from R134 Nangor Road. Other noise sources were aeroplanes, helicopters and more distant noise from other industrial land uses, which would also affect the noise climate at NSRs 1 and 2.

9.3.14 Monitoring location LT2 is deemed to be representative of the noise climate at NSRs 3-5 as the dominant noise sources were road traffic noise and aircraft movements from the department of defence/Casement Aerodrome. Distant plant noise from the Google Data Center Campus was also audible at this position. The noise sources would also affect the noise climate at NSRs 3-5.

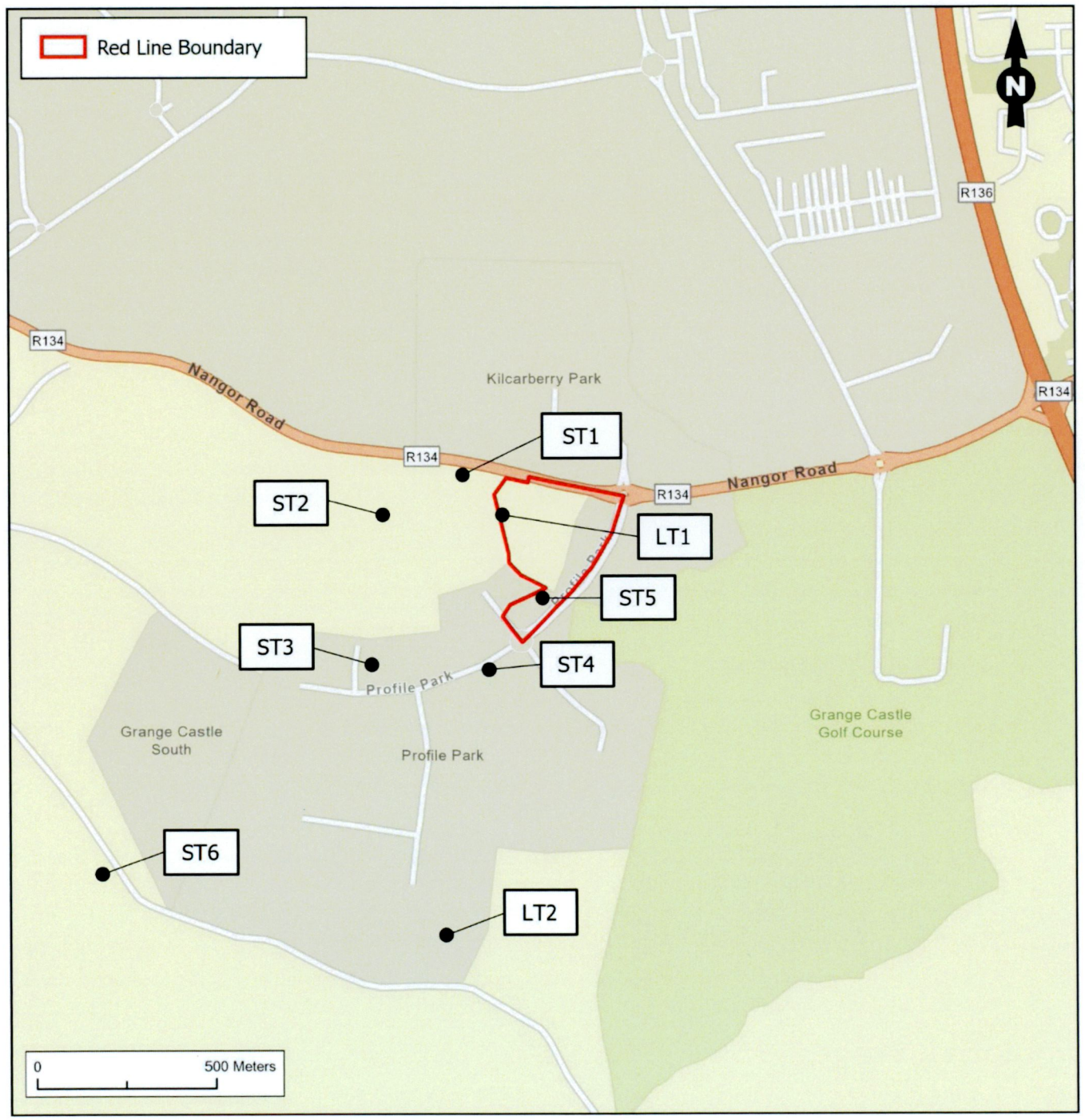

Figure 9-2: Noise Measurement Locations (LT positions were unattended monitoring positions and ST positions were attended monitoring positions)

9.4 Assessment Method

Methodology

Demolition and Construction Stage

9.4.1 Published Guidance: BS 5228:2009+A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

9.4.2 BS 5228:2009+A1 2014 gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

9.4.3 The approach adopted in BS 5228:2009+A1 2014, calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the demolition and construction activities.

9.4.4 BS 5228:2009+A1 2014 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 5228:2009+A1 2014. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9-4: BS 5228:2009+A1 2014 Assessment Categories

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 07:00)	45	50	55
Evenings and weekends (Note D)	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75

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

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

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

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

9.4.5 Noise limits have been set for the purposes of the construction noise effects assuming daytime working (07:00-19:00).

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

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

Demolition and Construction Noise Assessment

9.4.8 Proposed demolition and construction works on the site would involve the use of a variety of working methods, and operations would vary across the site throughout the construction period. Therefore, noise levels from the works are likely to vary over time as the distance from the noise sources and the type of construction activity change. Note BS 5228-1:2009+A1:2014 states that calculations to receivers over 300m away should be treated with caution.

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

9.4.10 An estimate of the expected noise levels over a representative period has been prepared using typical types of plant commensurate for works of this nature, and noise emission data for plant obtained from BS 5228-1:2009+A1:2014. As a 'worst case', the assessment has assumed that all plant would operate for each phase of work at a given location within the site.

9.4.11 Construction noise predictions have been based on the methodology contained within BS 5228-1:2009+A1:2014. This enables predictions to be made of the noise emissions from the construction activities for given distances from the works.

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

9.4.13 The following demolition and construction stages have been considered:

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

Demolition and Construction Traffic Noise Assessment

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

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

9.4.16 The number of HGVs attributable to the construction works would be highest during earthworks.

9.4.17 This assessment has been undertaken using the haul route method outlined in BS 5228-1:2009+A1:2014. The maximum number of trips would be included within the CEMP.

Demolition and Construction Vibration Assessment

9.4.18 BS 5228-2:2009+A1:2014 states that for the majority of people vibration levels between 0.14 and 0.3 mm/s Peak Particle Velocity (PPV) are just perceptible. A vibration level of 1.0 mm/s is sufficient to cause complaint, but tolerable with prior warning; whereas a level of 10 mm/s is intolerable for anything more than a very brief exposure. Vibration levels exceeding 15 mm/s PPV are sufficient to result in minor cosmetic damage in light/unreinforced buildings. This magnitude of vibration is not considered likely as a result of the proposed construction activities being undertaken, and therefore an assessment of building damage has not been undertaken. No piling is proposed as part of the development.

