of the site.
Economic reserve/land use	The nearest recorded mineral site is c. 2.7km east of the site, and the closest active quarry is Belgard quarry (c. 3km from the site). The land take for this option is primarily agricultural land with disturbed topsoil.	The nearest quarry (Brownstown Pit) is a sand and gravel pit that is located c. 5.75km to the south. The land take for this option is primarily agricultural land with disturbed topsoil.	There are two active local mine sites located in the immediate vicinity. These are located at Townparks (extraction of Zinc and Lead) and Navan (Sand and Gravel pit) situated at approx. 2.5km to the northwest and 3.0km to the north of the site, respectively. There is no connectivity between the Proposed Development site and these mining/quarry areas. The land take for this option is primarily agricultural land.
Aquifer Resource/Water supply	The site is located over a (LI) Locally Important Aquifer – "Bedrock which is Moderately Productive only in Local Zones". The site is well outside of the zone of influence of any known public or private water supplies (closest ones are c. 3.5km	The site is located over a (RKd) Regionally Important Aquifer which is described as a Sand & gravels aquifer, overlain by poorly drained soil. The GSI (2019) Well Card Index shows a number of groundwater monitoring and abstraction wells within a 3 km radius of	The site is located over a (LI) Locally Important Aquifer – "Bedrock which is Moderately Productive only in Local Zones". The GSI (2019) Well Card Index shows a number of groundwater monitoring and abstraction wells within a 3 km radius of

Environmental Criteria	Option 1 Grange Castle South	Option 2 Orbital Park, Naas	Option 3 Navan
	due east and used for industrial purposes). The site is also outside source protection zones forany groundwater protection schemes (c. 9km north of Kilteel GWS).	the site. There is no information on whether they are still in use. The nearest public groundwater supply is c. 8.5Km north-west to the site (Roberstown - PWS) The site is outside of the Source Protection Zone delineated for this supply.	the site. There is no information on whether they are still in use. The site is also outside source protection zones for any groundwater protection schemes.The nearest public groundwater supplies are located 10Km south-southwest and 11Km northeast to the site (Trim and Slane PWS, respectively).
Water & Hydrology	**Water & Hydrology**	**Water & Hydrology**	**Water & Hydrology**
Natural Hydrological Regime and Water Quality	The potential site lies within the Liffey Catchment and its tributaries. The Baldonnel Stream runs along the northern boundary of the potential site. It has been recently diverted by the road network upgrades, and none of the original natural features of the waterbody remain for this portion of the stream. The Water Framework Directive (WFD) (2010-2015) status for the Baldonnel Stream is currently classified as "*moderate*". The Baldonnel Stream flows for c. 1.1km in a northerly direction until it meets with the Griffeen River which also has a WFD status of "moderate". The Griffeen River flows for a further 4.2km until it joins the River Liffey which currently has an "unassigned" WFD status.	The potential site lies within the Liffey Catchment and its tributaries, which has a "good" and "moderate" water quality status adjacent to the site. The internal surface drainage that run along the west and east side of the site comprise a series of remnant drainage ditches that drain into the River Liffey that is located 1km to the north.	The potential site lies within the Boyne Catchment and its tributaries, which has a "good" water quality status The internal surface drainage on the site has hydrological connection with the River Boyne which flows southeast to northwest approximately 800m east from the site. The site drainage is predominantly internal and goes to ground in the internal remnant drainage ditches. However, there are pathways via flowing water drainage ditches to the north of the site leading to streams further north and west, ultimately leading to the River Boyne. The site is within the River Boyne Catchment and the area nearest to where the site is situated has obtained a 'Moderate' water quality status and an 'At Risk' rank under the WFD upstream of Balreask Old stream. Downstream the quality has not been assigned yet, but the risk has been classified as 'Not at Risk'.
Flood Risk	Flood water leaves the Camac River and flows overland to enter the River Griffeen traversing the subject lands. Where this floodwater leaves the River Camac the predicted floodwater level is c. 95.8mAOD or higher. This flows downhill before reaching the subject lands. The depth of flooding on the subject lands resulting from this flow is 0.00 – 0.25m with some deeper pockets. As the ground level varies along the route of this overland flow so will the water level between c. 72.75mAOD and c. 68.50mAOD. Based on the CFRAM flood extent mapping, it is concluded that the majority of the site is outside the 0.1%AEP flood extent and is therefore within Flood Zone C. Those parts of the site subject to overland flow from flood water arising in the River Camac are within the 0.1%AEP flood extent but outside the 1.0%AEP flood extent and are therefore within Flood Zone B. No part of the site is within Flood Zone A.	According to the OPW (2019) on-line database while there are flood events recorded in the wider area there is no apparent historical risk of flooding in the immediate vicinity of the site. The nearest flood point recorded is c. 1.0km to the south of the site and indicated the stream some 1km to the north-east that drains into the River Liffey has been recorded to flood to the eastern side of the N7. The cause in both instances was Fluvial flooding resulting from heavy rainfall. The flood map for the potential site indicates that the site is located outside the 0.1%AEP flood extent and is therefore within Flood Zone C.	According to the OPW (2019) on-line database while there are flood events recorded in the wider area there is no apparent historical risk of flooding in the immediate vicinity of the site. The nearest flood points recorded are at the Boyne River approximately 800m to the east of the site (November 2000) and at Robinpath Stream (Navan Swam Culvert) with recurrent events occurred in 2000, 2002 and 2005. The cause was Fluvial flooding resulting from heavy rainfall. The flood map for the potential site indicates that the site is located outside the 0.1%AEP flood extent and is therefore within Flood Zone C.
Water Supply, Wastewater and Stormwater Drainage	Construction and operation of a data centre at this location will have no impact on the required infrastructure i.e. water supply, foul sewer and stormwater sewer capacity.	Construction and operation of a data centre at this location will have no impact on the required infrastructure i.e. water supply, foul sewer and stormwater sewer capacity.	Construction and operation of a data centre at this location will have no impact on the required infrastructure i.e. water supply, foul sewer and stormwater sewer capacity.
Air Quality & Climate	**Air Quality & Climate**	**Air Quality & Climate**	**Air Quality & Climate**
Dust Emission	The receiving environment is considered a low sensitivity environment for dust soiling and human health impacts during construction. There are two air sensitive receptors within 200m of the site and the surrounding area is mainly industrial in nature. The receiving environment is considered a low sensitivity environment for the operational phase of a proposed data centre. There are a number of existing and permitted data centre developments within 500m of the site boundary. A cumulative assessment of the potential	The receiving environment is considered a low sensitivity environment for dust soiling and a low sensitivity environment for human health impacts during construction. There are more than ten air sensitive receptors within 400m of the site and the surrounding area is mainly rural in nature with a business park to the immediate east of the site. The receiving environment is considered a low sensitivity environment for the operational phase of a proposed data centre.	The receiving environment is considered a medium sensitivity environment for dust soiling and a low sensitivity environment for human health impacts during construction. There are more than ten air sensitive receptors within 200m of the site and the surrounding area is mainly rural in nature with some residential estates to the northeast and northwest of the site which are >200m from site boundary. The receiving environment is considered a medium sensitivity environment for the operational phase of a proposed data centre.

Environmental Criteria	Option 1 Grange Castle South	Option 2 Orbital Park, Naas	Option 3 Navan
	impacts of these data centres operating simultaneously with a proposed data centre at this site would need to be conducted to ensure no significant impacts from NO_x emissions on ambient air quality in the vicinity of this site.		
Climate Change	Based on the scale and short-term nature of the construction period, the potential impact on climate from construction of a data centre at any of the three sites will not be significant. There will be no direct emissions of CO_2 from the site during normal operations. In relation to indirect CO_2 emissions from electricity usage, all three sites would contribute a similar level of indirect CO_2 emissions assuming the data centre to be constructed would be of a similar scale irrespective of the location.	Based on the scale and short-term nature of the construction period, the potential impact on climate from construction of a data centre at any of the three sites will not be significant. There will be no direct emissions of CO_2 from the site during normal operations. In relation to indirect CO_2 emissions from electricity usage, all three sites would contribute a similar level of indirect CO_2 emissions assuming the data centre to be constructed would be of a similar scale irrespective of the location.	Based on the scale and short-term nature of the construction period, the potential impact on climate from construction of a data centre at any of the three sites will not be significant. There will be no direct emissions of CO_2 from the site during normal operations. In relation to indirect CO_2 emissions from electricity usage, all three sites would contribute a similar level of indirect CO_2 emissions assuming the data centre to be constructed would be of a similar scale irrespective of the location.
Noise & Vibration	**Noise & Vibration**	**Noise & Vibration**	**Noise & Vibration**
Noise	There a number of commercial and residential properties to the south west of the development site. The larger Grange Castle site has a number of similar developments operational or permitted for development. SDCC require noise emissions from the day to day activities of the development do not exceed pre-existing background noise levels in the area. This likely would require attenuation to be considered for specific plant items but it would be expected that the required noise limits would be achievable.	There a number of commercial and residential properties to the east, south and west of the site. The site is close to the M7 therefore, prevailing noise levels would be expected to be slightly higher than other sites considered. In order to achieve appropriate noise criteria it is likely it would be required to provide attenuation for specific plant items but it would be expected that the required noise limits would be achievable.	There a number of residential properties to the beyond the northern, eastern, southern and western sides of the site. In order to achieve appropriate noise criteria it is likely it would be required to provide attenuation for specific plant items but it would be expected that the required noise limits would be achievable
Vibration	Based on the distance of the site from sensitive receptors, and with application of good construction practices vibration impacts would not be expected in relation to the construction of the development. In relation to day to day operations associated with the site vibration impacts off site would not be a material issue.	Based on the distance of the site from sensitive receptors, and with application of good construction practices vibration impacts would not be expected in relation to the construction of the development. In relation to day to day operations associated with the site vibration impacts off site would not be a material issue.	Based on the distance of the site from sensitive receptors, and with application of good construction practices vibration impacts would not be expected in relation to the construction of the development. In relation to day to day operations associated with the site vibration impacts off site would not be a material issue.
Landscape & Visual	**Landscape & Visual**	**Landscape & Visual**	**Landscape & Visual**
Landscape Character	According to the South Dublin County Development Plan the site is not located within an area of rural or high amenity zone, it is not a specified sensitive landscape area and has no protected or significant views. There are no designated landscapes or protected structures within the immediate area of the subject lands. The Grange Castle site is located within an area that is either already developed by similar industries to a data centre, or lands that are zoned for industries similar to a data centre.	According to the Kildare County Development Plan the site is not located within an area of rural or high amenity zone, it is not a specified sensitive landscape area. It is identified as within the Northern Lowlands landscape character area that has a low sensitivity to development. The site is located within an area that is primarily characterised by agricultural lands, one off housing and the business park (to its east). The lands within the site and to the north are agricultural and are currently unzoned for development	According to the Meath County Development Plan the site is not located within an area of rural or high amenity zone, it is not a specified sensitive landscape area and has no protected or significant views. There are no designated landscapes or protected structures within the immediate area. The Navan site is located within an area that is primarily characterised by the rural environment, proximate to the urban fringe. The lands within the site and to the north are agricultural, all of which are zoned "*E1/E2– Strategic Employment Zones (High Technology Uses)*".
Visual Receptors	Visual receptors for Grange Castle are primarily road users whose sensitivity is low as their focus is not generally on the landscape environment, and workers in the nearby businesses who are also considered to have low sensitivity. Mitigation planting will likely be required for some of the single residences in the surrounding area.	Visual receptors for this site are primarily the residents living to the west and south, as well as to the north-east; who are considered to have high sensitivity. Workers within the business park to the east of the subject land are considered to have low sensitivity. Mitigation planting and screening measures will likely be required.	Visual receptors for Navan are primarily the residents living in Balreask Woods housing estate to the east and Balreask Manor housing estate to the west, along with the single residences located along the R161 and Old Balreask Woods Road who are considered to have high sensitivity. Patrons of and workers within the small industrial area to the south-east of the potential site, and users of the South Navan access road are considered to have low sensitivity. Mitigation planting and screening measures will likely be required.
Archaeology, Architecture & Cultural Heritage	**Archaeology, Architecture & Cultural Heritage**	**Archaeology, Architecture & Cultural Heritage**	**Archaeology, Architecture & Cultural Heritage**
Archaeological Monuments	There are 3 SMR records and 4 NIAH records within 1 km of the site, the closest	There are a number of SMR Records in close proximity to the site but none of	There are 4 SMR records and 1 NIAH record All five of the records are 1km from

Environmental Criteria	Option 1 Grange Castle South	Option 2 Orbital Park, Naas	Option 3 Navan
Record	of which a SMR (DU021-109, an enclosure) is located c. 100m south of the site. Extensive archaeological excavations have already been conducted. Further works will be undertaken as part of predevelopment works allowing preservation by record prior to the planned development of the land.	these are located on the site. The nearest being on land 200m west of the site. A full archaeological impact assessment will be required, and at this stage the probability of further archaeological investigations cannot be ruled out.	the site. A full archaeological impact assessment will be required, and at this stage the probability of further archaeological investigations cannot be ruled out.
Material Assets	**Material Assets**	**Material Assets**	**Material Assets**
Traffic	While a traffic impact assessment will need to be carried out, it would appear that the existing road infrastructure is capable of carrying both the construction related traffic and the operational traffic associated with the provision of a data centre.	While a traffic impact assessment will need to be carried out, it would appear that the wider road infrastructure is capable of carrying both the construction related traffic and the operational traffic associated with the provision of a data centre. The access to the actual site is likely to require improvements to the local road infrastructure or agreements with third parties (Business Park) to enable access associated with the operational traffic associated with the provision of a data centre.	Access to the site is currently provided from a small private entrance off the Local Road "Old Balreask Woods Road". This current access is not sufficient for a data centre and new access will need to be provided. The Old Balreask Woods Road is a narrow single-lane road which will require consideration in the management of construction-related traffic. While a traffic impact assessment will need to be carried out, it would appear that the existing road infrastructure will need additional management to provide for construction related traffic and the operational traffic associated with the provision of a data centre. Site design will need to account for the provision of an access point from the Old Balreask Woods Road, and also for the LDR1 Local Distributor Road.
Waste Management	There is currently sufficient waste management capacity within the surrounding area to permit the development of a data centre at this site to meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.	There is currently sufficient waste management capacity within the surrounding area to permit the development of a data centre at this site to meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.	There is currently sufficient waste management capacity within the surrounding area to permit the development of a data centre at this site to meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.
Utilities	A new Eirgrid substation is located at the south-east corner of the site with both HV and MV/LV services located within the services wayleave along the southern perimeter. Virgin Media and Eir have a network running along Nangor Road and Baldonnel Road. There is a 3 Mobile mast in the extreme southeast corner of the site east of the substation. A T-50 fibre-optic cable runs along the northern perimeter of the site. There is a 4 bar 180 mm PE main running within the services wayleave on the southern perimeter of the site. There is also a 4 bar 125mm PE main under the old Nangor Road. Irish Water potable water mains run along the new and old Nangor Road, the Baldonnel Road and the southern perimeter road serving the site. A 500 mm ductile iron watermain runs along the northern side of the southern site perimeter road, within the 15 m services wayleave. A number of potential connection points are provided from this line into the site.	There are currently all main services available in the park including ESB, gas, telecom, broadband, water and drainage, subject to the necessary connection charges where applicable. The surface water runoff presently goes to ground throughout the majority of the site, with the northern part draining through a series of ditches to the River Liffey. The development will be required to attenuate to greenfield run-off rates under current legislation. There is currently no foul drainage on this potential site. Access to all services is available off the R413 to the south of the site	There is a local power line (presumably 38kV) running along the Old Balreask Woods Road. Additional works will need to be required to bring 110kV supply to this potential site. The surface water runoff presently goes to ground throughout the majority of the site, with the northern part draining through a series of ditches to the Boyne River. The development will be required to attenuate to greenfield run-off rates under current legislation. There is currently no foul drainage on this potential site. The site is located within the Navan WWTP which is running under capacity, with a design capacity of 50,000 P.E., but is currently treating 37,286 P.E. There is a watermain serving the "Old Balreask Woods Road", however it may not be of a suitable size for a data centre. Further assessment will be required. A recent drinking water audit report from 2017 states that the Liscarton WTP produces approximately 10,000 m^3/day which is in excess of the design capacity of 8,000 m^3/day. The plant is currently undergoing upgrades, which are due to be completed 2020. It is unknown as to what communications services exist at this potential site.
CONCLUSIONS	Both the Orbital Park and Navan sites considered had a higher degree of local residential properties that were closer to the Proposed Development than at the proposed site in Grange Castle South that would require a higher degree of noise attenuation; neither had a precedent of permitting and accommodating data centres compared to Grange Castle South; with the Navan site also lacking a local 110kV power supply.		

APPENDIX C BIODIVERSITY

Appendix C.1 – Legislation, policy and Guidelines

National and International Legislation

Planning and Development (Amendment) Act 2010, as *amended*
Wildlife Act, 1976 and *Wildlife (Amendment) Act (2000)* (as amended); hereafter collectively referred to as the Wildlife Acts.
European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011 (as amended); hereafter the 'Birds and Habitats Regulations'.
EU Birds Directive 2009/147/EEC;
EU Habitats Directive 92/43/EEC (as amended);
Flora (Protection) Order, 2015.

Relevant Policies and Plans

National Biodiversity Action Plan 2017 – 2021;
South Dublin County Development Plan 2016 – 2022;
South Dublin County Heritage Plan 2010 – 2015.

Relevant Guidelines

Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA, 2003);
Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
Guidelines on the Information to be contained in Environmental Impact Assessment Reports, DRAFT. (EPA, 2017);
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, 2nd edition. (CIEEM, 2018);
Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011);
A Guide to Habitats in Ireland (Fossitt, 2000);
Bat Mitigation Guidelines for Ireland (National Parks and Wildlife Service, 2006);
Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition (Collins, J., 2016);
Guidance Note 08/18: Bats and artificial lighting in the UK; Bats and the Built Environment. (Bat Conservation Trust & Institute of Lighting Professionals, 2018);
Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority National Roads Authority, undated);
Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority (National Roads Authority, 2009);
Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006);
Design Manual for Roads and Bridges: Nature Conservation Advice in Relation to Bats (Highways Agency, 2001).

Appendix C.2 – Ecological Valuation Criteria

Ecological Valuation Criteria

International Importance:
• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
• Proposed Special Protection Area (pSPA).
• Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
• Features essential to maintaining the coherence of the Natura 2000 Network.[1]
• Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
• Resident or regularly occurring populations (assessed to be important at the national level)[2] of the following:
  ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or
  ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
• Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
• World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
• Biosphere Reserve (UNESCO Man & The Biosphere Programme).
• Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
• Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
• Biogenetic Reserve under the Council of Europe.
• European Diploma Site under the Council of Europe.
• Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[3]

National Importance:
• Site designated or proposed as a Natural Heritage Area (NHA).
• Statutory Nature Reserve.
• Refuge for Fauna and Flora protected under the Wildlife Acts.
• National Park.
• Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
• Resident or regularly occurring populations (assessed to be important at the national level)[4] of the following:
  ○ Species protected under the Wildlife Acts; and/or
  ○ Species listed on the relevant Red Data list.
• Site containing 'viable areas'[5] of the habitat types listed in Annex I of the Habitats Directive.

[1] See Articles 3 and 10 of the Habitats Directive.
[2] It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.
[3] Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).
[4] It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.
[5] A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

County Importance:

- Area of Special Amenity.[6]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[7] of the following:
    - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
    - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
    - Species protected under the Wildlife Acts; and/or
    - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[8] of the following:
    - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
    - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
    - Species protected under the Wildlife Acts; and/or
    - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

[6] It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of county importance from an ecological perspective.

[7] It is suggested that, in general, 1% of the county population of such species qualifies as a county important population. However, a smaller population may qualify as county importance where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

[8] It is suggested that, in general, 1%of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

Appendix C.3 – European and National Designated Sites within the Vicinity of the Proposed Development

Qualifying interests (QIs) and special conservation interests (SCIs) of the European sites in the vicinity of the Proposed Development site

European Site Name [Code] and its Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Special Area of Conservation (SAC)	
Rye Water Valley/ Carton SAC [001398] [7220] Petrifying springs with tufa formation (*Cratoneurion*)* [1014] Narrow-mouthed Whorl Snail *Vertigo angustior* [1016] Desmoulin's Whorl Snail *Vertigo moulinsiana* NPWS (2018) *Conservation objectives for Rye Water Valley/Carton SAC [001398]*. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.	Located c. 5.2km north-west of the Proposed Development
Glenasmole Valley SAC [001209] [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [7220] Petrifying springs with tufa formation (*Cratoneurion*) NPWS (2018) *Conservation objectives for Glenasmole Valley SAC [001209*]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.	Located c. 8.3km south-east of the Proposed Development
Wicklow Mountains SAC [002122] [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3160] Natural dystrophic lakes and ponds [4010] Northern Atlantic wet heaths with *Erica tetralix* [4030] European dry heaths [4060] Alpine and Boreal heaths [6130] *Calaminarian* grasslands of the *Violetalia calaminariae* [6230] Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [7130] Blanket bogs (* if active bog) [8110] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8210] Calcareous rocky slopes with chasmophytic vegetation [8220] Siliceous rocky slopes with chasmophytic vegetation [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [1355] *Lutra lutra* (Otter) NPWS (2017) *Conservation Objectives: Wicklow Mountains SAC 002122. Version* 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located c. 10km south-east of the Proposed Development
Red Bog, Kildare SAC [000397] [7140] Transition mires and quaking bogs NPWS (2019) *Conservation Objectives: Red Bog, Kildare SAC 000397*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	Located c. 14.2km south of the Proposed Development
South Dublin Bay SAC [000210] [1140] Mudflats and sandflats not covered by seawater at low tide [1210] Annual vegetation of drift lines [1310] *Salicornia* and other annuals colonising mud and sand [2110] Embryonic shifting dunes NPWS (2013b) *Conservation Objectives: South Dublin Bay SAC 000210*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 15.6km east of the Proposed Development
North Dublin Bay SAC [000206] [1140] Mudflats and sandflats not covered by seawater at low tide [1210] Annual vegetation of drift lines [1310] *Salicornia* and other annuals colonising mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1395] Petalwort *Petalophyllum ralfsii* [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [2110] Embryonic shifting dunes [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2190] Humid dune slacks NPWS (2013) *Conservation Objectives: North Dublin Bay SAC 000206*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 18.2km east of the Proposed Development

Malahide Estuary SAC [000205] [1140] Mudflats and sandflats not covered by seawater at low tide [1310] Salicornia and other annuals colonising mud and sand [1320] Spartina swards (*Spartinion maritimae*) [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)* NPWS (2013) *Conservation Objectives: Malahide Estuary SAC 000205*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 22.9km south-east of the Proposed Development
Baldoyle Bay SAC [000199] [1140] Mudflats and sandflats not covered by seawater at low tide [1310] Salicornia and other annuals colonizing mud and sand [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1410] Mediterranean salt meadows (*Juncetalia maritimi*) NPWS (2012) *Conservation Objectives: Baldoyle Bay SAC 000199*. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 22.5km north-east of the Proposed Development
Howth Head SAC [000202] [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts [4030] European dry heaths NPWS (2016) *Conservation Objectives: Howth Head SAC 000202*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located c. 24km north-east of the Proposed Development
Rockabill to Dalkey Island SAC [003000] [1170] Reefs [1351] Harbour porpoise *Phocoena phocoena* NPWS (2013) *Conservation Objectives: Rockabill to Dalkey Island SAC 003000*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 23.8km east of the Proposed Development
Ireland's Eye SAC [002193] [1220] Perennial vegetation of stony banks [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts NPWS (2017) *Conservation Objectives: Ireland's Eye SAC 002193*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.	Located c. 27km north-east of the Proposed Development
Ballyman Glen SAC [000713] [7220] Petrifying springs with tufa formation (*Cratoneurion*) [7230] Alkaline fens NPWS (2019) *Conservation Objectives: Ballyman Glen SAC 000713*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.	Located c. 22.3km south-east of the Proposed Development

Special Protection Area (SPA)	
Wicklow Mountains SPA [004040] [A098] Merlin *Falco columbarius* [A103] Peregrine *Falco peregrinus* NPWS (2018) *Conservation objectives for Wicklow Mountains SPA [004040].* Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.	Located c. 13.1km south-east of the Proposed Development
South Dublin Bay and River Tolka Estuary SPA [004024] [A046] Light-bellied Brent Goose *Branta bernicla hrota* [A130] Oystercatcher *Haematopus ostralegus* [A137] Ringed Plover *Charadrius hiaticula* [A141] Grey Plover *Pluvialis squatarola* [A143] Knot *Calidris canutus* [A144] Sanderling *Calidris alba* [A149] Dunlin *Calidris alpina* [A157] Bar-tailed Godwit *Limosa lapponica* [A162] Redshank *Tringa totanus* [A179] Black-headed Gull *Croicocephalus ridibundus* [A192] Roseate Tern *Sterna dougallii* [A193] Common Tern *Sterna hirundo* [A194] Arctic Tern *Sterna paradisaea* [A999] Wetland and Waterbirds NPWS (2015) *Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 15.2km east of the Proposed Development site
North Bull Island SPA [004006] [A046] Light-bellied Brent Goose *Branta bernicla hrota* [A048] Shelduck *Tadorna tadorna* [A052] Teal *Anas crecca* [A054] Pintail *Anas acuta* [A056] Shoveler *Anas clypeata* [A130] Oystercatcher *Haematopus ostralegus* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A143] Knot *Calidris canutus* [A144] Sanderling *Calidris alba* [A149] Dunlin *Calidris alpina* [A156] Black-tailed Godwit *Limosa limosa* [A157] Bar-tailed Godwit *Limosa lapponica* [A160] Curlew *Numenius arquata* [A162] Redshank *Tringa totanus* [A169] Turnstone *Arenaria interpres* [A179] Black-headed Gull *Croicocephalus ridibundus* [A999] Wetlands & Waterbirds NPWS (2015) *Conservation Objectives: North Bull Island SPA 004006*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 18.2km east of the Proposed Development site
Malahide Estuary SPA [004025] [A005] Great Crested Grebe *Podiceps cristatus* [A046] Brent Goose *Branta bernicla hrota* [A048] Shelduck *Tadorna tadorna* [A054] Pintail *Anas acuta* [A067] Goldeneye *Bucephala clangula* [A069] Red-breasted Merganser *Mergus serrator* [A130] Oystercatcher *Haematopus ostralegus* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A143] Knot *Calidris canutus* [A149] Dunlin *Calidris alpina alpina* [A156] Black-tailed Godwit *Limosa limosa* [A157] Bar-tailed Godwit *Limosa lapponica* [A162] Redshank *Tringa totanus* [A999] Wetlands NPWS (2013) *Conservation Objectives: Malahide Estuary SPA 004025*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.	Located c. 22.9km north-east of the Proposed Development
Ireland's Eye SPA [004117] [A017] Cormorant *Phalacrocorax carbo* [A184] Herring Gull *Larus argentatus* [A188] Kittiwake *Rissa tridactyla* [A199] Guillemot *Uria aalge* [A200] Razorbill *Alca torda* NPWS (2018) *Conservation objectives for Ireland's Eye SPA [004117].* Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.	Located c. 26.7km north-east of the Proposed Development

Howth Head Coast SPA [004113] [A188] Kittiwake *Rissa tridactyla* NPWS (2018) *Conservation objectives for Howth Head Coast SPA [004113].* Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.	Located c. 26.6km north-east of the Proposed Development

National Qualifying features of national designated sites in the vicinity of the Proposed Development and reasons for their designation

National Site Name [Code] and its Reasons for Designation	Location Relative to the Proposed Development Site
Grand Canal pNHA [002104] Designated for the diversity of the habitats within it. Opposite-leaved pondweed *Groenlandia densa*, which is a protected flora species (Flora Protection Order (2015) has been recorded from within the Grand Canal pNHA. Signs of otter *Lutra lutra* and smooth newt *Lissotriton vulgaris* are also found along the Grand Canal pNHA, both of which are protected species.	Located c. 1km to the north of the Proposed Development site.
South Dublin Bay pNHA [000210] This site is designated for the same features for which the South Dublin Bay SAC and the South Dublin Bay and River Tolka Estuary SPA have been designated (See Table 7.4 above).	Located c. 15.6km east of the Proposed Development site.
North Dublin Bay pNHA [000206] This site is designated for the same features for which the North Dublin Bay SAC and the North Bull Island SPA have been designated (See Table 7.4 above).	Located c. 14.9km east of the Proposed Development site.
Dolphins, Dublin Docks pNHA [000201] This site is designated for breeding common tern *Sterna hirundo* and Arctic tern *Sterna paradisaea* on a man-made structure in Dublin Bay	Located c. 16.8km east of the Proposed Development site.