9.4.19 Perceptibility of vibration is considered in the assessment.

Operation Stage

Published Guidance: BS 4142:2014+A1:2019 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

9.4.20 BS 4142:2014+A1:2019 provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon receptors. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

9.4.21 The basis of BS 4142:2014+A1:2019 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
- Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;
- Residual Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating Level, $L_{Ar,Tr}$: the specific sound level plus any adjustment made for the characteristic features of the noise.

9.4.22 The standard specifies that noise measurements of one hour should be used during the day (07:00-23:00) and 15 minutes at night (23:00-07:00).

9.4.23 Potential impacts are predicted from the difference between the representative background level at a NSR and the rating level from the noise source considered. The standard suggests that the greater the excess, the greater the magnitude of impact.

9.4.24 In determining the significance of the impact, BS 4142:2014+A1:2019 requires a consideration of the context of the assessment i.e. the nature of the existing acoustic environment and the new noise source, and the sensitivity of the affected receptors.

Operational Noise Modelling Approach

9.4.25 The predicted noise levels likely to be generated during the operational phase of the proposed development due to new items of fixed plant have been calculated using the proprietary noise modelling software CadnaA®. The operational noise predictions have been undertaken in accordance with the noise prediction framework set out in ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation'.

9.4.26 The ISO 9613 noise prediction model assumes that individual sources act as point sources; the noise level reducing by 6 dB for every doubling of distance. Noise from line sources reduce by 3 dB per doubling of distance. The model takes into account the distance between the sources and the NSRs and the amount of attenuation due to atmospheric absorption and ground cover.

9.4.27 The topography on and around the site has been modelled using topographical survey information. The acoustic ground absorbency has been modelled according to local conditions.

Cumulative Stage

9.4.28 For the purposes of assessing the cumulative effects, consideration has been given to all cumulative schemes that have the potential to result in a significant cumulative effect alongside the proposed development. Full details of all the cumulative schemes are given in Chapter 2: EIAR Process and Methodology. The baseline and assessment of significance, and the judgement of the magnitude of change stages are as above for the construction and operation stages. Only receptors for which the

proposed development is predicted to result in a significant residual effect alone are included in this part of the assessment.

9.5 Assessment Criteria

9.5.1 The assessment of significance of effect with regards to noise and vibration is based on professional judgement of the sensitivity of the receptor and the magnitude of effect.

9.5.2 The general criteria used to assess if an effect is significant or not, is set out in Chapter 2, further details are provided herein. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

9.5.3 The sensitivity of receptors has been classified as low, medium or high in accordance with the criteria set out in Table 9-5.

Table 9-5: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	Industrial, commercial and retail premises
Medium	Places of worship, community facilities, offices
High	Specialist vibration sensitive equipment, residential properties, educational buildings, medical facilities, care homes, hotels

9.5.4 NSR 1 is deemed to be of medium sensitivity (office). NSRs 2-5 are high sensitivity (residential).

Impact Magnitude Criteria

Demolition and Construction Noise

9.5.5 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 9-6.

Table 9-6: Impact Magnitude Criteria – Construction Noise

Magnitude of Impact	Façade noise level dB(A)
Low	<65
Medium	65-70
High	>70

Demolition and Construction Vibration

9.5.6 Table 9-7 details the distances at which certain construction activities are likely to give rise to a just perceptible level of vibration. These figures are based on historical field measurements to inform BS 5228:2009+A1:2014.

Table 9-7: Distances at which vibration may just be perceptible

Construction Activity	Distance from Activity (m)
Heavy vehicles (e.g. dump trucks)	5-10
Excavation	10-15
Hydraulic breaker	15-20

Table 9-7: Distances at which vibration may just be perceptible

Continuous flight auger (CFA) piling	10-20
Rotary bored piling	20-30
Driven piling	50-100

Operational Phase Building Services Plant

9.5.7 Plant rating noise limits have been set following the methodology of BS 4142:2014+A1:2019. Based on guidance from BS 4142:2014+A1:2019 and noise limits defined by the EPA, the magnitudes of impact in Table 9-8 have been used.

Table 9-8: Impact Magnitude Criteria – Operational Building Services Noise Emissions

Magnitude of Impact	Description
	Noise due to the normal operation of the proposed development, shall not exceed the lesser of the following limits:
Low	• Daytime (07:00-19:00) 55 dB $L_{Ar,Tr}$ or 10 dB above background. • Evening (19:00-23:00) 50 dB $L_{Ar,Tr}$ or 0 dB above background. • Night time (23:00-07:00) 45 dB $L_{Ar,Tr}$ or 0 dB above background.
Medium	• Daytime (07:00-19:00) 60 dB $L_{Ar,Tr}$ or 10-15 dB above background. • Evening (19:00-23:00) 55 dB $L_{Ar,Tr}$ or 0-5 dB above background. • Night time (23:00-07:00) 50 dB $L_{Ar,Tr}$ or 0-5 dB above background.
High	• Daytime (07:00-19:00) 65 dB $L_{Ar,Tr}$ or > 15 dB above background. • Evening (19:00-23:00) 60 dB $L_{Ar,Tr}$ or > 5 dB above background. • Night time (23:00-07:00) 55 dB $L_{Ar,Tr}$ or > 5 dB above background.

Operational Phase Emergency Plant

9.5.8 Back-up emergency generators would be provided as part of the proposed development to serve the data hall. The generators would only operate in a situation where there is a failure in the electricity supply from the national grid and for routine testing. Routine testing would be conducted during regular weekday daytime periods only.

9.5.9 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 would have certain items of emergency equipment (e.g. standby generators) that would 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'.

9.5.10 With reference to other developments in the area, it is noted that an emergency noise emissions limit of 55 dB $L_{Aeq,1hr}$ is generally applied at nearby NSRs. On this basis, the following magnitudes of impact have been adopted for this assessment:

Table 9-9: Impact Magnitude Criteria – Operational Emergency Services Noise Emissions

Magnitude of Impact	Description
	Noise due to emergency plant operation at the proposed development, shall not exceed the lesser of the following limits:
Low	55-60 dB $L_{Aeq,1hr}$

Table 9-9: Impact Magnitude Criteria – Operational Emergency Services Noise Emissions	
Medium	60-65 dB $L_{Aeq,1hr}$
High	>65 dB $L_{Aeq,1hr}$

Scale of Effect Criteria

9.5.11 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 9-10.