Appendix C.4 Flora species list

Improved agricultural grassland (GA1)

Common Name	Scientific Name
Annual meadow grass	*Poa annua*
Germander speedwell	*Veronica chamaedrys*
White clover	*Trifolium repens*
Meadow Foxtail	*Alopecurus pratensis*
Meadow Vetchling	*Lathyrus pratensis*
Perennial Rye	*Lolium perenne*

Improved amenity grassland (GA2)

Common Name	Scientific Name
Springy turf-moss	*Rhytidiadelphus squarrosus*
Curly-leaved dock	*Rumex crispus*
Bush vetch	*Vicia sepium*
Creeping buttercup	*Ranunculus repens*
Lord's and lady's	*Arum maculatum*
Ground-ivy	*Glechoma hederacea*
Cowslip	*Primula veris*
Ribwort plantain	*Plantago lanceolata*
Creeping thistle	*Cirsium arvense*
Common hogweed	*Heracleum sphondylium*

Dry Meadows and Grassy Verges (GS2)

Common Name	Scientific Name
Brambles	*Rubus fructicosus agg.*
Broad-leaved Dock	*Rumex obtusifolius*
Bush Vetch	*Vicia sepium*
Common Hogweed	*Heracleum sphondylium*
Selfheal	*Prunella vulgaris*
Creeping Buttercup	*Ranunculus repens*
Creeping Thistle	*Cirsium arvense*
Lord's and Lady's	*Arum maculatum*
Ground-ivy	*Glechoma hederacea*
Cowslip	*Primula veris*
Meadowsweet	*Filipendula ulmaria*
Meadow Foxtail	*Alopecurus pratensis*
Meadow Vetchling	*Lathyrus pratensis*
Perennial Rye	*Lolium perenne*
Ribwort Plantain	*Plantago lanceolata*
White Clover	*Trifolium repens*
Yorkshire Fog	*Holcus lanatus*

Treelines (WL2)

Common Name	Scientific Name
Elder	*Sambucus nigra*
Hawthorn	*Crataegus monogyna*
Ash	*Fraxinus exelsior*
Blackthorn	*Prunus spinosa*
Sycamore	*Acer pseudoplatanus*
Rose species	*Rosa sp.*
Silver Birch	*Betula pendula*
Elm	*Ulmus sp.*
Bramble	*Rubus fruiticosus agg.*
Holly	*Ilex aquilifolium*
Leyland Cypress	*Cuppressocyparis leylandii*
Cleavers	*Galium aparine*
Spear thistle	*Cirsium vulgare*
Ground-ivy	*Glechoma hederacea*
Willowherb sp.	*Epilobium sp.*
Lord's and Lady's	*Arum maculatum*
Common Nettle	*Urtica dioecia*
Creeping buttercup	*Ranunculus repens*
Herb Robert	*Geranium robertianum*
Common hogweed	*Heracleum sphondylium*
Broad-leaved dock	*Rumex obtusifolius*
Germander speedwell	*Veronica chamaedrys*
Lesser burdock	*Arctium minus*
Timothy	*Phleum pratensis*
Ivy	*Hedera helix*
Winter heliotrope	*Petasites fragrans*

Drainage Ditches (FW4)

Common Name	Scientific Name
Fool's watercress	*Apium nodiflorum*

Recolonising Bare Ground (ED3)

Common Name	Scientific Name
Springy turf-moss	*Rhytidiadelphus squarrosus*
Fescue	*Festuca sp.*
Selfheal	*Prunella vulgaris*
Creeping buttercup	*Ranunculus repens*
Violet species	*Viola sp.*
Common daisy	*Bellis perennis*
Mouse-ear chickweed	*Cerastium fontanum*
Hawkbit species	*Leontodon sp.*
Creeping thistle	*Cirsium arvense*
Common nettle	*Urtica dioecia*
Ground-ivy	*Glechoma hederacea*

Appendix C.5 Records of rare/ protected species within 10km or 2km of the Proposed Development site

Common Name	Scientific Name	Protection[9]	Red-Listing Status[10]
Plants			
Hairy Violet	*Viola hirta*	FPO	Vulnerable
Hairy St John's Wort	Hairy St John's Wort	Hairy St John's Wort	Hairy St John's Wort
Amphibians			
Common Frog	*Rana temporaria*	HD V, WA	Least Concern
Smooth Newt	*Lissotriton vulgaris*	WA	Least Concern
Mammals			
Red Deer	*Cervus elaphus*	WA	Least Concern
Sika Deer	*Cervus nippom*	WA	Not Assessed
Otter	*Lutra lutra*	HD II IV, WA	Near Threatened
Daubenton's Bat	*Myotis daubentonii*	HD IV, WA	Least Concern
Leisler's Bat	*Nyctalus leisleri*	HD IV, WA	Near Threatened
Commmon Pipistrelle	*Pipistrellus pipistrellus*	HD IV, WA	Least Concern
Soprano Pipistrelle	*Pipistrellus pygmaeus*	HD IV, WA	Least Concern
Brown Long-eared Bat	*Plecotus auritus*	HD IV, WA	Least Concern
Pygmy Shrew	*Sorex minutus*	WA	Least Concern
Birds			
Eurasian Sparrowhawk	*Accipiter nisus*	WA	Amber Listed
Sky Lark	*Alauda arvensis*	BD II, WA	Amber Listed
Common Kingfisher	*Alcedo atthis*	BD I, WA	Amber Listed
Northern Pintail	*Anas acuta*	BD II III, WA	Red Listed
Eurasian Teal	*Anas crecca*	BD II III, WA	Amber Listed
Eurasian Wigeon	*Anas penelope*	BD II III, WA	Red Listed
Meadow Pipit	*Anthus pratensis*	WA	Red Listed
Swift	*Apus apus*	WA	Amber Listed
Tufted Duck	*Aythya fuligula*	BD II III, WA	Red Listed
Common Linnet	*Carduelis cannabina*	WA	Amber Listed
Corn Crake	*Crex crex*	BD I, WA	Red Listed
Mute Swan	*Cygnus olor*	WA	Amber Listed

[9] HDII/IV/V = Habitats Directive Annexes II/IV/V; FPO = Flora Protection Order; WA = Wildlife Acts; BD I = Birds Directive Annex I.
[10] Mammal Red-list from Marnell et al., Birds from Birds of Conservation Concern in Ireland (Colhoun & Cummings 2013); Vascular Flora from the Irish Red Data Book 1
Vascular Plants (Curtis & McGough 2005); Fish and Amphibians from King et al., 2011; Non-Marine Molluscs from Byrne et.al, 2009.

APPENDIX D LAND, SOIL, GEOLOGY AND HYDROGEOLOGY

Appendix D.1 NRA criteria for rating the magnitude and significance of impacts at EIA stage (National Roads Authority (NRA, 2009))

Table D.1 Criteria for rating site importance of Geological Features (NRA, 2009)

Magnitude of Impact	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and/or high fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying route is moderate on a local scale	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale Degree or extent of soil contamination is minor on a local scale Volume of peat and/or soft organic soil underlying route is small on a local scale	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Table D.2 Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on soil / geology attribute (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table D.3 Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table D.4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeology Attribute (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

Table D.5 Rating of Significant Environmental Impacts at EIS Stage (NRA, 2009)

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

APPENDIX E HYDROLOGY

Appendix E.1 Criteria for rating Site Attributes - Estimation of Importance of Hydrology Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2- 3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

APPENDIX F NOISE AND VIBRATION

Appendix F.1 Glossary of acoustic terminology

ambient noise The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

background noise The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

broadband Sounds that contain energy distributed across a wide range of frequencies.

dB Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).

dB L_{pA} An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

Hertz (Hz) The unit of sound frequency in cycles per second.

impulsive noise A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

$L_{Aeq,T}$ This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

L_{AFmax} is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).

$L_{Ar,T}$ The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.

L_{AF90} Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AT}(DW) equivalent continuous downwind sound pressure level.

L_{fT}(DW) equivalent continuous downwind octave-band sound pressure level.

L_{day} L_{day} is the average noise level during the daytime period of 07:00hrs to 19:00hrs

L_{night} L_{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.

low frequency noise LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.

noise Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause

actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

noise sensitive location NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

rating level See $L_{Ar,T}$.

sound power level The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where:

$$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$

Where: p is the rms value of sound power in pascals; and
P_0 is 1 pW.

sound pressure level The sound pressure level at a point is defined as:

$$Lp = 20Log\frac{P}{P_0}\text{dB}$$

specific noise level A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq,T}$)'.

tonal Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

$^1/_3$ octave analysis Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

Appendix F.2 Baseline noise monitoring survey

An environmental noise survey has been conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

Survey Details

Dates & Times of Survey

Noise measurements were conducted during typical day and night-time periods. The night-time survey represents the time of night that provides a measure of existing background noise levels during a period where people are attempting to go to sleep or are sleeping. The surveys were conducted during the following periods:

- Daytime – 10:50hrs to 14:40hrs on 9 January 2020, and;
- Night-time – 23:00hrs on 9 January to 01:25hrs on 10 January 2020.

Personnel and Instrumentation

Donal Heavey (AWN) conducted the noise level measurements during all survey periods. The noise measurements were performed using a Brüel & Kjær Type 2250 Sound Level Analyzer (S/N 2818091). Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

Measurement Locations

Figure F.1 details the approximate location of the measurement positions identified below.

Location A Located in the vicinity of the nearest noise sensitive locations to the south west of the development site.

Figure F.1 Location A

Location B Located midway along the southern boundary of the site. The lands to the immediate south are currently being developed with construction ongoing at the time of survey work completed here. This located is chosen to be representative of those noise sensitive locations further south. A review of the planning assessment completed for the development under construction has been completed in order to inform expected levels of noise in the absence of these activities at this location.

Figure F.2 Location B

Location C Located in the vicinity of the nearest residential noise sensitive location to the east of the Proposed Development site.

Plate F.3 Location C

Location D Located in the vicinity of an existing structure associated with the existing pitch and putt course.

Figure F.4 Location D

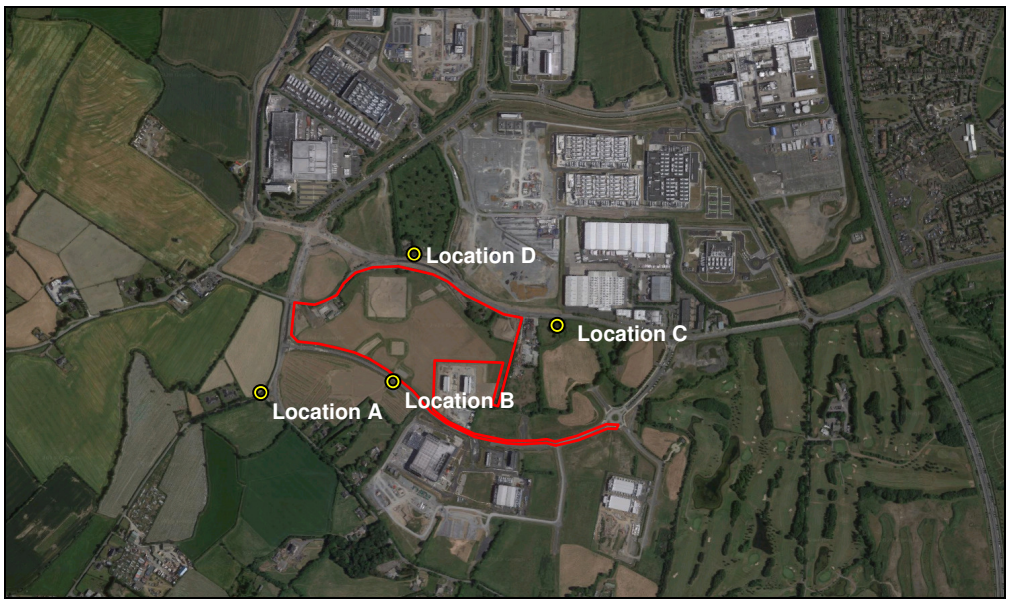


Figure F.5 Noise Survey Locations (Source: Google Maps)

Methodology

Measurements were conducted at the boundary location noted above. Sample periods for the noise measurements were typically 15 minutes. The results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis if required. Survey personnel noted the primary noise sources contributing to noise build-up.

Weather

The weather during the daytime survey periods was dry with wind speeds <3m/s. Temperatures were of the order of 5℃. Cloud cover was minimal (some 20%).

The weather during the night-time survey period was dry with wind speeds <3m/s. Temperatures were of the order of 3℃. Cloud cover was minimal (some 10%).

Survey Results

Location A

The survey results for Location A are given in Table F.1 below.

Table F.1 Summary of Results for Location A

Start Time		Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
		L_{Aeq}	L_{AF10}	L_{AF90}
Daytime	11:48	71	68	53
	12:59	66	69	56
	14:23	63	66	54
Night-time	23:55	44	42	35
	01:09	37	38	35

Ambient daytime noise levels at this location were dominated by the road traffic noise on local roads and to a lesser extent by construction noise from nearby sites. Other noise sources noted included occasional aircraft movements overhead and birdsong. Distant road traffic noise typically dictated background noise levels along with a contribution from distant construction noise. Ambient (i.e. $L_{Aeq,15min}$) levels were in the range of 63 to 71dB with background noise levels in the range of 53 to 56dB.

Night-time noise levels were influenced by distant road traffic movements along with occasional local vehicle movements on the nearby road and wind generated noise on a nearby structure. Ambient noise levels were in the range of 37 to 44dB with background noise levels were the order of 35dB.

Location B

The survey results for Location B are given in Table F.2 below.

Table F.2 Summary of Results for Location B

Start Time		Measured Noise Levels (dB re. 2x10^{-5} Pa)		
		L_{Aeq}	L_{AF10}	L_{AF90}
Daytime	11:31	66	69	61
	12:42	65	67	61
	14:06	64	65	59
Night-time	23:36	45	41	36
	00:51	40	42	39

Ambient daytime noise levels at this location were dominated construction noise and to a lesser extent by traffic movements on local and nearby roads. Other noise sources noted included occasional aircraft movements overhead and birdsong. Construction noise and distant road traffic noise typically dictated background noise levels. Ambient (i.e. $L_{Aeq,15min}$) levels were in the range of 64 to 66dB with background noise levels in the range of 59 to 61dB.

Night-time noise levels were influenced by distant road traffic movements along with occasional local vehicle movements. Background noise levels included distant plant noise from existing operations. Ambient noise levels were in the range of 40 to 45dB with background noise levels were in the range 36 to 39dB.

Location C

The survey results for Location C are given in Table F.3.

Table F.3 Summary of results for Location C

Start Time		Measured Noise Levels (dB re. 2x10^{-5} Pa)		
		L_{Aeq}	L_{AF10}	L_{AF90}
Daytime	10:51	71	76	49
	12:07	71	76	51
	13:25	72	77	54
Night-time	23:00	66	68	39
	00:14	61	57	40

Ambient daytime noise levels at this location were dominated by traffic on the Nangor Road. Other noise sources noted including dogs barking, occasional aircraft movements overhead and construction noise in the distance. Distant road traffic noise typically dictated background noise levels. Ambient (i.e. $L_{Aeq,15min}$) levels were in the range of 71 to 72dB with background noise levels in the range of 49 to 54dB.

Night-time noise levels were influenced by distant road traffic movements along with occasional local vehicle movements. Background noise levels included distant plant noise from existing operations. Ambient noise levels were in the range of 61 to 66dB with background noise levels were in the range 39 to 40dB.

Location D

The survey results for Location D are given in Table F.4.

Table F.4 Summary of results for Location D

Start Time		Measured Noise Levels (dB re. 2x10^{-5} Pa)		
		L_{Aeq}	L_{AF10}	L_{AF90}
Daytime	11:08	72	76	54
	12:24	71	75	47
	13:43	71	76	50
Night-time	23:17	60	59	36
	00:32	60	55	39

Ambient daytime noise levels at this location were dominated by traffic on the Nangor Road. Other noise sources noted including dogs barking, occasional aircraft movements overhead and construction noise in the distance. Distant road traffic noise typically dictated background noise levels. Ambient (i.e. $L_{Aeq,15min}$) levels were in the range of 71 to 72dB with background noise levels in the range of 47 to 54dB.
Night-time noise levels were influenced by distant road traffic movements along with occasional local vehicle movements. Background noise levels included distant plant noise from existing operations. Ambient noise levels were in the order of 60dB with background noise levels were in the range 36 to 39dB.

Appendix F.3 - Noise modelling details & assumptions

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (L_{WA});
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms^{-1} and 5ms^{-1}, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights. The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = LW + Dc - A \qquad \textbf{Eqn. A}$$

Where:

$L_{fT}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to 2x10^{-5}Pa;
L_W is the octave band sound power of the point source;
D_c is the directivity correction for the point source;
A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table F.5 below:

Table F.5 Estimated Accuracy for Broadband Noise of $L_{AT}(DW)$

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.

N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout The general site layout has been obtained from the drawings forwarded by HJL Architects.

Local Area The location of noise sensitive locations has been obtained from a combination of site drawings provided by HJL Architects and others obtained from Ordinance Survey Ireland (OSI).

Heights The heights of buildings on site have been obtained from site drawings forwarded by HJL Architects. Off-site buildings have been assumed to be 8m high for houses with the exception of industrial buildings where a default height of 15m has been assumed.

Contours Site ground contours/heights have been obtained from site drawings forwarded by HJL Architects where available.

The final critical aspect of the noise model development is the inclusion of the various plant noise sources. Details are presented in the following section.

Source Sound Power Data

The noise modelling competed indicates the following limits in relation to various items of plant associated with the overall site development. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise).

Table F.6 L_{wA} levels Utilised in Noise Model

Source	L_{wA} - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Roof Fan Note A	56	59	67	71	69	66	62	62	75
AHU & CRAH Louvres Note B	55	61	55	51	46	44	41	32	54
Condensers	55	63	68	72	72	67	61	52	77
Generator Intake Note C	88	90	82	83	83	80	78	76	94
Generator Rear Note C	88	90	82	83	83	80	78	76	94
Generator Stack Note D	84	77	77	73	69	74	71	71	86
Generator Sides & Roof Note C	82	93	92	94	94	93	88	75	101

Note A Roof exhaust with attenuator – as advised by client.

Note B Per m^2

Note C Assuming generator housing dimensions of 17m (L) x 4m (W) x 4m (H). Data based on CAT data supplied in relation to previous sites.

Note D Additional attenuation due to 20m stack and additional bends assumed.

Note E The following extract from *the "EirGrid Evidence Based Environmental Studies Study 8: Noise – Literature review and evidence-based field study on the noise effects of high voltage transmission development (May 2016)* states the following in relation to noise impacts associated with 110KvA transformer installations:

"The survey on the 110kV substation at Dunfirth indicated that measured noise levels (L_{Aeq}) were less than 40dB(A) at 5m from each of the boundaries of the substation. This is below the WHO night-time free-field threshold limit of 42dB for preventing effects on sleep and well below the WHO daytime threshold limits for serious and moderate annoyance in outdoor living areas (i.e. 55dB and 50dB respectively). Spectral analysis of the data recorded at this site demonstrated that there were no distinct tonal elements to the recorded noise level. To avoid any noise impacts from 110kV substations at sensitive receptors, it is recommended that a minimum distance of 5m is maintained between 110kV substations and the land boundary of any noise sensitive property."

Assuming the proposed substation installation has comparable noise emissions to the 110kV unit discussed above and considering the distance between the 110kV substation and the nearest off site i.e. >250m) noise from this installation is not predicted to be an issue off site.

Considering the above, it is concluded that there will be no significant noise emissions from the operation of the cable installations or substation. Consequently, there is no requirement to assess any operational noise emissions.

It is assumed that the plant parapets will be at least 0.5m higher than the highest dimension of the roof mounted plant.

Figure F.6 presents a 3D render of the developed site noise model for the current proposals.

Figure F.6 Images of Developed Noise Model – View of Site

Modelling Calculation Parameters[11]

Prediction calculations for plant noise have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*. Ground attenuation factors of 1.0 have been assumed. No metrological corrections were assumed for the calculations. The atmospheric attenuation outlined in Table E.7 has been assumed for all calculations.

Table F.7 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (ºC)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

[11] See Appendix 10.5 for further discussion of calculation parameters.

Appendix F.4 Indicative Construction Noise & Vibration Management Plan

This Noise and Vibration Management Plan (NVMP) details a *'Best Practice'* approach to dealing with potential noise and vibration emissions during the construction phase of the development. The Plan should be adopted by all contractors and sub-contractors involved in construction activities on the site. The Site Manager should ensure that adequate instruction is provided to contractors regarding the noise and vibration control measures contained within this document.

The environmental impact assessment (EIA) Report conducted for the construction activity has highlighted that the construction noise and vibration levels can be controlled to within the adopted criteria. However, mitigation measures should be implemented, where necessary, in order to control impacts to nearby sensitive areas within acceptable levels.

Nearby sensitive properties in the vicinity of the Proposed Development are summarised in Figure F.7 below:

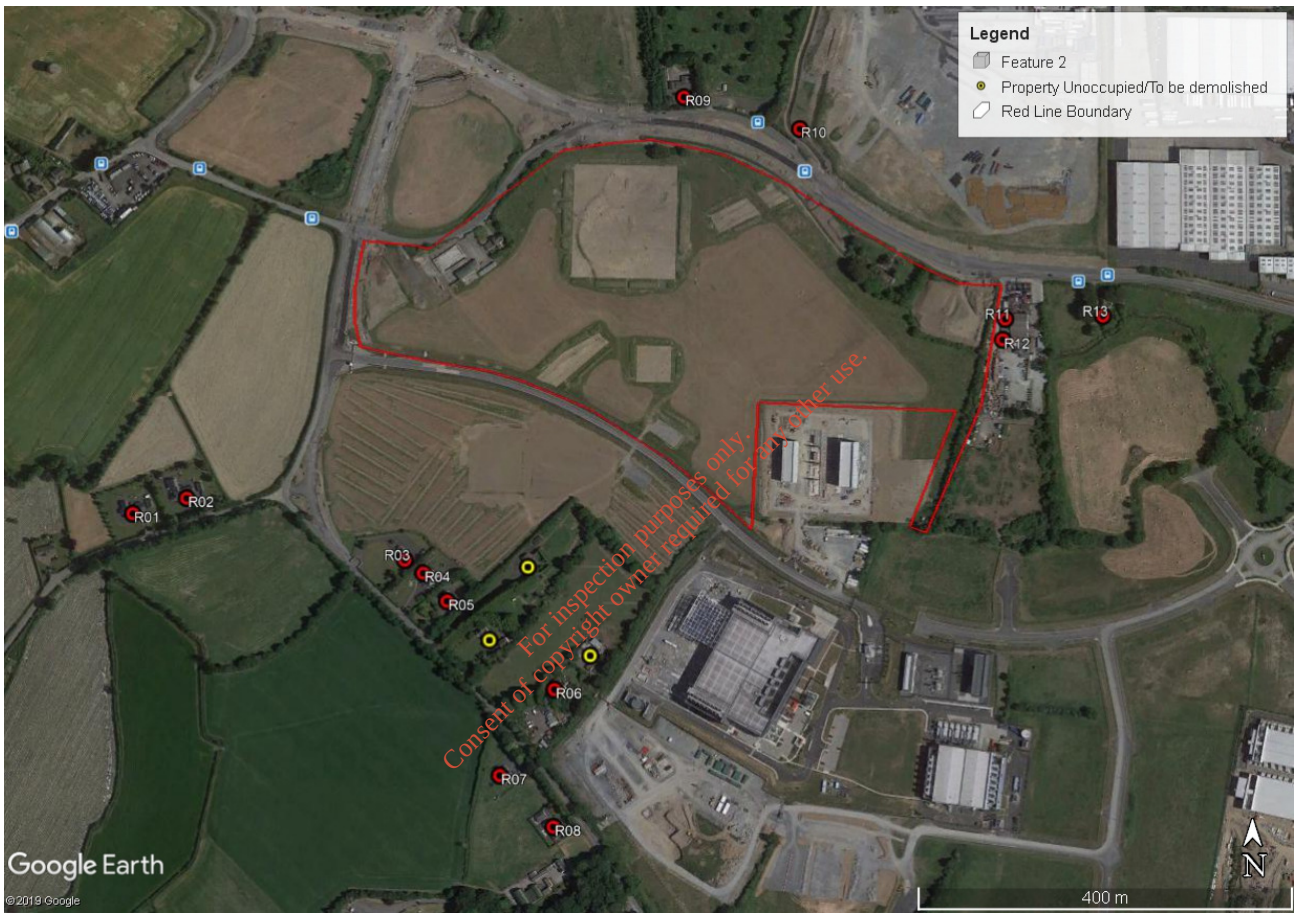


Figure F.7 Sensitive Receptors REPLACE

R01 Located at a private residence to the south west of the proposed site at a distance of some 300m from the site boundary.

R02 Located at a private residence to the south west of the proposed site at a distance of some 250m from the site boundary.

R03 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 220m from the site boundary.

R04 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 230m from the site boundary.

R05 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 250m from the site boundary.

R06 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 270m from the site boundary.

R07 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 375m from the site boundary.

R08 Located at a private residence along the Baldonnel Road, to the south of the site, on the opposite side of the Cyrus One facility under construction, some 380m from the site boundary.

R09 Located at a private residence, adjoining a nearby pitch and putt course on the opposite side of the New Nangor Road, to the north of the site, some 50m from the northern site boundary.

R10 Located at nearby commercial site, on the opposite side of the Old Nangor Road, some 55m from the northern site boundary.

R11/12 Located at nearby commercial site, opposite the eastern boundary of the site.

R13 Located at a private residence located off the Old Nangor Road, to the east of the site some 120m from the eastern site boundary. It is understood this property is abandoned and is unlikely to be reoccupied going forward.

Figure F.7 illustrates three other properties (yellow dots) to the south of the site, on the opposite side of the Cyrus One building (currently under construction). These properties are within the site boundaries of nearby commercial operations and are not occupied and are due for demolition. For the purposes of this assessment these are not considered noise sensitive receptors.

Construction Noise Criteria

As referenced in the EIA Report prepared for the Proposed Development, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[12] which indicates the following criteria and hours of operation.

Table F.8 Construction Noise Limit Values

Days and Times	Noise Levels (dB re. 2x10-5 Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00hrs to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00hrs to 13:00hrs	65	75

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

Construction Vibration Criteria

It is recommended in this EIA Report that vibration from construction activities to off-site residences be limited to the values set out in Table F.9. 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%.

Table F.9 Construction Vibration Limit Values

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

[12] *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

Hours of Work

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays. However, weekday evening works may also be required from time to time.

Weekday evening activities should be significantly reduced and generally only involve internal activities and concrete pouring which will be required during certain phases of the development. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Best Practice Guidelines for the Control of Noise & Vibration

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening;
- hours of work;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise and vibration control measures that will be considered include the selection of suitable plant, enclosures and screens around noise sources, limiting the hours of work and monitoring.

Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that *"as far as reasonably practicable sources of significant noise should be enclosed"*. In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures will also be used to screen operatives using hand tools and will be moved around site as necessary.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. As with Ireland's Environmental Protection Act legislation, we propose that the concept of *"best available techniques not entailing excessive cost "*(BATNEEC) be adopted. Furthermore, proposed noise control techniques should be evaluated in light of their potential effect on occupational safety etc.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced in full. These recommendations will be adopted on site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas. Special care will be necessary when work has to be carried out at night.*
>
> *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.*

Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.

Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.

Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.
Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening
Typically, screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen should be bent around the source. The height of any screen should be such that there is no direct line of sight between the source and the receiver.

BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice screens constructed of materials with a mass per unit of surface area greater than 7 kg/m^2 will give adequate sound insulation performance.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances, materials such as topsoil or aggregate can provide a degree of noise screening if placed between the source and the receiver.

Vibration
The vibration from construction activities will be limited to the values set out in Table 10.4.2. 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%.

Liaison with the Public
The Contractor will provide proactive community relations and will notify the public and sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The Contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

A designated noise liaison should be appointed to site during construction works. Any complaints should be logged and followed up in a prompt fashion. In addition, prior to particularly noisy construction activity, e.g. rock breaking, piling, etc., the site contact should inform the nearest noise sensitive locations of the time and expected duration of the works.

Noise Monitoring
During the construction phase consideration should be given to noise monitoring at the nearest sensitive locations or site boundary.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise* and be located a distance of greater than 3.5m away from any reflective surfaces, e.g. walls, in order to ensure a free-field measurement without any influence from reflected noise sources.

Vibration Monitoring

During the construction phase consideration should be given to vibration monitoring at the nearest sensitive locations.

Vibration monitoring should be conducted in accordance with BS7385-1 (1990) *Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings* or BS6841 (1987) *Guide to measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock*.

The mounting of the transducer to the vibrating structure should comply with BS ISO 5348:1998 *Mechanical vibration and shock – Mechanical mounting of accelerometers*. In summary, the following ideal mounting conditions apply:

- the transducer and its mountings are as rigid as possible;
- the mounting surfaces should be as clean and flat as possible;
- simple symmetric mountings are best, and;
- the mass of the mounting should be small in comparison to that of the structure under test.

In general, the transducer will be fixed to the floor of a building or concrete base on the ground using expansion bolts. In instances where the vibration monitor will be placed outside of a building a flat and level concrete base with dimensions of approximately 1m x 1m x 0.1m will be required.

Appendix F.5 Noise model parameters

Prediction calculations for noise emissions have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*. The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measures in a down wind direction, corresponding to the worst-case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 1.0 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 4m in all instances. For construction noise predictions have been made at a level of 1.6m as these activities will not occur at night.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log (\text{distance from source in meters}) + 11$$

Atmospheric Absorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10°C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Table F.10 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

APPENDIX G AIR QUALITY AND CLIMATE

Appendix G.1 Aermod model

The AERMOD dispersion model has been developed in part by the U.S. Environmental Protection Agency (USEPA, 2004a). The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD with PRIME, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD (precursor to AERMOD with PRIME) performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets (USEPA, 1999).

Due to the proximity to surrounding buildings, the PRIME (Plume Rise Model Enhancements) building downwash algorithm has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered. The PRIME algorithm takes into account the position of the stack relative to the building in calculating building downwash. In the absence of the building, the plume from the stack will rise due to momentum and/or buoyancy forces. Wind streamlines act on the plume leads to the bending over of the plume as it disperses. However, due to the presence of the building, wind streamlines are disrupted leading to a lowering of the plume centreline.

When there are multiple buildings, the building tier leading to the largest cavity height is used to determine building downwash. The cavity height calculation is an empirical formula based on building height, the length scale (which is a factor of building height & width) and the cavity length (which is based on building width, length and height). As the direction of the wind will lead to the identification of differing dominant tiers, calculations are carried out in intervals of 10 degrees.