Table 9-10: Scale of Effect Criteria

Magnitude	Sensitivity of Receptors		
	Low	Medium	High
Low	Imperceptible	Not Significant	Slight
Medium	Not Significant	Slight	Moderate
High	Slight	Moderate	Significant

9.5.12 Based on Environmental Protection Agency's (EPA) Guidelines on the information to be contained in Environment Impact Assessment Reports[9] (2022), as described in Chapter 2: EIA Process and Methodology, effects ranging from 'moderate' to 'profound' are considered 'significant' in terms of EIA.

Nature of Effect Criteria

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

9.6 Assumptions and Limitations

General

9.6.1 The following assumptions and limitations apply to the assessments contained within this Chapter:

- The assessment has relied on data provided by Burns & McDonnell. It has been assumed that these data sets have been reported correctly;
- The measured baseline climate is a sample of the current noise climate at the site and is representative of activities occurring during the surveys;
- A number of assumptions have been made to inform the appraisal of demolition and construction stage impacts, such as the techniques used to construct the buildings, the type of plant being used, the number of plant items operating, and the running time throughout the day. The assumptions provide a worst-case assessment;
- The demolition and construction phasing strategy for the site has been set out in EIAR Chapter 5 and has been used to assess potential impacts;
- The specification for the building envelope of the generator building has been determined to achieve the noise limits set out in this report. This is subject to detailed design, along with other mitigation measures proposed for barriers, attenuation requirements for exhaust stacks, etc;
- Exhaust stack heights for the MFGP are modelled at 30m and the emergency diesel generators are modelled at 22.3m;
- Sound level data for the emergency diesel generators has been used as follows:
  - 'Inlet' and 'Canopy' applies to noise breaking out of the generator enclosure;
  - 'Discharge' applies to the noise exiting through the enclosure chimney; and
  - 'Exhaust' sound data has been applied to the top of the stacks.

  In the absence of specific measurement conditions of this data (an overall figure averaged from measurements all around the generator is provided) it is assumed the generator radiates equal sound levels from all faces;
- Noise from externally mounted or terminating plant is not expected to be tonal or intermittent at the NSRs due to distance attenuation and masking by ambient noise. The spectral sound data does not indicate any strong tonal properties to the noise.

Approach to Assessment

9.6.2 The assessment of noise and vibration impacts has been undertaken using the detailed masterplan layouts and general arrangement (GA) plans/sections/elevations that have been prepared for the site.

9.7 Baseline Conditions

Existing Baseline

9.7.1 The existing noise climate across the site varies with location. The northern portion of the site generally experiences higher levels of noise due to the influence of the surrounding road network and other commercial/industrial uses. Other noise sources include industrial uses and aircraft movements from the nearby Casement Aerodrome.

9.7.2 A summary of the noise measurements at each position is provided below. The typical $L_{A90,T}$ values have been derived from statistical analysis in line with BS 4142:2014+A1 2019.

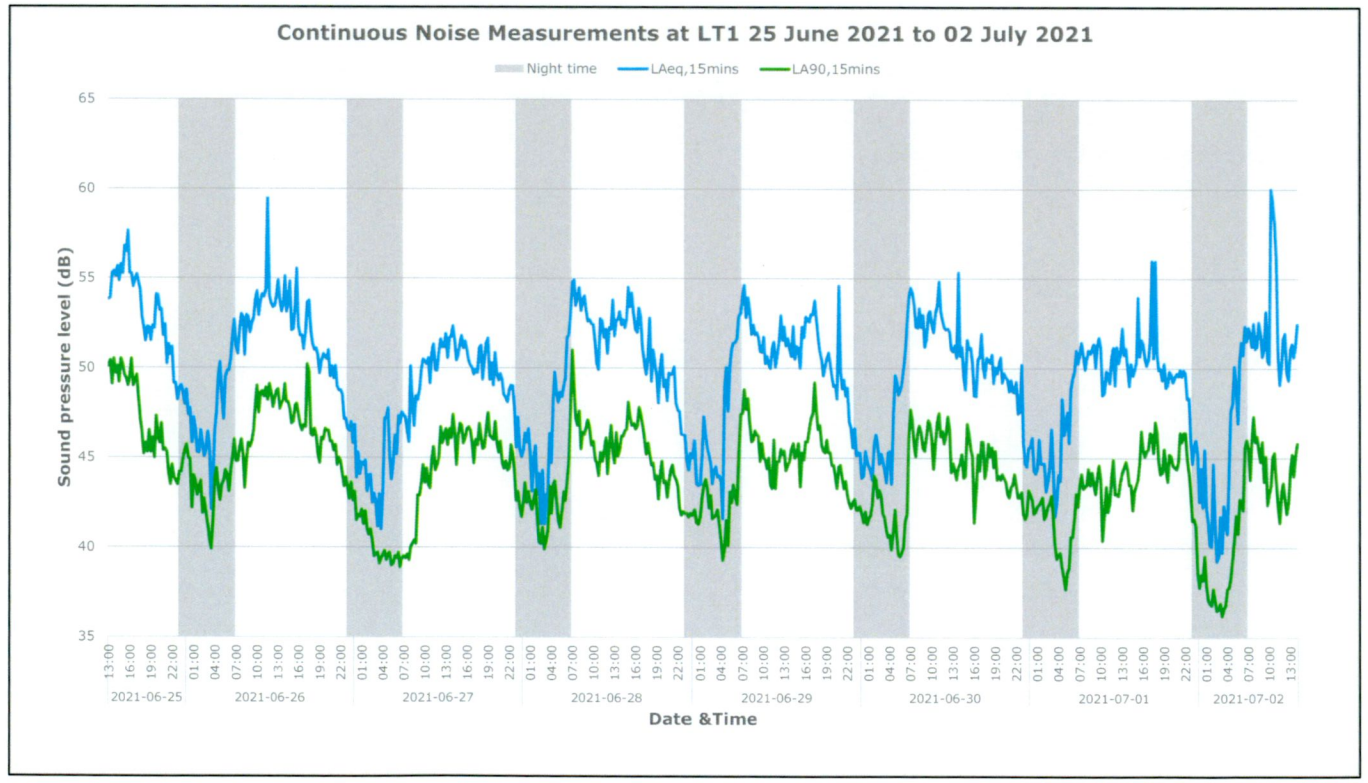

Figure 9-3: Continuous noise measurements at LT1

[9] Environmental Protection Agency, 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Table 9-11: Summary of Noise Measurements at Monitoring Position LT1			
Measurement Period	**Time Period**	**Log Average $L_{Aeq,T}$**	**Typical $L_{A90,T}$ dB**
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	53	46
	Evening (19:00-23:00)	50	44
	Night time (23:00-07:00)	47	42