In PRIME, the nature of the wind streamline disruption as it passes over the dominant building tier is a function of the exact dimensions of the building and the angle at which the wind approaches the building. Once the streamline encounters the zone of influence of the building, two forces act on the plume. Firstly, the disruption caused by the building leads to increased turbulence and enhances horizontal and vertical dispersion. Secondly, the streamline descends in the lee of the building due to the reduced pressure and drags the plume (or part of) nearer to the ground, leading to higher ground level concentrations. The model calculates the descent of the plume as a function of the building shape and, using a numerical plume rise model, calculates the change in the plume centreline location with distance downwind.

The immediate zone in the lee of the building is termed the cavity or near wake and is characterised by high intensity turbulence and an area of uniform low pressure. Plume mass captured by the cavity region is re-emitted to the far wake as a ground-level volume source. The volume source is located at the base of the lee wall of the building, but is only evaluated near the end of the near wake and beyond. In this region, the disruption caused by the building downwash gradually fades with distance to ambient values downwind of the building.

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3 (USEPA, 2004a, 2009). ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height (USEPA, 2004a, 2009). The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also has the capability of modelling both unstable (convective) conditions and stable (inversion) conditions. The stability of the atmosphere is defined by the sign of the sensible heat flux. Where the sensible heat flux is positive, the atmosphere is unstable whereas when the sensible heat flux is negative the atmosphere is defined as stable. The sensible heat flux is dependent on the net radiation and the available surface moisture (Bowen Ratio). Under stable (inversion) conditions, AERMOD has specific algorithms to account for plume rise under stable conditions, mechanical mixing heights under stable conditions and vertical and lateral dispersion in the stable boundary layer.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

Appendix G.2 Description of Aermet

AERMOD incorporates a meteorological pre-processor AERMET PRO (USEPA 2004b). AERMET PRO allows AERMOD to account for changes in the plume behaviour with height. AERMET PRO calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET PRO meteorological pre-processor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET PRO for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET PRO calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, water, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the location of the meteorological station in line with USEPA recommendations (USEPA 2005) for albedo and Bowen ratio with a 1km geometric determination undertaken for the surface roughness. In relation to wind direction, a minimum sector arc of 30 degrees is recommended.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on geometric mean of the inverse distance area-weighted land use within the sector, by using the eight land use categories outlined by the USEPA. The area-weighted surface roughness length derived from the land use classification within a radius of 1km from Casement Aerodrome is shown in
Table G.*1*.

Table G.1 Surface Roughness based on an inverse distance area-weighted average of the land use within a 1km radius of Casement Aerodrome.

Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
0-360	100% Grassland	0.050	0.100	0.010	0.010

Note 1: Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983)). Thus for the current location autumn more accurately defines "winter" conditions at the proposed facility.

Albedo

Noon-time Albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. The area-weighted arithmetic mean albedo derived from the land use classification over a 10km x 10km area centred on Casement Aerodrome is shown in Table G.2.

Table G.2 Albedo based on an area-weighted arithmetic mean of the land use over a 10km x 10km area centred on Casement Aerodrome.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note1]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.155	0.180	0.187	0.187

Note 1: For the current location autumn more accurately defines "winter" conditions at the proposed facility.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. The area-weighted geometric mean Bowen ratio derived from the land use classification over a 10km x 10km area centered on Casement Aerodrome is shown in
Table G.*3*.

Table G.3 Bowen ratio based on an area-weighted geometric mean of the land use over a 10km x 10km area centred on Casement Aerodrome.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note1]
0.5% Water, 30% Urban, 0.5% Coniferous Forest 38% Grassland, 19% Cultivated Land	0.549	1.06	1.202	1.202

Note 1: For the current location autumn more accurately defines "winter" conditions at the proposed facility.

APPENDIX H LANDSCAPE AND VISUAL IMPACT

Appendix H.1 Landscape masterplan (not to scale)

APPENDIX I - ARCHAEOLOGY

Appendix I.1 RMP/SMR sites within the surrounding area

SMR No.	DU021-108
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Ballybane
Parish	Clondalkin
Barony	Uppercross
I.T.M.	703059/730984
Classification	Concentric enclosure
Dist. From Development	Within Proposed Development area
Description	Not indicated on any OS map a large concentric enclosure is visible as a crop-mark on an aerial photo. A second enclosure (DU021-109) is visible to the SW (now fully excavated).
Reference	www.archaeology.ie/ SMR file

SMR No.	DU021-109
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Ballybane
Parish	Clondalkin
Barony	Uppercross
I.T.M.	702937/730713
Classification	Enclosure
Dist. From Development	Immediately south
Description	Not indicated on any OS map this enclosure is as a crop-mark on an aerial photo. A second larger enclosure (DU021-108) is visible to the NE (now fully excavated).
Reference	www.archaeology.ie/ SMR file

SMR No.	DU021-112
RMP Status	Scheduled for inclusion in the next revision of the RMP
Townland	Kilmactalway
Parish	Kilmactalway
Barony	Newcastle
I.T.M.	702445/730450
Classification	Enclosure
Dist. From Development	c. 500m southwest of the Proposed Development area
Description	Two concentric enclosures (ext. diam 60.65m N-S) are visible as a crop mark on an aerial photograph (SMR file; pers. comm. Tom Condit, 11 March 2015). The landscape setting is a tillage field in flat terrain with extensive views in all directions.
Reference	www.archaeology.ie/ SMR file

Appendix I.2 Architectural heritage sites within the surrounding area

RPS No.	n/a
NIAH No.	11208016
Townland	Milltown
Parish	Kilmactalway
Barony	Newcastle
I.T.M.	702520/731042
Classification	House
Dist. From Development	c. 280m west
Description	Description Formerly detached four-bay two-storey former house, c.1790, in use as public house. Roughcast rendered walls with parallel render quoins. Timber casement windows. Timber door with iron fittings. Pitched slate roof with single rendered chimney stack. Series of nineteenth- and twentieth-century extensions to south and west. Appraisal This site has long been in use as a public house as shown by the extensions surrounding the original modest rural house. Its presence gives a focus to this important and formerly more developed junction.
Reference	NIAH South County Dublin

RPS No.	n/a
NIAH No.	11208006
Townland	Milltown
Parish	Kilmactalway
Barony	Newcastle
I.T.M.	702446/730989
Classification	Outbuilding
Dist. From Development	c. 344m west
Description	Description Detached two-storey farm outbuilding, c.1850, with two-bay gable ends. Rendered walls. Blind wall to street with chamfered corners. Timber sash and casement windows. Corrugated aluminium pitched roof. Adjoining rubble stone walls of demolished outbuildings to south-east and ruinous cottages to north-east. Appraisal The chamfered corners of this outbuilding indicate the volume of horse-drawn traffic originally passing into the farm complex. Such buildings following the road line sheltered the farm yard and were a characteristic feature of Irish agriculture. This farm was associated with the now-demolished Milltown House.
Reference	NIAH South County Dublin

RPS No.	155
NIAH No.	11208015
Townland	Milltown
Parish	Kilmactalway
Barony	Newcastle
I.T.M.	702446/731071
Classification	Farm house
Dist. From Development	c. 357m west
Description	Description Detached four-bay two-storey farm house, c.1760, with attached outbuildings. Rendered rubble stone walls. Glazed timber door in gabled porch. Timber sash windows. Some openings blocked. Possible traces of carriage arch to central bay. Pitched slate roof with two rendered chimney stacks. House possibly originally single-storey. Adjoining outbuildings to north with hayloft, and enlarged openings inserted recently. Partial tubular iron sunburst gate. Original fir tree stand to south. Appraisal A fine example of an eighteenth-century farm cottage and barn, demonstrating a classic sequence of vernacular evolution. Retains many period features.
Reference	NIAH South County Dublin/ South Dublin County Development Plan 2016–2022

Appendix I.3 Legislation protecting the Archaeological resource

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Culture, Heritage and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the Proposed Development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989,* Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the Proposed Development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the Proposed Development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

South Dublin County Council Development Plan, 2016–202

It is the policy of the Council to manage development in a manner that protects and conserves the Archaeological Heritage of the County and avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest.

HCL2 Objective 1:
To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.

HCL2 Objective 2:
To ensure that development is designed to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.

HCL2 Objective 3:
To protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately.

HCL2 Objective 4:
To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.

HCL2 Objective 5:
To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.

Appendix I.4 Legislation Protecting the Architectural Resource

The main laws protecting the built heritage are the *Architectural Heritage (National Inventory) and National Monuments (Miscellaneous Provisions) Act 1999* and the *Local Government (Planning and Development) Acts 1963–1999*, which has now been superseded by the *Planning and Development Act, 2000*. The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The background to this legislation derives from Article 2 of the 1985 Convention for the Protection of Architectural Heritage (Granada Convention). This states that:

For the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member state will undertake to maintain inventories of that architectural heritage.

The National Inventory of Architectural Heritage (NIAH) was established in 1990 to fulfil Ireland's obligation under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architecture of Ireland (NIAH Handbook 2005:2). As inclusion in the inventory does not provide statutory protection, the survey information is used in conjunction with the *Architectural Heritage Protection Guidelines for Planning Authorities* to advise local authorities on compilation of a Record of Protected Structures as required by the *Planning and Development Act, 2000*.

Protection Under the Record of Protected Structures and County Development Plan
Structures of architectural, cultural, social, scientific, historical, technical or archaeological interest can be protected under the Planning and Development Act, 2000, where the conditions relating to the protection of the architectural heritage are set out in Part IV of the act. This act superseded the Local Government (Planning and Development) Act, 1999, and came into force on 1st January 2000.

The act provides for the inclusion of Protected Structures into the planning authorities' development plans and sets out statutory regulations regarding works affecting such structures. Under new legislation, no distinction is made between buildings formerly classified under development plans as List 1 and List 2. Such buildings are now all regarded as 'Protected Structures' and enjoy equal statutory protection. Under the act the entire structure is protected, including a structure's interior, exterior, attendant grounds and also any structures within the attendant grounds.

The act defines a Protected Structure as (a) a structure, or (b) a specified part of a structure which is included in a Record of Protected Structures (RPS), and, where that record so indicates, includes any specified feature which is in the attendant grounds of the structure and which would not otherwise be included in this definition. Protection of the structure, or part thereof, includes conservation, preservation, and improvement compatible with maintaining its character and interest. Part IV of the act deals with architectural heritage, and Section 57 deals specifically with works affecting the character of Protected Structures or proposed Protected Structures and states that no works should materially affect the character of the structure or any element of the structure that contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The act does not provide specific criteria for assigning a special interest to a structure. However, the National Inventory of Architectural Heritage (NIAH) offers guidelines to its field workers as to how to designate a building with a special interest, which are not mutually exclusive. This offers guidance by example rather than by definition:

Archaeological
It is to be noted that the NIAH is biased towards post-1700 structures. Structures that have archaeological features may be recorded, providing the archaeological features are incorporated within post-1700 elements. Industrial fabric is considered to have technical significance, and should only be attributed archaeological significance if the structure has pre-1700 features.

Architectural
A structure may be considered of special architectural interest under the following criteria:

- *Good quality or well executed architectural design*
- *The work of a known and distinguished architect, engineer, designer, craftsman*
- *A structure that makes a positive contribution to a setting, such as a streetscape or rural setting*
- *Modest or vernacular structures may be considered to be of architectural interest, as they are part of the history of the built heritage of Ireland.*
- *Well-designed decorative features, externally and/or internally*

Historical
A structure may be considered of special historical interest under the following criteria:

- *A significant historical event associated with the structure*
- *An association with a significant historical figure*
- *Has a known interesting and/or unusual change of use, e.g. a former workhouse now in use as a hotel*
- *A memorial to a historical event.*

Technical
A structure may be considered of special technical interest under the following criteria:

- *Incorporates building materials of particular interest, i.e. the materials or the technology used for construction*
- *It is the work of a known or distinguished engineer*
- *Incorporates innovative engineering design, e.g. bridges, canals or mill weirs*
- *A structure which has an architectural interest may also merit a technical interest due to the structural techniques used in its construction, e.g. a curvilinear glasshouse, early use of concrete, cast-iron prefabrication.*
- *Mechanical fixtures relating to a structure may be considered of technical significance.*

Cultural
A structure may be considered of special cultural interest under the following criteria:

- *An association with a known fictitious character or event, e.g. Sandycove Martello Tower, which featured in Ulysses.*
- *Other structure that illustrate the development of society, such as early schoolhouses, swimming baths or printworks.*

Scientific
A structure may be considered of special scientific interest under the following criteria:

- *A structure or place which is considered to be an extraordinary or pioneering scientific or technical achievement in the Irish context, e.g. Mizen Head Bridge, Birr Telescope.*

Social
A structure may be considered of special social interest under the following criteria:

- *A focal point of spiritual, political, national or other cultural sentiment to a group of people, e.g. a place of worship, a meeting point, assembly rooms.*
- *Developed or constructed by a community or organisation, e.g. the construction of the railways or the building of a church through the patronage of the local community*
- *Illustrates a particular lifestyle, philosophy, or social condition of the past, e.g. the hierarchical accommodation in a country house, philanthropic housing, vernacular structures.*

Artistic
A structure may be considered of special artistic interest under the following criteria:

- *Work of a skilled craftsman or artist, e.g. plasterwork, wrought-iron work, carved elements or details, stained glass, stations of the cross.*
- *Well-designed mass-produced structures or elements may also be considered of artistic interest.*

(From the NIAH Handbook 2003 & 2005 pages 15–20)

The Local Authority has the power to order conservation and restoration works to be undertaken by the owner of the protected structure if it considers the building to need repair. Similarly, an owner or developer must make a written request to the Local Authority to carry out any works on a protected structure and its environs, which will be reviewed within three months of application. Failure to do so may result in prosecution.

South Dublin County Council Development Plan, 2016–2022

It is the policy of the Council to conserve and protect buildings, structures and sites contained in the Record of Protected Structures and to carefully consider any proposals for development that would affect the special character or appearance of a Protected Structure including its historic curtilage, both directly and indirectly.

HCL3 Objective 1:
To ensure the protection of all structures (or parts of structures) and the immediate surroundings including the curtilage and attendant grounds of structures contained in the Record of Protected Structures.

HCL3 Objective 2:
To ensure that all development proposals that affect a Protected Structure and its setting including proposals to extend, alter or refurbish any Protected Structure are sympathetic to its special character and integrity and are appropriate in terms of architectural treatment, character, scale and form. All such proposals shall be consistent with the Architectural Heritage Guidelines for Planning Authorities, DAHG (2011) including the principles of conservation.

HCL3 Objective 3:
To address dereliction and encourage the rehabilitation, renovation, appropriate use and re-use of Protected Structures.

HCL3 Objective 4:
To prevent demolition and inappropriate alteration of Protected Structures.

It is the policy of the Council to preserve and enhance the historic character and visual setting of Architectural Conservation Areas and to carefully consider any proposals for development that would affect the special value of such areas.

HCL4 Objective 1:
To avoid the removal of structures and distinctive features that positively contribute to the character of Architectural Conservation Areas including buildings, building features, shop fronts, boundary treatments, street furniture, landscaping and paving.

HCL4 Objective 2:
To ensure that new development, including infill development, extensions and renovation works within or adjacent to an Architectural Conservation Area (ACA) preserves or enhances the special character and visual setting of the ACA including vistas, streetscapes and roofscapes.

HCL4 Objective 3:
To address dereliction and promote appropriate and sensitive reuse and rehabilitation of buildings, building features and sites within Architectural Conservation Areas.

HCL4 Objective 4:
To reduce and prevent visual and urban clutter within Architectural Conservation Areas including, where appropriate, traffic management structures, utility structures and all signage.

HCL4 Objective 5:
To support public realm improvements proposed within Architectural Conservation Areas under South Dublin County Council's Villages Initiative subject to compliance with the Architectural Heritage Protection Guidelines for Planning Authorities (DAHG, 2011).

HCL4 SLO 1:
To secure the preservation and enhancement of the Palmerstown Lower (Mill Complex) ACA, to actively promote the restoration of industrial heritage including the former mills, mill races and other buildings on Mill Lane and to explore their use for residential, tourism/outdoor recreation and/or commercial purposes.

It is the policy of the Council to encourage the preservation of older features, buildings, and groups of structures that are of historic character including 19th Century and early to mid-20th Century houses, housing estates and streetscapes.

HCL5 Objective 1:
To retain existing houses that, while not listed as Protected Structures, are considered to contribute to historic character, local character, visual setting, rural amenity or streetscape value within the County.

HCL5 Objective 2:
To ensure that the redevelopment of older buildings, including extensions and renovation works do not compromise or erode the architectural interest, character or visual setting of such buildings including surrounding housing estates or streetscapes.

HCL5 Objective 3:
To encourage the retention, rehabilitation, renovation and re-use of older buildings and their original features where such buildings and features contribute to the visual setting, collective interest or character of the surrounding area.

HCL5 Objective 4:
To ensure that infill development is sympathetic to the architectural interest, character and visual amenity of the area.

Appendix I.5 Impact Assessment and the Cultural Heritage Resource

Potential Impacts on Archaeological and Historical Remains

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2017). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- *Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.*
- *Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.*
- *Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.*
- *Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.*
- *Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.*
- *Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.*
- *Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.*

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- *The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;*
- *Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;*
- *Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.*

Appendix I.6 Mitigation Measures and the Cultural Heritage Resource

Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the Proposed Development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

Archaeological Resource

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

Architectural Resource

The architectural resource is generally subject to a greater degree of change than archaeological sites, as structures may survive for many years but their usage may change continually. This can be reflected in the fabric of the building, with the addition and removal of doors, windows and extensions. Due to their often more visible presence within the landscape than archaeological sites, the removal of such structures can sometimes leave a discernable 'gap' with the cultural identity of a population. However, a number of mitigation measures are available to ensure a record is made of any structure that is deemed to be of special interest, which may be removed or altered as part of a Proposed Development.

Conservation Assessment consists of a detailed study of the history of a building and can include the surveying of elevations to define the exact condition of the structure. These assessments are carried out by Conservation Architects and would commonly be carried out in association with proposed alterations or renovations on a Recorded Structure.

Building Survey may involve making an accurate record of elevations (internal and external), internal floor plans and external sections. This is carried out using an EDM (Electronic Distance Measurer) and GPS

technology to create scaled drawings that provide a full record of the appearance of a building at the time of the survey.

Historic Building Assessment is generally specific to one building, which may have historic significance, but is not a Protected Structure or listed within the NIAH. A full historical background for the structure is researched and the site is visited to assess the standing remains and make a record of any architectural features of special interest. These assessments can also be carried out in conjunction with a building survey.

Written and Photographic record provides a basic record of features such as stone walls, which may have a small amount of cultural heritage importance and are recorded for prosperity. Dimensions of the feature are recorded with a written description and photographs as well as some cartographic reference, which may help to date a feature.

APPENDIX J OUTLINE CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLAN

AWN Consulting Ltd. (AWN) has prepared this outline Construction and Demolition (C&D) Waste Management Plan (WMP) for the demolition of an existing residential building on site, the construction of 3 no. data centres and associated ancillary development OF 80,269sqm on a primarily greenfield site (area of c. 16.9 hectares) in Grange Castle, Dublin 22.

The purpose of this C&D WMP is to provide information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with current legal and industry standards including the *Waste Management Acts 1996-2011* and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015-2021* [4]. In particular, this C&D WMP aims to ensure maximum recycling, re-use and recovery of waste with diversion from landfill, where possible. It also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources).

In the preparation of the C&D WMP consideration has been given to the requirements of National and Regional waste policy, legislation and other guidelines (referred to in Section 2.0). However, in determining the structure and content of the document, the following two publications have been referenced in particular:

- Department of the Environment, Heritage and Local Government (DoEHLG), *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006) [5].
- FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers,* (2002) [6].

These Guidance Documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

OVERVIEW OF WASTE MANAGEMENT IN IRELAND

National Level

The Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [7] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland [7]. The target for C&D waste in this Strategy was to recycle at least 50% of C&D waste within a five-year period (by 2003), with a progressive increase to at least 82% over fifteen years (by 2013) [7].

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the wastE sector of the already established Forum for the Construction Industry, released a report titled *Recycling of Construction and Demolition Waste* [8] concerning the development and implementation of a voluntary construction industry programme to meet the governments objectives for the recovery of construction and demolition waste.

A number of additional National and Regional Waste Policies, Strategies and Reports have been issued in previous years including:

- Department of the Environment, Heritage and Local Government (DoEHLG), *Preventing and Recycling Waste - Delivering Change* (2002);
- DoEHLG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action, World Summit on Sustainable Development* (2002);
- DoEHLG, *Taking Stock and Moving Forward* (2004);
- DoEHLG, *National Strategy on Biodegradable* Waste (2006); and
- DoEHLG, *A Resource Opportunity* (2012).

The most recent national policy document was published in July 2012, entitled *A Resource Opportunity - Waste Management Policy in Ireland* [9]. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions in relation to C&D waste - it commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* in July 2006 in conjunction with the Department of the Environment, Heritage and Local Government (DoEHLG).

The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted construction and demolition wastes;
- Procedures to prevent and minimise wastes;
- Options for reuse/recycling/recovery/disposal of construction and demolition wastes;
- Provision of training for Waste Manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of proposed consultation with relevant bodies i.e. waste recycling companies, South Dublin County Council, etc.

Regional Level

The Proposed Development is located in the Local Authority area of South Dublin County Council (SDCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the SDCC area published in May 2015. The regional plan sets out the following strategic 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.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *South Dublin County Council Development Plan 2016 – 2022* [10] sets out a number of objectives and actions for the South Dublin area in line with the objectives of the waste management plan.

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.

Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of 2015)
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended
  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended.

These Acts and subordinate Regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the Waste Management Acts 1996 – 2011 and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal reuse, recycling, recovery and/or disposal (including its method of reuse, recycling, recovery and/or disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final waste reuse, recycling, recovery and/or disposal site. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the appointed construction contractor(s) are legally compliant with respect to waste transportation, reuse, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and reuse/recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended, or a waste or Industrial Emissions (IE) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

DESCRIPTION OF THE PROJECT

Location, Size and Scale of the Development

The Proposed Development consists of the construction of three no. two storey data centres. The Proposed Development comprises the demolition of an existing residential building on site, the construction of 3 no. data centres and associated ancillary development with a total gross floor area of 80,269sqm on a primarily greenfield site (area of c. 16.9 hectares) in Grange Castle, Dublin 22.

A detailed description of the development is provided in Chapter 2 (Characteristics of the Proposed Development) of the EIA Report. A description of the characteristics of the development relevant to waste are described in Chapter 14 (Waste Management).

Overview of the Non-Hazardous Wastes to be produced

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will generate c. 33,930m^3 of soil and stones, as advised by the project engineers, CS Consulting. It is currently proposed that all excavated material will be reused on site.

The main buildings at the site will be constructed from structural steel. It is expected that throughout the construction phase, waste will be produced from surplus steel and other metal materials and broken/off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials are also likely to be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (wastepaper, 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 printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Potentially Hazardous Waste

Contaminated Soil

Any surplus material that requires removal from site for offsite reuse, recovery and/or disposal and any potentially contaminated material (in the unlikely event that it is encountered), should be segregated, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [11] using the *HazWasteOnline* application (or similar approved classification method). If the material is to be disposed of to landfill, it will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* and landfill specific 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.

Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated in accordance with the above procedure.

A geotechnical site investigation was conducted at the site in May 2019 by IGSL Limited on behalf of O'Connor Sutton Cronin. The ground investigation report shows there was no evidence of subsurface contamination encountered during the site investigation works.

Further details on the soil quality at the site is provided in Chapter 7 of the EIA Report.

Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil waste generated at the site.

Invasive Species
Ecological site surveys have been undertaken by Scott Cawley (SC) at this site and in the surrounding area as part of the site ecological assessment. This included walkover surveys of the entire site and the perimeter of the site.

SCs's report concludes that Spanish bluebell (*Hyacinthoides hispanica*) is present in on the site. Spanish bluebell is an alien invasive species listed under *schedule 3 of Regulations SI No. 477 2011*. Under legislation there is an onus on the developer to prevent its spread. No other alien invasive plant species were found.

There were an additional 6 no. non-desirable invasive species recorded on the lands which are not subject to legal restrictions: copper beech (*Fagus sylvatica* ssp. *purpurea*), sycamore (*Acer pseudoplatanus*), winter heliotrope (*Petasites fragrans*), variegated yellow archangel (*Lamiastrum galeobdolon* ssp. *argentatum*), butterfly-bush (*Buddleia davidii*), and snowberry (*Symphiocarpos albus*).

Further details regarding the management of the invasive species present on site can be found in Chapter 6 (Biodiversity) of the EIA Report. Management details will also be available in the Construction and Environmental Management Plan (CEMP) for the Proposed Development.

Other Known Hazardous Substances
Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, waste electrical and electronic equipment (WEEE) containing hazardous components, printer/toner cartridges and batteries (Lead, Ni-Cd or Mercury) may be generated from the temporary site offices during construction works. These wastes will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

Main Construction and Demolition Waste Categories
The main non-hazardous and hazardous waste streams that may typically be generated by the construction activities at the proposed site are presented in Table 1. The List of Waste code (also referred to as the European Waste code or EWC) for each waste stream is also shown.

Table 1 Typical waste types generated, and List of Waste Codes (*individual waste type may contain hazardous materials)

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

ESTIMATED WASTE ARISINGS

Demolition Waste Generation

Demolition works at the site will involve the demolition of existing structures on site. Demolition figures published by the EPA in the *'National Waste Reports'* [14] and data from previous projects have been used to estimate the approximate break-down for indicative reuse (offsite), recycling and disposal targets of demolition waste. This breakdown is shown in Table 2.

Table 2. Estimated off-site reuse, recycle and disposal rates for demolition waste

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	30.5	0	0.0	85	25.9	15	4.6
Concrete, Bricks, Tiles, Ceramics	172.9	30	51.9	65	112.4	5	8.6
Plasterboard	13.6	30	4.1	60	8.1	10	1.4
Asphalts	3.4	0	0.0	25	0.8	75	2.5
Metals	50.9	5	2.5	80	40.7	15	7.6
Slate	27.1	0	0.0	85	23.1	15	4.1
Timber	40.7	10	4.1	60	24.4	30	12.2
Total	**339.0**	**-**	**62.5**	**-**	**235.4**	**-**	**41.0**

The appointed demolition contractor will be required to prepare a detailed demolition management plan prior to work commencing which should refine the above estimated waste figures.

Construction Waste Generation

Table 3 shows the breakdown of construction waste types produced on a typical site based on data from EPA *National Waste Reports* [12].

Table 3. Breakdown of waste materials generated on a typical Irish construction site *(Source: EPA National Waste Reports)*

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

An assessment has been undertaken to estimate the quantity of construction waste likely to be generated from the proposed data centre development.

Table 4 presents the estimated construction waste quantities based on the gross floor area of the buildings to be constructed and includes indicative targets for off-site reuse, recycling and recovery.

Table 4. Estimated on and off-site reuse, recycling and disposal rates for construction waste (based on floor size)

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	1566	10	157	80	1253	10	157
Timber	1329	40	532	55	731	5	66
Plasterboard	475	30	142	60	285	10	47
Metals	380	5	19	90	342	5	19
Concrete	285	30	85	65	185	5	14
Other (includes cabling, ducting, conduits, packaging and plastics)	712	20	142	60	427	20	142
Total	**4746**	**-**	**1077**	**-**	**3223**	**-**	**446**

In addition, as noted in Section 3.2, the quantity of excavated material that will be generated has been estimated by CS Consulting to be c. 33,930m^3. It is currently proposed that all the excavated material will be reused on site.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

All waste arising during the construction phase will be transported off-site by an approved waste contractor holding a current waste collection permit. All waste arising requiring reuse, recycling, recovery or disposal off-site will be brought to facilities holding the appropriate COR, licence or permit, as required.

Proposed Waste Management Options

Waste Management Options for Excavated Materials

The Waste Management Hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. Any excavations carried out will be required to facilitate construction works. However, it is currently proposed that all the excavated material will be reused on site and therefore will not require removal from site and therefore the preferred option of waste prevention is proposed for the excavated material.

In the event that any excavated material is removed off-site for reuse as a by-product (and not as a waste), it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that certain conditions are met and that by-product decisions are made to the EPA via their online notification form. However, it is not currently anticipated that any excavated material will be removed offsite for reuse as a by-product. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27.

If any excavated material requires removal from site and is deemed to be a waste, then removal and reuse/recycling/ recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* 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 removed will dictate whether a COR, permit or licence is required by the receiving waste facility. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the unlikely event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Waste Management Options for other Construction Wastes

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring reuse, recycling, recovery or disposal off-site will be transferred to a facility holding the appropriate COR, permit or licence, as required.

Mixed C&D waste (classified under the List of Waste code 17 09 04) is permitted for acceptance at a number of waste facilities in the region including Integrated Material Solutions landfill in north Dublin and a number of waste transfer stations.

Written records will be maintained by the contractor detailing the waste arising throughout the construction phase, the classification of each waste type, the contact details and waste collection permit number of all waste contractors who collect waste from the site and the end destination details for all waste removed and disposed offsite.

Dedicated storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc., as required. The containers used for storing hazardous liquids will be appropriately bunded or will be stored on suitably sized spill pallets. The management of the main construction waste streams are detailed as follows:

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be placed into a dedicated skip and recycled off-site. Clean timber is typically recycled as chipboard.

Metal

Metals will be segregated and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard

Plasterboard from the construction phase will be stored in a separate skip, pending collection for recycling. The site manager and project engineers will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment

Waste electrical and electronic equipment (WEEE) will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling off site.

Other Recyclables

Where any other recyclable wastes such as cardboard and soft plastic are generated, these will be segregated at source into dedicated skips and removed offsite.