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

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

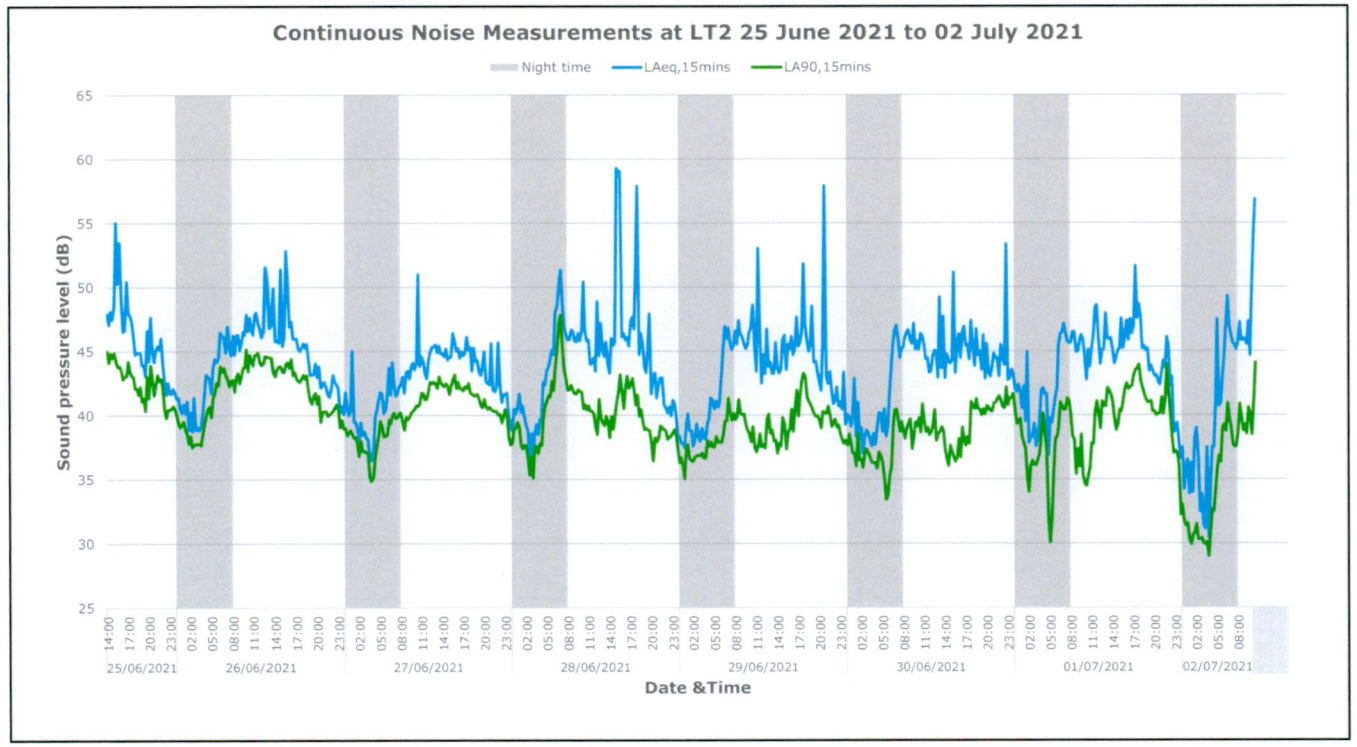

Figure 9-4: Continuous noise measurements at LT2

Table 9-12: Summary of Noise Measurements at Monitoring Position LT2			
Measurement Period	**Time Period**	**Log Average $L_{Aeq,T}$**	**Typical $L_{A90,T}$ dB**
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	47	42
	Evening (19:00-23:00)	45	40
	Night time (23:00-07:00)	42	38

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

Table 9-13: Summary of Noise Measurements at Monitoring Position ST1			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
23/06/2021	23:17	54	40
24/06/2021	00:28	48	39
	01:33	45	37
02/07/2021	11:14	67	46
	13:31	69	49
	16:58	69	51

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

Table 9-14: Summary of Noise Measurements at Monitoring Position ST2			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
23/06/2021	23:39	38	33
24/06/2021	00:48	38	34
	01:54	36	34
02/07/2021	11:35	45	39
	13:52	49	43
	17:19	44	40

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

Table 9-15: Summary of Noise Measurements at Monitoring Position ST3			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:05	39	35
	01:13	40	37
	02:11	39	36
02/07/2021	13:11	46	44
	15:41	44	41
	16:38	45	40

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

Table 9-16: Summary of Noise Measurements at Monitoring Position ST4			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:52	41	39
	23:43	41	38

Table 9-16: Summary of Noise Measurements at Monitoring Position ST4			
	01:53	41	39
02/07/2021	12:52	46	43
	15:22	44	42
	16:20	50	42

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

Table 9-17: Summary of Noise Measurements at Monitoring Position ST5			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
23/06/2021	23:22	49	39
24/06/2021	00:31	39	37
	01:35	39	36
02/07/2021	12:32	41	39
	15:01	41	37
	16:01	46	41

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

Table 9-18: Summary of Noise Measurements at Monitoring Position ST6			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:06	34	33
	01:13	50	32
	02:15	36	33
02/07/2021	11:59	64	43
	14:38	64	39
	17:44	65	39

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

Table 9-19: Summary of Weather Conditions During Monitoring Period				
Average Wind Direction	**Average Wind Speed (m/s)**	**Average Ambient Temperature (°C)**	**Average Pressure (bar)**	**Average Precipitation (mm)**
South-East (SE)	1.3	14.1	1009.6	0.0

Future Baseline

9.7.12 The future baseline includes the operation of the July 2022 DUB-1 permitted development and so therefore, background noise levels may be slightly higher than the background noise levels used for setting plant noise limits in this assessment.

9.7.13 The rating noise levels for the July 2022 DUB-1 permitted development were equal to the representative background noise levels, as a worst case (for NSR 4) for scenario 1 of the proposed development. The predicted rating noise levels for all other NSR locations were below the representative background noise levels in scenario 1 as described in Table 9-2.

9.7.14 The rating noise levels for the July 2022 DUB-1 permitted development were less than the representative background noise levels for all NSRs for scenario 2 of the proposed development, as described in Table 9-2.

9.7.15 The predicted emergency operation noise levels met the limiting criterion.

DUB-1 Future Baseline Equipment

9.7.16 The following section outlines the equipment that will operate for the DUB-1 campus to form the future baseline, as included in the EIAR for the July 2022 DUB-1 permitted development.

Generator Buildings (Multifuel Generation Plant) associated with the July 2022 DUB-1 permitted development

DUB-1 Exhaust Stacks

9.7.17 A total of 11 Wartsilla 20V34SG engines would operate in the two generator halls. The sound power per engine exhaust is shown below:

Table 9-20: Wartsilla 20V34SG engine noise								
Total (dBA)	Sound Power Level L_{wA} (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
119.8	88.0	103.0	110.0	113.0	114.0	111.0	114.0	-

9.7.18 Each exhaust stack would include silencers to reduce the engine noise by 45dB.

DUB-1 Internal reverberant noise level

9.7.19 The internal reverberant noise level from within the engine halls is based on 5no. Wartsilla 20V34SG engines running in each generator hall.

Table 9-21: Internal reverberant noise level in generator halls used in the assessment								
Total (dBA)	Internal reverberant noise level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
105.8	74.1	89.1	96.1	99.1	100.1	97.1	100.1	-

DUB-1 Building Envelope Construction

9.7.20 The building design allows for the following building envelope construction:

- 0.7mm standing seam steel outer
- 160mm Rockwool 100kg/m^3 (1 x 60mm + 1 x 100mm)
- 5mm Tecsound (10kg/m^2)
- 1.2mm profiled steel liner

9.7.21 The estimated performance of this construction is as follows:

Table 9-22: Generator building envelope construction octave band transmission loss used in the assessment									
• Transmission loss of	Approx R_w (dB)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k

Table 9-22: Generator building envelope construction octave band transmission loss used in the assessment									
building envelope (dB)	50	20	28	37	49	55	58	64	-

DUB-1 Noise from Air Inlets/Exhausts

9.7.22 The noise level from each air inlet/exhaust would be limited to 65 dBA at 1m from the external louvre/duct. This has been calibrated within the model using the spectrum for the internal reverberant noise level, corrected to 65 dBA at 1 m.

DUB-1 Remote radiators

9.7.23 The air-cooled radiators associated with the MFGP would be selected to be 'ultra-ultra-low noise'. The A-weighted sound power level $L_{w,A}$ for one 3-fan cooling radiator is shown below. It is assumed that this data is applied evenly over the radiator per fan for the model.

Table 9-23: Remote radiator fan noise used in the assessment								
Total (dBA)	A-weighted Sound Power Level $L_{w,A}$ (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
88	92.2	93.1	88.6	85.2	83.0	77.8	73.0	65.1

DUB-1 Barriers/Screens

DUB-1 Substation compound

9.7.24 The proposed substation compound would include a min. 3m high brick blast wall to its full perimeter.

DUB-1 External Plant Installations

DUB-1 Rooftop Chillers per data hall

9.7.25 12no. Airedale TurboChill V chillers would operate per roof of each data hall. The sound power per chiller is as follows:

Table 9-24: Sound power L_w (dB) as a function of frequency (Hz) per chiller								
Total (dBA)	Sound power L_w (dB) at Octave Band Centre Frequency (Hz) per chiller							
	63	125	250	500	1k	2k	4k	8k
99.2	72.0	87.7	98.6	96.5	93.2	90.7	89.4	86.6

9.7.26 Each chiller would include an acoustic package with attenuated inlet and discharge, providing the following minimum insertion losses:

Table 9-25: Chiller acoustic package octave band insertion loss used in the assessment							
Insertion loss (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
4.0	8.0	13.0	22.0	24.0	21.0	18.0	14.0

DUB-1 Step-up Substation

9.7.27 3no. transformers would be located in the external substation compound. A sound power of 106 dB L_w has been assumed per transformer in the model.

DUB-1 Emergency generators

9.7.28 36 no. KD3300-F emergency generators would be included (13no. per hall). These would be housed in containers and include silencers to attenuate noise levels to 85dBA at 1m. The following sound levels have been used in the model:

DATA:
Generator set: KD3300-F
Engine: KD83V16-5BFS @ 1500RPM
Radiator Cooling airflow: 46m³/s @ 300Pa.
Absorbed fan Power: 70kW
Combustion airflow: 3.262m³/s
Overall Noise : 85dB(A)@1m

NOISE DATA FOR PROPOSED GENERATOR SET, CANOPY designed to achieve 85dB(A)@1m around the perimeter under standard test conditions Free Field .									
FREQUENCY (Hz)	Octave band Centres (dB).								OVERALL dB(A)
	63	125	250	500	1000	2000	4000	8000	
UNSILENCED ENGINE NOISE L_W	119.4	126.3	125.6	118.7	117.7	116.9	114.6	114.7	..
UNSILENCED Radiator fan L_W (Calculated)	119	123	124	125	125	125	123	121	130
CANOPY PREDICTED L_P @1m	64.1	74.3	78.2	75.9	69.9	56.9	56.9	52.8	81.6
INLET ATTN PREDICTED L_P @1m	99.3	96.3	80.7	67.3	58.2	55.2	60.2	74	82.2
DISCHARGE PREDICTED L_P @1m	102.6	97.1	80.8	62.8	56.7	56.1	54.0	72.8	83.1
UNSILENCED EXHAUST NOISE Lw SDMO Data	129.9	142.9	135.2	129.3	125.4	123.8	125.6	124.2	..
PREDICTED EXHAUST L_P @1m	99.0	95.0	87.0	69.0	60.0	54.0	56.0	59.0	83.0

NOTES: Grey areas above denote source data stated in L_W Sound Power levels.
White areas above denote calculated data, stated in L_P Sound Pressure levels at 1m from the unit.

Calculations for noise within the unit is carried out using both the engine and radiator fan as noise sources to ensure "Beaming" from fan Pure Tones is prevented in the discharge attenuator.

Figure 9-5: Emergency Generator Sound Levels

9.8 Assessment of Effects

Embedded Mitigation

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

Demolition and Construction

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

Construction Environmental Management Plan

9.8.3 A Construction Environmental Management Plan (CEMP) would be prepared that defines construction mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive

receptors. This would be updated as the project progresses to incorporate specific measures for all phases of the construction works where noise and vibration may give rise to disturbance.