Non-Recyclable Waste

Construction waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 6.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be

made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil in the unlikely event that it is encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

It should be noted that until the main contractor is appointed, it is not possible to provide information on the specific destinations of each waste stream. Prior to commencement construction of each data centre and removal of any waste off-site, details of the proposed destination of each waste stream will be provided to SDCC.

Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the waste contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the contractor.

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 – 2011* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project Waste Manager (see Section 6.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority COR, waste permit or EPA Waste/IE Licence for that site will be provided to the nominated project Waste Manager. If the waste is being shipped abroad, a copy of the TFS document will be obtained from Dublin City Council (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

If any surplus soil or stone is being removed from the site for reuse on another construction site as a by-product, this will need to be done in accordance with Article 27 of the *EC (Waste Directive) Regulations, 2011*. Similarly, if any soil or stone are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27.

All information will be entered in a waste management recording system to be maintained on site.

ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below. The total cost of construction waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

Reuse

By reusing materials on site, there will be a reduction in the transport and offsite recycling/recovery/disposal costs associated with the requirement for a waste contractor to take the material away to landfill.

Clean and inert excavated material which cannot be reused on site may be used as capping material for landfill sites, or for the reinstatement of quarries, etc. as previously discussed. This material is often taken free of charge for such purposes, reducing final waste disposal costs. However, it is not currently anticipated that there will be surplus excavated material.

Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips. Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste

contractors will typically charge less to take segregated wastes, such as recyclable waste, from a site than mixed waste streams.

Disposal

Landfill charges in the Eastern-Midlands region are currently at around €130-150 per tonne (which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a fee for provision and collection of skips.

Collection of segregated construction waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a registered, permitted or licensed facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill.

DEMOLITION PROCEDURES

The demolition stage will involve the removal of the existing abandoned dwelling known as Ballybane, Old Nangor Road, Clondalkin, Dublin 22. A formal demolition plan should be prepared for the site; however, in general, the following sequence of works should be followed during the demolition stage.

Check for Hazards

Prior to commencing works, buildings and structures to be demolished will be checked for any likely hazards including asbestos, ACMs, electric power lines or cables, gas reticulation systems, telecommunications, unsafe structures and fire and explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

Removal of Components

All hazardous materials will be removed first. All components from within the buildings that can be salvaged will be removed next. This will primarily include metal however may also include timbers, doors, windows, wiring and metal ducting, etc.

Removal of Roofing

Steel roof supports, beams etc. will be dismantled and taken away for recycling/salvage.

Excavation of Services, Demolition of Walls and Concrete

Services will be removed from the ground and the breakdown of walls will be carried out once all salvageable or reusable materials have been taken from the buildings. Finally, any existing foundations and hard standing areas will be excavated.

TRAINING PROVISIONS

A member of the construction team will be appointed as the Waste Manager to ensure commitment, operational efficiency and accountability during the construction phase of the project.

Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid him/her in the organisation, operation and recording of the waste management system implemented on site. The Waste Manager will have overall responsibility to oversee, record and provide feedback to the Project Manager on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to subcontractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The Waste Manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The Waste Manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this C&D WMP.

Site Crew Training

Training of the site crew is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the C&D WMP and to

detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arising's on site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or waste manager with a waste docket (or WTF for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC/LoW

The waste transfer dockets will be transferred to the site waste manager on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the DCC Waste Regulation Unit on a monthly basis.

Alternatively, each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets/WTF maintained on file and available for inspection on site by the main contractor as required.

A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR/permit/licence for the receiving waste facilities and maintain a copy on file available for inspection on site as required.

OUTLINE WASTE AUDIT PROCEDURE

Responsibility for Waste Audit

The appointed Waste Manager will be responsible for auditing the site during the construction and demolition phases of the project.

Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported on or off-site should be undertaken mid-way through the project. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established reuse/recovery/recycling/disposal targets for the site.
Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed.

Upon completion of the construction phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total reuse, recycling, recovery and disposal figures for the development.

CONSULTATION WITH RELEVANT BODIES

Local Authority

Once the main contractor has been appointed and prior to removal of any waste materials offsite, details of the proposed destination of each waste stream will be provided to SDCC for their approval.

SDCC will also be consulted, as required, throughout the construction phase in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

Recycling/Salvage Companies

Companies that specialise in C&D waste management will be contacted to determine their suitability for engagement. Where a waste contractor is engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/licences are held. In addition, information regarding individual construction materials will be obtained, including the feasibility of recycling each material, the costs of recycling/reclamation, the means by which the wastes will be collected and transported off-site and the recycling/reclamation process each material will undergo off site.

APPENDIX K SCHEDULE OF MITIGATION MEASURES

Project Phase	Mitigation Measures
	Biodiversity
Construction - *Pollution prevention*	A project environmental management plan will be developed prior to works commencing. This document will ensure that storm water and wastewater runoff are managed and will not cause an off-site environmental impact. This document will be developed and include the following: • Silt control on the roads; • Discharge water from dewatering systems; • Diversion of clean water; • Treatment and disposal of wastewater from general clean-up of tools and equipment; • Spills control; • A buffer zone of at least 20m separating working machinery from watercourses; • A prohibition on machinery entering watercourses; • Refueling of machinery off-site or at a designated bunded refueling area; and, • Silt trapping and oil interception (to be considered where surface water runoff may enter watercourses). The Outline Construction and Environment Management Plan (CS Consulting, 2020) specifies that the following general pollution prevention measures will be implemented: • It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence; • Only approved storage system for oil/ diesel within the site will be permitted. The bunded area will accommodate the relevant oil/ diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment/ removal from site; • The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkalinity in watercourses. Consequently, it is a requirement that all concrete truck washout takes place in the ready-mix depot; • The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner; and, • The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses The mitigation measures outlined in the Hydrology chapter (Chapter 8) of the EIAR will prevent pollution of the Baldonnel Stream and the receiving surface water network. These include measures which prevent contaminated surface water run-off entering the stream, measures to prevent spillage of fuels and chemicals, measures to deal with accidental releases and measures to prevent impacts arising from the management of soil removal and compaction.
Construction - *Habitats and flora*	Invasive species (including Spanish bluebell) on the Proposed Development site will be controlled / eradicated according to the methodology outlined in the Outline Invasive Species Management Plan (Scott Cawley, 2020) that forms a stand-alone document to this EIA Report. Spanish bluebell will be physically removed ensuring that all bulbs and runners are removed. The bulbs will be left in the sun for one month and then placed in a plastic bag for a year prior to composting. Other invasive species on the site will be appropriately controlled and eradicated using either physical or chemical control methods. Full landscaping details are provided in the landscaping plan accompanying this planning application (KFLA, 2020). The landscape strategy will enhance the biodiversity value of the Proposed Development site and provide green infrastructure links to the surrounding area. It is proposed that landscaping works will be carried out in the first phase of the development and will be in place prior to the construction of Building B. Therefore, suitable breeding, foraging and roosting habitat will be available to a wide range of fauna prior to the completion of the development. Existing hedgerows and other vegetation will be retained along the Baldonnel Stream and strengthened with native planting. This will create commuting and foraging corridors within the Proposed Development site for a range of fauna species. A woodland belt is proposed along the northern boundary of the site. Large, semi-mature tree planting has been proposed for this area and will provide an immediate ecological corridor within the site. Additional smaller areas of hedgerow, woodland and large tree planting will take place throughout the Proposed Development site and will provide suitable foraging, roosting and nesting habitat for fauna. Large areas of native wildflower meadow are also proposed within the site and will provide foraging and resting habitat for a range of fauna, particularly pollinators and birds. Planting lists for hedgerows and woodlands have included pollinator friendly species as recommended by the All Ireland Pollinator Plan 2015-2020. A wetland / attenuation area and three attenuation ponds will be constructed as part of the Proposed Development. These areas will enhance the biodiversity value of the Proposed Development site. The wetland area will be planted with native riparian flora and surrounded by wildflower meadows and small woodland berms. The range of proposed habitats in this area will provide a refuge for flora and fauna species. The wetland area has been designed with shallow, sloping areas which will provide suitable amphibian breeding habitat. It is proposed to install bat and bird boxes in appropriate locations within the

	Proposed Development site. Bird boxes have been selected to provide nesting habitat for birds of conservation concern that have been recorded on the site i.e. kingfisher, swallow and grey wagtail. Woodcrete bat boxes will be installed in areas with low light levels, in close proximity to suitable commuting and foraging features.
Construction - *Bats*	Construction lighting will be designed so as to be sensitive to the potential presence of bats and should adhere to the following guidance: • *Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers* (Bat Conservation Trust, 2010); • *Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011);* • *Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2008).* Where trees are considered to have low potential for roosting bats, a PRF (potential roosting feature) inspection survey will be conducted on the day of the proposed felling by a suitably qualified and experienced ecologist. Access to PRFs on the day of removal will be facilitated using a cherry picker/Mobile Elevating Work Platform (MEWP) where possible and the PRFs will be inspected with the aid of an endoscope and/or torch. Where bats are encountered, all relevant works will cease and an application for a derogation licence must be submitted to the NPWS to permit removal of the roost. If bat roosts are not encountered during the survey, trees will be section-felled in the presence of a suitably qualified ecologist. Tree sections with PRFs will be left in-situ with bat access points facing upwards for 48 hours to allow any bats that may be present to emerge. The farmhouse and associated buildings on site must be re-surveyed prior to demolition to ensure there are no roosting bats present. A suitably qualified and experienced ecologist must carry out a minimum of one bat emergence survey and one bat re-entry survey. Where a bat roost is encountered, all relevant works will cease and an application for a derogation licence must be submitted to the NPWS to permit removal of the roost. Suitable woodcrete bat boxes will be installed on trees within the Proposed Development site. The boxes will be installed in areas that are in close proximity to suitable commuting and foraging habitat in areas not subject to light spill.
Construction phase - *Birds*	In order to avoid disturbance of breeding birds, their nests, eggs and/or their unflown young, all works involving the demolition of buildings and/or removal of trees or hedgerows will be undertaken outside of the nesting season (1st March to 31st August inclusive). If vegetation removal must take place in the nesting season, then checks for breeding birds will be undertaken immediately prior to site clearance. Where active nests are found, works must cease until such a time that the nests are deemed inactive. It is proposed to provide alternative nesting habitat for birds of conservation concern that were recorded on the Proposed Development site. It is proposed to build a structure that replicates a farm building that swallows may use, and suitable nest boxes will be installed within it. It is also proposed to install dipper/ wagtail boxes along the stream to provide suitable nesting habitat for grey wagtails. Kingfisher tunnels will be installed into the banks of the stream. These will be installed during the first phase of the development.
Construction phase - *Amphibians*	An amphibian check will be carried out by an experienced ecologist prior to works to infill the drainage ditch to ensure that no common frog *Rana rana* or smooth newt *Lissotriton vulgaris* species are present. This check will involve a torching survey for smooth newt the night prior to infilling. A sweep-net survey immediately prior to works will also be required to check for common frog. Should amphibians be encountered during this check they will be translocated from the affected ditch to a suitable receptor site in a sensitive manner so as to avoid any mortality or injury to amphibians present.
Operational – *Pollution prevention*	Pollution of the Baldonnel Stream as a result of surface water run-off during the operation phase of the development will be prevented as outlined in the *'Engineering Services Report'* (CS Consulting, 2020). In summary, all surface waters from hardstanding areas within the Proposed Development site will pass through an oil interceptor and 'forebays' to remove detritus from the water. These waters will be retained onsite in one of the three attenuation areas prior to controlled release into the Baldonnel Stream.
Operational – *Operational lighting*	The lighting plan for the Proposed Development 'External Lighting Design Report' (Thorlux Ireland, 2020) has been designed to reduce light spill and has been reviewed by an ecologist. Existing features of ecological interest and those proposed in the landscape plan (i.e. the Baldonnel Stream, the wetland area and the attenuation ponds) appear to not be subject to any light spill and will be kept at 0 lux. As outlined in the plan, light spill modelling has not taken into account proposed tree planting and berms which will further mitigate the effects of light spill.
	Land, Soil and Geology
Construction - *CEMP*	In advance of work starting on site the works Contractor will author a Construction Methodology document taking into account their approach and any additional requirements of the Design Team or Planning Regulator. A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractors during the construction and operational phases. The CEMP will cover all potentially polluting activities and include emergency response procedures. All personnel working on the site

	will be trained in the implementation of the procedures.
Construction – *Control of soil excavation*	Subsoil will be excavated to facilitate the construction of foundations, access roads, car parking areas, expansion of drainage connections and other ancillary works. The Proposed Development will incorporate the reduction, reuse and recycle approach in terms of soil excavations on site. The construction will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Reuse of 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. It is envisaged that any soil excavated will be retained on site and reused as fill material or landscaping. The project engineers, CS Consulting, have estimated that c. 33,930m^3 of spoil will be generated. It is envisaged that all of this material will be re-used on site in the proposed preparatory levelling phase.
Construction – *Control of soil excavation*	It is unlikely that any contaminated material will be encountered during construction of the Proposed Development. Nonetheless, any excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil. In the unlikely event that any potentially contaminated soils are encountered, they should be tested and classified as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication, HazWasteOnline tool or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with *EC Decision 2003/33/EC*. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.
Construction – *Control of soil excavation*	Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.
Construction - *Control of soil excavation*	Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.
Construction – *Export of material from site*	It is currently envisioned that all soil/stones arising on the site will be re-used on site. In the event that any excavated material requires removal off-site, it may be removed as either 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 spoil as a by-product. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product. Where material cannot be reused off site it will be sent for recovery or disposal at an appropriately authorised facility. Refer to Chapter 14 Waste Management for further detail.
Construction – *Export of material from site*	If any waste soil requires removal from site, it will be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery/disposal offsite. Refer to Chapter 14 Waste Management for further relevant information.
Construction – *Sources of fill and aggregates*	All fill and aggregate for the Proposed Development will be sourced from reputable suppliers. All suppliers will be vetted for: • Aggregate compliance certificates/declarations of conformity for the classes of material specified for the Proposed Development; • Environmental Management status; and • Regulatory and Legal Compliance status of the Company.
Construction – *soil and groundwater*	The following mitigation measures will be taken at the construction stage in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts: • Designation of a bunded refuelling areas on the site; • Provision of spill kit facilities across the site; and • Where mobile fuel bowsers are used the following measures will be taken: – Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use; – The pump or valve will be fitted with a lock and will be secured when not in use; – All bowsers to carry a spill kit – Operatives must have spill response training; and – Drip trays used on any required mobile fuel units.
Construction – *Fuel and chemical handling*	In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted: • Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area; • Clear labelling of containers so that appropriate remedial measures can be taken in the event of a