9.8.4 The CEMP would include the following Best Available Techniques (BAT):

- Use of plant conforming with relevant Irish standards, directives or recommendations on noise or vibration.
- Works would only be carried out within agreed working hours. Restricted working hours (including Monday-Friday: 07:00-19:00, Saturday: 08:00-13:00, and no working on Sundays or Bank Holidays). Planning of working hours to take account of the effects of noise and vibration upon persons in areas surrounding site operations and upon persons working onsite.
- Construction plant would be maintained in good condition with regards to minimising noise output and workers exposed to harmful noise and vibration.
- All drivers to site, including deliveries, would drive vehicles in a considerate manner in accordance with the specified speed limits with any failure to comply addressed as per infringements of the contractor's Project Health and Safety Plan.
- Construction plant would be operated and maintained appropriately, having regard to the manufacturer's written recommendations and maintenance programmes.
- Starting-up plant and vehicles sequentially rather than all together. Plant, equipment and site vehicles would be switched off when not in use.
- Construction traffic would only use the designated routes as per the construction traffic management plan as outlined in Chapter 5: Construction Description.
- The transport of construction materials, spoil and personnel would be programmed and routed to reduce the risk of increased noise and vibration impacts.
- Adoption of quiet working methods, using plant with lower noise emissions, where reasonably practicable.
- Use of silenced and well-maintained plant conforming with the relevant Irish directives relating to noise and vibration. Vehicle and mechanical plant used for the purpose of the works would be fitted with effective exhaust silencers and/or mufflers, maintained in good working order and operated in such a manner as to minimise noise emissions.
- Construction plant and activities would be positioned to minimise noise at sensitive locations.
- Equipment that breaks concrete by munching or similar, rather than by percussion, would be used as far as is practicable.
- Mufflers would be used on pneumatic tools.
- Avoiding breaking out hard surfaces using percussive techniques, where reasonably practicable. Where practicable, rotary drills actuated by hydraulic or electrical power would be used for excavating hard materials.
- Adoption of working methods that minimise vibration generation, where reasonably practicable;
- Locating plant away from noise and vibration sensitive receptors, where feasible;
- Use of site hoarding, assumed 2.4m high, and acoustic screening for static items of plant and work areas, where feasible;
- Avoiding unnecessary revving of engines and switch off equipment, when not required;
- Keeping internal haul routes well maintained and avoid steep gradients;
- Use of rubber linings for chutes and dumpers to reduce impact noise;
- Minimisation of drop height of materials;
- Carrying out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
- Providing briefings for all site-based personnel so that noise and vibration issues are understood, and mitigation measures are adhered to;
- Management of plant movement to take account of surrounding NSRs, as far as is reasonably practicable; and
- Carrying out compliance monitoring of onsite noise and vibration levels to ensure that the agreed limits are being adhered to.

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

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

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

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

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

Demolition and Construction Effects

Demolition and Construction Noise

9.8.9 Reference should be made to Appendix 9.2 for details of the construction noise calculation that has been used to inform this summary.

9.8.10 Table 9-26 presents the mitigated noise levels (dBA) at various distances from the construction activities taking place at the site. A +3 dB building façade correction factor has been applied in accordance with BS 5528:2009+A1 2014.

Table 9-26: Construction noise assessment results, dB L_{Aeq} (façade levels)

Activity	NSR1 (Offices)	NSR2 (Nangor Lea)	NSR3 (Baldonnel Rd)	NSR4 (Baldonnel Rd)	NSR5 (Baldonnel Rd)
Min. separating distance[1]	75/120m	155/200m	690/770m	535/690m	680/830m
Enabling Works	60	53	41	43	41
Demolition	55	52	41	42	42
Substructure	58	53	41	42	41
Superstructure	50	46	34	35	33
Internal Fit-out	47	42	31	32	30
External Works	58	52	39	41	39

[1]Distance to boundary for Enabling and External Works / distance to building footprint, at the closest point

9.8.11 The noise levels at the identified NSRs are not predicted to exceed the threshold criteria as demonstrated by the above table.

9.8.12 On the basis of the predicted mitigated noise levels and distances to NSRs, the demolition and construction works are predicted to give rise to noise levels that would constitute:

- a **direct, temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), not-significant in terms of EIA; and
- **direct, temporary, Slight, Negative** (low magnitude) effects for receptors NSR2-5 (high sensitivity), not-significant in terms of EIA.

Demolition and Construction Traffic Noise

9.8.13 The management of demolition and construction vehicle movements would form an integral part of the CEMP as outlined above.

9.8.14 The assessment has calculated a maximum number of trips per hour to not exceed the construction noise limit (65 dB $L_{Aeq,T}$).

9.8.15 Based on a (83 dBA at 10m) 44t lorry travelling at 34 kph, the peak permissible number of HGV vehicle movements passing a NSR at 20m (the shortest distance been the NSR and the road centreline) has been assessed as 16 per hour, or 8 return journeys per hour. On this basis the predicted demolition and construction traffic noise level would be calculated as 65 dB $L_{Aeq,1hour}$. This would constitute:

- a **Direct, Temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), Not-significant in terms of EIA; and
- **direct, temporary, Slight, Negative** (low magnitude) effects for receptors NSR2-5 (high sensitivity), Not-significant in terms of EIA.

Demolition and Construction Vibration

9.8.16 With reference to Table 9-7, the assessed receptors are at distances greater than which vibration may be perceptible.

9.8.17 Receptor NSR1 is deemed to be at 75 m from the site boundary/proposed works, at the closest point. No works that would take place at the site boundary are expected to generate sufficient levels of vibration to be perceivable at receptor NSR1. All other receptors are of much greater distance from the site boundary/proposed works.

9.8.18 Demolition and construction vibration constitutes:

- a **direct, temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), Not-significant in terms of EIA; and
- direct temporary **Slight, Negative** and **Not Significant** (low magnitude) effects for receptors NSR2-5 (high sensitivity), Not-significant in terms of EIA.

Operation Effects

9.8.19 This section of the chapter outlines:

- Noise emission limits applicable to the operation of the proposed development and the July 2022 DUB-1 permitted development;
- The equipment that will be required for the operation of the proposed development;
- The predicted operational noise levels for:
  - Scenario 1: worst-case operation of the proposed development, with the impact of the proposed development assessed as a contribution to noise generated by the campus as whole, including the July 2022 DUB-1 permitted development;
  - Operational Scenario 2: best-case operation of the proposed development, with the impact of the proposed development assessed as a contribution to noise generated by the campus as a whole, including the July 2022 DUB-1 permitted development; and
  - Scenario 3: emergency operation of the proposed development, with the impact of the proposed development assessed as a contribution to noise generated by the campus as whole, including the July 2022 DUB-1 permitted development.

9.8.20 The results are compared to the future baseline noise levels with the July 2022 DUB-1 permitted development operational.

9.8.21 The effects are described against the noise emission limits and the contribution of the proposed development to the future baseline noise levels with the July 2022 DUB-1 permitted development operational.

Building Services Plant

Noise Emission Limits

9.8.22 The specifications for fixed plant installations serving the proposed development have been based on the following noise limits, which have been set in accordance with BS 4142:2014+A 2019 and local requirements.

9.8.23 Limits are set at 1 m from the window of the nearest NSRs and include a façade reflection.

Table 9-27: Noise Emissions Limits for New Building Services Plant

NSR reference	Time Period	Representative Background Noise Level $L_{A90,15min}$ (dB)	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Emergency Noise Limit $L_{Aeq,1hr}$ (dB)
1-2	Daytime (07:00-19:00)	46	≤56	55
	Evening (19:00-23:00)	44	≤44	55
	Night-time (23:00-07:00)	42	≤42	55
3-5	Daytime (07:00-19:00)	42	≤52	55
	Evening (19:00-23:00)	40	≤40	55
	Night-time (23:00-07:00)	38	≤38	55

9.8.24 The proposed development would run 24 hours a day, 7 days a week. Therefore, the assessment has considered the noise emission limits during night-time only (for normal operation).

9.8.25 The limits for NSRs 1 and 2 have been taken from the unattended noise survey results of LT1. The limits for NSRs 3-5 have been taken from the unattended noise survey results of LT2.

9.8.26 The limits set in Table 9-27 are based on the representative background noise levels measured during the baseline noise survey and are equal to the limits set for the assessment of the July 2022 DUB-1 permitted development.

9.8.27 The future baseline would include the operation of the July 2022 DUB-1 permitted development and so therefore, background noise levels may be slightly higher than the background noise levels used for setting plant noise limits.

9.8.28 The rating noise levels for the July 2022 DUB-1 permitted development were equal to the representative background noise levels, as a worst case (for NSR 4) for scenario 1 of the proposed development. The predicted rating noise levels for all other NSR locations were below the representative background noise levels in scenario 1.

9.8.29 The rating noise levels for the July 2022 DUB-1 permitted development were less than the representative background noise levels for all NSRs for scenario 2 of the proposed development.

9.8.30 It is not possible to accurately calculate the future baseline noise levels by combining the typical measured background noise levels with the predicted specific noise levels from the operation of the July 2022 DUB-1 permitted development. Therefore, it has been deemed appropriate to compare the rating noise levels of the proposed development, with the contribution of the July 2022 DUB-1 permitted development, to the representative background noise levels as measured during the baseline noise survey, as the findings of the July 2022 DUB-1 permitted development assessment found that the DUB-1 operation was not expected to significantly affect the background noise levels at the NSRs.

9.8.31 Therefore, the noise impact of the proposed development has been assessed against the background noise levels without the contribution of the July 2022 DUB-1 permitted development and has been compared to the predicted rating noise levels with the July 2022 DUB-1 permitted development in operation, to calculate the difference between the rating noise levels of the proposed development and the July 2022 DUB-1 permitted development.

Proposed Development Equipment

9.8.32 With reference to the DUB-1 Future Baseline Equipment section above, the proposed development would comprise the following equipment:

- 14 no. Airedale TurboChill V chillers with acoustically attenuated inlets and discharge (or equivalent); and
- 13 no. KD3300-F emergency generators, silenced to 85dBA at 1m (or equivalent).

Modelled Sound Levels – Normal Operations

9.8.33 Noise levels have been predicted using the computer noise propagation model, the proposed building constructions, proposed screens and barriers and proposed fixed plant installations, inclusive of any embedded mitigation measures as outlined in this assessment.

9.8.34 Extracts of the noise model for scenarios 1 and 2 are shown in Figure 9-6 and Figure 9-7, respectively. The noise contour plots in each scenario include the contribution from the DUB-1 campus as the future baseline noise levels.