	spillage; • All drums to be quality approved and manufactured to a recognised standard; • If drums are to be moved around the site, they will be secured and on spill pallets; and • Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.
Construction – *Control of water during construction*	Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation. Due to the very low permeability of the overburden and the relative shallow nature for foundation excavations, infiltration to the underlying aquifer is not anticipated. Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses/ drainage ditches. Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.
Operational – *Environmental procedures*	Prior to operation of the Proposed Development, a comprehensive set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures.
Operational – *Fuel storage*	In order to minimise any impact on the underlying subsurface strata from material spillages, the fuel storage tanks are located above ground in designated fuel storage bunds with an impervious base. Three no. 40,000 litre bunded tanks will provided next to each data centre. They will be bunded to volume of 110% of the capacity of the tank within the bund (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunds will be diverted for collection and safe disposal. Fuel delivery to the bulk storage tanks will take place within designated bunded unloading areas. Diesel will be piped from the bulk storage tanks to belly tanks at each of the back-up generator units. The belly tanks will be double skinned. Delivery of fuel will be undertaken following a documented procedure which minimises risk of spills and spill containment/clean-up kit shall be readily available on site. It is anticipated, based on the Operator's experience, that the back-up generators will rarely be used.
Operational – *Increase in hard stand area*	A proportion of the development area will be covered in hardstand (c. 8.43ha). This provides protection to the underlying aquifer but also reduces local recharge in this area of the aquifer. As the area of aquifer is large this reduction in local recharge will have no significant change in the natural hydrogeological regime.
	Hydrology
Construction - *CEMP*	An outline Construction Environmental Management Plan (CEMP) has been prepared by CS Consulting for the Proposed Development and is included with the planning documentation. A detailed CEMP will be prepared and maintained by the appointed contractors during the construction phase of the proposed project. The CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the CEMP. At a minimum, the CEMP will be formulated in consideration of the standard best international practice including, but not limited, to: • CIRIA, (2001), *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532)* Construction Industry Research and Information Association; • CIRIA (2002) *Control of water pollution from construction sites: guidance for consultants and contractors (SPI56)* Construction Industry Research and Information Association; • CIRIA (2005), *Environmental Good Practice on Site* (C650); Construction Industry Research and Information Association; • BPGCS005, *Oil Storage Guidelines*; • CIRIA 697 (2007), *The SuDS Manual*; and • *UK Pollution Prevention Guidelines,* (PPG) UK Environment Agency, 2004. All contractors will be required to implement the CEMP.
Construction - *Surface water run-off*	As there is potential for direct run-off to a watercourse present on the site, 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 (silt traps, silt sacks and settlement tanks/ponds). The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. The material will be stored away from any surface water drains. This will prevent any potential negative impact on the storm water drainage. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact. Weather conditions will be considered when planning construction activities to minimise the risk of run-off

	from the site and a suitable distance of topsoil piles from surface water drains will be maintained.
Construction – *Fuel and chemical handling*	The following mitigation measures will be taken at the construction stage in order to prevent any spillages of fuels and prevent any resulting impacts to surface water systems; • Designation of a bunded refuelling areas on the site; • Provision of spill kit facilities across the site; • Where mobile fuel bowsers are used the following measures will be taken: – Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use; – The pump or valve will be fitted with a lock and will be secured when not in use; – All bowsers will carry a spill kit and operatives must have spill response training; and – Portable generators or similar fuel containing equipment will be placed on suitable drip trays. In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted: • Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded areas; • Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage; • All drums to be quality approved and manufactured to a recognised standard; • If drums are to be moved around the site, they should be done so secured and on spill pallets; and • Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment. 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 waste waters or contaminated storm water to the underlying subsoil. Wash-down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.
Construction – *Accidental release*	Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.
Construction – *Soil removal and compaction*	The project engineers have estimated that c. 33,930m^3 of material will require excavation to facilitate construction. Excavated material will be reused on site for site levelling, roads, car parking areas, berms and other landscaping purposes. Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust. 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 potential contaminants 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 segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.
Operational – *Environmental procedures*	The operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to operation of the Proposed Development, a set of operational procedures will be established (based on those used at other similar facilities) which will include site-specific mitigation measures and emergency response measures.
Operational – *Fuel and chemical handling*	The containment measures planned will minimise the risk of release of solid/ liquid material spillages to the water environment. Containment measures will include storage of fuels on site in bunded containers or compartments. The design of all bunds will conform to standard bunding specifications - BS EN 1992-3:2006, *Design of Concrete Structures – Part 3: Liquid retaining and containment measures*.
Operational – *Storm water & foul sewer drainage*	The proposed drainage system design has incorporated SuDS features throughout. The proposed discharge rates for the development and overall landholding have been addressed in the *Engineering Services Report,* prepared by CS Consulting, which accompanies this planning application. The allowable discharge rate (QBAR) applicable to the Proposed Development is 2.01 l/s. The proposed surface water attenuation system will be released via a hydrobrake to the Baldonnel Stream. Foul drainage for the Proposed Development will be in accordance with the relevant standards for design and construction as detailed in the *Engineering Services Report,* prepared by CS Consulting.
Operational – *Water supply*	A pre-connection enquiry (PCE) form was submitted to Irish Water (IW) in January 2020 which addressed water demand) for the development of the indicative masterplan for overall landholding. Once the PCE is accepted, mitigation measures will be discussed. The water system will be metered to facilitate detection of leakage and the prevention of water loss. Dual and low flush toilets, water economy outlets and water saving measures will also be proposed.

	Noise and vibration
Construction – *Noise and vibration*	With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the Proposed Development. As an example, the following measures will be implemented on site: • 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 critical sensitive locations; and • all site access roads will be kept even so as to mitigate the potential for vibration from lorries. Furthermore, a variety of practicable noise control measures will be employed, such as: • 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. Vibration from construction activities to off-site residences be limited to the values set out in Table 9.7 of the EIAR. 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%. Appendix F.4 presents an indicative construction noise and vibration management plan that will be implemented in terms of the day to day operation of the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place that have an increased potential in giving rise to issues off site (Note: no rock breaking is anticipated as part of the Proposed Development).
Operational - *Building services noise / emergency site operation*	Noise from external plant will be minimised by the following measures: • 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.
Additional vehicular traffic on public roads	The noise impact assessment has demonstrated that mitigation measures are not required.
Operational - *Cumulative assessment*	The environmental noise survey takes account of noise emissions from existing developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network. The noise criteria proposed for new building services plant items (i.e. chillers etc.) has been derived with consideration of existing site noise emissions levels to ensure that cumulative noise emissions do not exceed the relevant noise criteria. The potential cumulative noise emissions from the Proposed Development and neighbouring Google Ireland Data Centre and Cyrus One Data Centre have been considered. Reference is made to Section 9 of the Google Ireland EIS (PM Group ref. IE0311190-22-RP-0001, Issue A) (Google EIS Table 9.12) and Section 10 of the Cyrus One EIA Report which presents noise predictions to nearby shared residential receptors. The closest shared receptors to the two neighbouring sites are the receivers R2, R5 and R6. Table 9.17 of the EIAR presents the predicted cumulative noise levels to these two receivers and compares to the proposed noise criteria.
	Air quality and climate
Construction – *Dust control*	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, the UK and the USA based on the following publications: • 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014); • 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996); • 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002); • 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);

	• 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and • 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).
Construction – *site management*	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. 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. As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors. 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 0.2mm/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 shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions outlined under the following: The Principal Contractor or equivalent will 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 will also include head/regional office contact details; • Community engagement shall 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 • The procedures put in place will be reviewed at regular intervals and monitoring conducted and recorded by the principal contractor. It is recommended that reviews are conducted on a monthly basis as a minimum. 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.
Construction – *site roads / haulage routes*	Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002). • A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads; • Access gates to the site shall be located at least 10m from sensitive receptors where possible; • Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and • Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
Construction – *Land clearing / earth moving*	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 shall be postponed until the gale has subsided.

Construction – *storage piles*	The location and moisture content of storage piles are important factors which determine their potential for dust emissions. The following measures will be implemented to minimise dust formation from storage piles. 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.
Construction – *Site traffic on public roads*	Spillage and blow-off of debris, aggregates and fine material onto public roads will 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 • At the main site traffic exits, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.
Construction – *Dust mitigation*	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; and • The specification of effective measures to deal with any complaints received.
Operational – *stack heights*	The stack heights of the back-up diesel generators for the Proposed Development have been designed in a fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards beyond the site boundary (including background concentrations). No additional mitigation measures are proposed for the operational phase of the development.
	Landscape and visual assessment
Operational – *visual impact*	The mitigation of potential negative landscape and visual impacts has influenced the design and layout of the Proposed Development 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 colour palette chosen for the building aims to further reduce any visual impact of the building.
	Traffic and transportation
Construction – *traffic and transportation*	During the construction phase of the development, the following measures will be put in place to reduce the impact on the surrounding environment: 1. The contractor will be required to provide wheel cleaning facilities, and regular cleaning of the sites construction and main access road will be carried out; 2. Temporary car parking facilities for the construction workforce will be provided within the site and the surface of the car park will be prepared and finished to a standard sufficient to avoid mud spillage onto adjoining roads, and; 3. Monitoring and control of construction traffic will be ongoing during construction works. Construction traffic will be managed to avoid unnecessary trips during peak hours. The lead contractor appointed for the construction of the development shall be required to prepare a Construction Management Plan, including a plan for the scheduling and management of construction traffic that details the measures to be taken to mitigate the risk of such events. Approved routes for construction vehicle traffic shall be agreed with South Dublin County Council.
Operational – *traffic and transportation*	As described in the Mobility Management Plan (MMP) Framework document prepared in support of this planning application, a Mobility Management Coordinator shall be appointed for the Proposed Development, with the remit to implement and oversee an ongoing Mobility Management Plan (MMP). This shall assist development occupants and visitors in making the most of sustainable transport opportunities and in avoiding single-occupant car journeys. As also described in the accompanying MMP Framework, the development site is situated within a 10-minute walk of an existing high-quality bus route linking Grange Castle with Dublin City. The site is also within a 12-

	minute bicycle journey of Adamstown railway station. As described in the Traffic Impact Assessment report prepared with this planning application, the development shall include a relatively high provision of bicycle parking, which shall serve to encourage bicycle journeys by both development occupants and visitors.
	Cultural heritage
Construction - *Archaeology*	It is recommended that archaeological monitoring of topsoil stripping associated with the construction of the Proposed Development be carried out in all areas outside the footprint of the previously excavated areas. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
Construction – *Architecture*	As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.
Construction – *Cultural heritage*	As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.
Operational phase – *archaeology*	There are no mitigation measures required for the operational phase of the Proposed Development in relation to the archaeological, architectural and cultural heritage resource.
	Waste management
Construction – *C&D WMP*	A project specific outline 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.
Construction – *C&D WMP*	The project engineers, CS Consulting, have estimated that c. 33,930m^3 of soil/stones will be generated from the excavations required to facilitate construction. The main contractor will endeavor to ensure that surplus material is reused on site. It is not anticipated that there will be surplus material that will require removal from site. In the unlikely event that there is surplus material that is not required for reuse onsite, it 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.
Construction – *C&D WMP*	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.
Construction – *C&D WMP*	In the unlikely event that there are excess soils/stones requiring removal from site, any nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, which 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 done in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)* as previously referred to in Section 15.27 and detailed in the C&D WMP (Appendix J).

	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 - *Waste*	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 areas of 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. 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.
	Material assets
Construction – *Service providers*	Construction of the proposed development will require connections to water supply and drainage infrastructure, power and telecommunications. Ongoing consultation with IDA, FCC, 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.
Construction – *Power and Electricity supply*	The power demand for the construction phase will be relatively minor and the temporary connection works are entirely within the Proposed Development site, so it is not anticipated that this would 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 the construction of the temporary substation is completed, ESB Networks will be mobilised to complete the commissioning in accordance with the ESB Network requirements. As stated in Chapter 2, there is no requirement for chemical usage, and minimal access to the cable route is required by personnel, there are no likely significant effects as a result of commissioning. As such, no remedial or mitigation measures are required in relation to power supply for the construction phase.
Construction - *Telecommunications*	A fibre optic cable distribution network will be installed within the site for the entire Proposed Development to serve Buildings A, B and C. 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.
Construction - *Surface water infrastructure*	Run-off water containing silt will be contained on site and treated (using a siltbuster or temporary on-site settlement ponds/tanks) 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. It is not anticipated that there will 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 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).
Construction – *foul drainage infrastructure*	A temporary connection to the foul water drainage network will be made and is required or 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 to medium term construction phase. As the construction works for the new foul drainage network 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 a number of measures in place to ensure that there is no impact on the existing foul drainage network during the construction works.

	Foul drainage 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 (TGD) 'Part H' & the Regional Code of Practice for Drainage Works. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration. Portable toilets will be provided for construction staff. As the construction works are entirely within the site boundary and business park, it not anticipated that this would have any offsite impact . The works contractor will be obliged to put a number of measures in place to ensure that there is no impact on the foul drainage network of the business park. Strict quality control measures will be undertaken while laying pipes to minimise or eradicate infiltration and ex-filtration.
Construction – *Water supply*	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 potential offsite impact. The works contractor will be obliged to put best practice measures in place to ensure that there are no interruptions to service from the existing watermain. It is not anticipated that there will 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.
Operational – *Power and electricity supply*	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. A number of sustainability measures have been incorporated into the design of the Proposed Development including the installation of an array of photovoltaic panels on the roof and the use of direct drive EC fans for facilitating air supply and extract systems. These will feed back into the electrical supply for the building, serving lighting, office area general services and office IT equipment. The *Energy Statement* also describes how waste heat associated with the facility could be utilised with a future district heating scheme developed by others. Further detail is provided in the *Energy Statement* which accompanies the planning application.
Operational - *Telecommunications*	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.
Operational - *surface water infrastructure*	The surface water drainage system for the Proposed Development incorporates runoff control in the form of attenuation, which will restrict discharge from the development to the allowable greenfield runoff rate of 2 l/s/ha. The attenuation storage is provided via 4 no. attenuation ponds and forebays with a c. 9,377m^3 capacity. The forebays allow small intensity rainfall events to be stored separated from the main water body. This allows for any detritus material to be removed from the water and aids in particulate removal, increasing overall storm water quality prior to disposal. To limit the discharges from the attenuation zones to pre-development levels flow control devises are required. It is proposed to use 'Hydrobrake' flow control systems to achieve the required discharge rates. These 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, CS Consulting Engineers, using the methodology set out in the *Engineering Services Report*. A Class 1 Bypass Oil Separator will be used to treat runoff prior to discharging from site. In addition, rainfall which passes through the back-up generator exhaust stacks will discharge to a new Class 2 petrol interceptor before connecting to the foul drainage network for the Proposed Development. The Class 2 petrol interceptor is located downgradient of foul drain which collects the rainwater which passes through the backup generator stacks.
Operational – *Foul drainage infrastructure*	Foul drainage for the proposed new 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 development. IW have agreed in principal that the wastewater requirements for the development can be accommodated, subject to application. No remedial or mitigation measures are required in relation to foul drainage infrastructure.
Operational – *Water supply*	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. IW have agreed in principal that the water requirements for the development can be met from existing supplies and the necessary water connections made subject to application. No remedial or mitigation measures are required in relation to water supply.