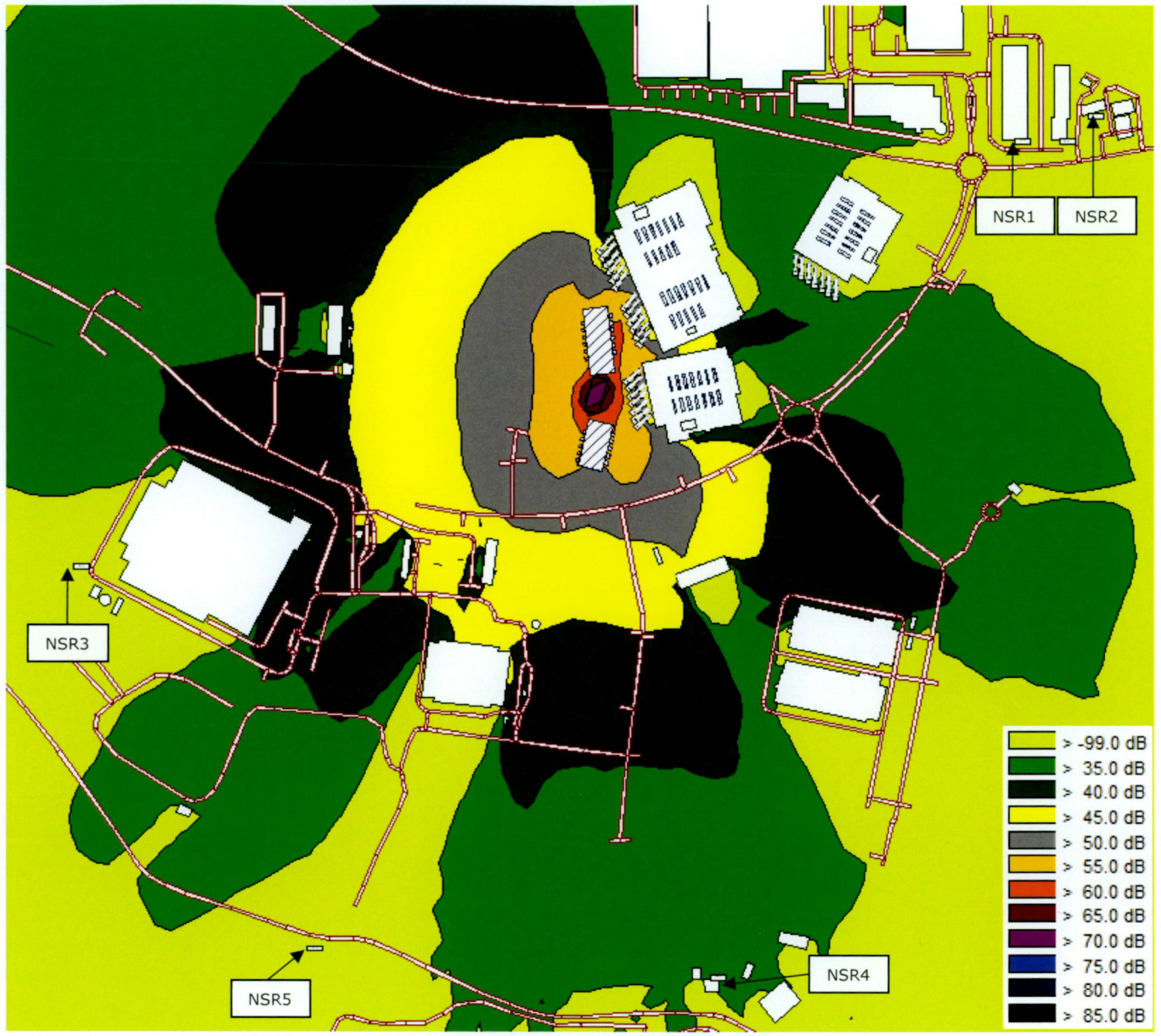

Figure 9-6: Scenario 1 worst-case noise emissions at 4.0 m above ground level

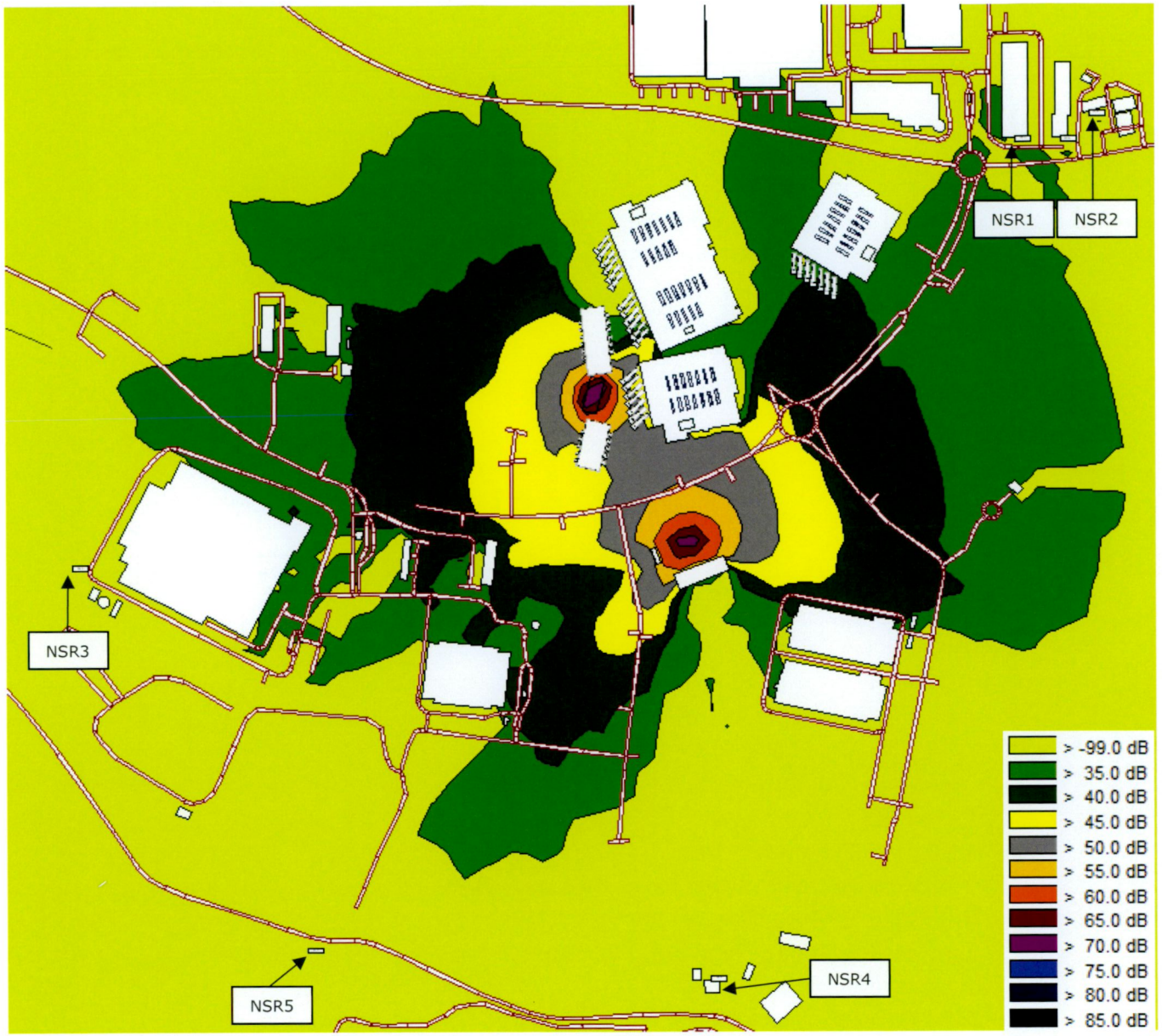

Figure 9-7: Scenario 2 best-case noise emissions at 4.0 m above ground level

9.8.35 Table 9-28 details the noise emissions from the July 2022 DUB-1 permitted development, without the proposed development operational.

Table 9-28: July 2022 DUB-1 permitted development predicted normal operational building services noise at NSR at 1m from the façade with façade reflection

NSR reference	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Predicted Rating Noise Level $L_{Ar,Tr}$ (dB)		
		Scenario 1	Scenario 2	Scenario 3 (Emergency)
1	42	37	37	49
2	42	29	33	43
3	38	32	26	44
4	38	38	28	50
5	38	32	32	44

9.8.36 The predicted noise levels at each NSR location for the proposed development operating in addition to the July 2022 DUB-1 permitted development campus are detailed in Table 9-29.

Table 9-29: Proposed development (in addition to July 2022 DUB-1 permitted development) predicted normal operational building services noise at NSR at 1m from the façade with façade reflection

NSR reference	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Predicted Rating Noise Level $L_{Ar,Tr}$ (dB)		
		Scenario 1	Scenario 2	Scenario 3 (Emergency)
1	42	36	37	51
2	42	28	33	45
3	38	32	26	45
4	38	38	28	52
5	38	32	32	44

9.8.37 The difference in predicted rating levels between the proposed development and July 2022 DUB-1 permitted development are detailed in Table 9-30.

Table 9-30: Predicted rating noise level difference between the proposed development and the July 2022 DUB-1 permitted development

NSR reference	Predicted Rating Noise Level Difference (dB) Proposed Development – July 2022 DUB-1 permitted development		
	Scenario 1	Scenario 2	Scenario 3 (Emergency)
1	-1	0	2
2	-1	0	2
3	0	0	1
4	0	0	2
5	0	0	0

9.8.38 The predicted noise rating levels for Scenario 1 (worst-case typical operation) meet the required limits and do not cause an increase in the predicted noise levels from DUB-1. This constitutes a direct **long-term to permanent Slight**, **Negative** (low magnitude) effect which is **Not Significant** in terms of EIA for all NSRs (medium-high receptor sensitivity).

9.8.39 The predicted noise rating levels for Scenario 2 (best-case typical operation) meet the required limits and do not cause an increase in the predicted noise levels from DUB-1. This constitutes a direct **long-term to permanent Slight**, **Negative** (low magnitude) effect which is **Not Significant** in terms of EIA for all NSRs (medium-high receptor sensitivity).

Modelled Sound Levels – Emergency Condition

9.8.40 An extract of the noise model showing the calculated noise levels during the emergency scenario is shown in Figure 9-8. The noise contour plot includes the contribution from the DUB-1 campus as the future baseline noise levels.

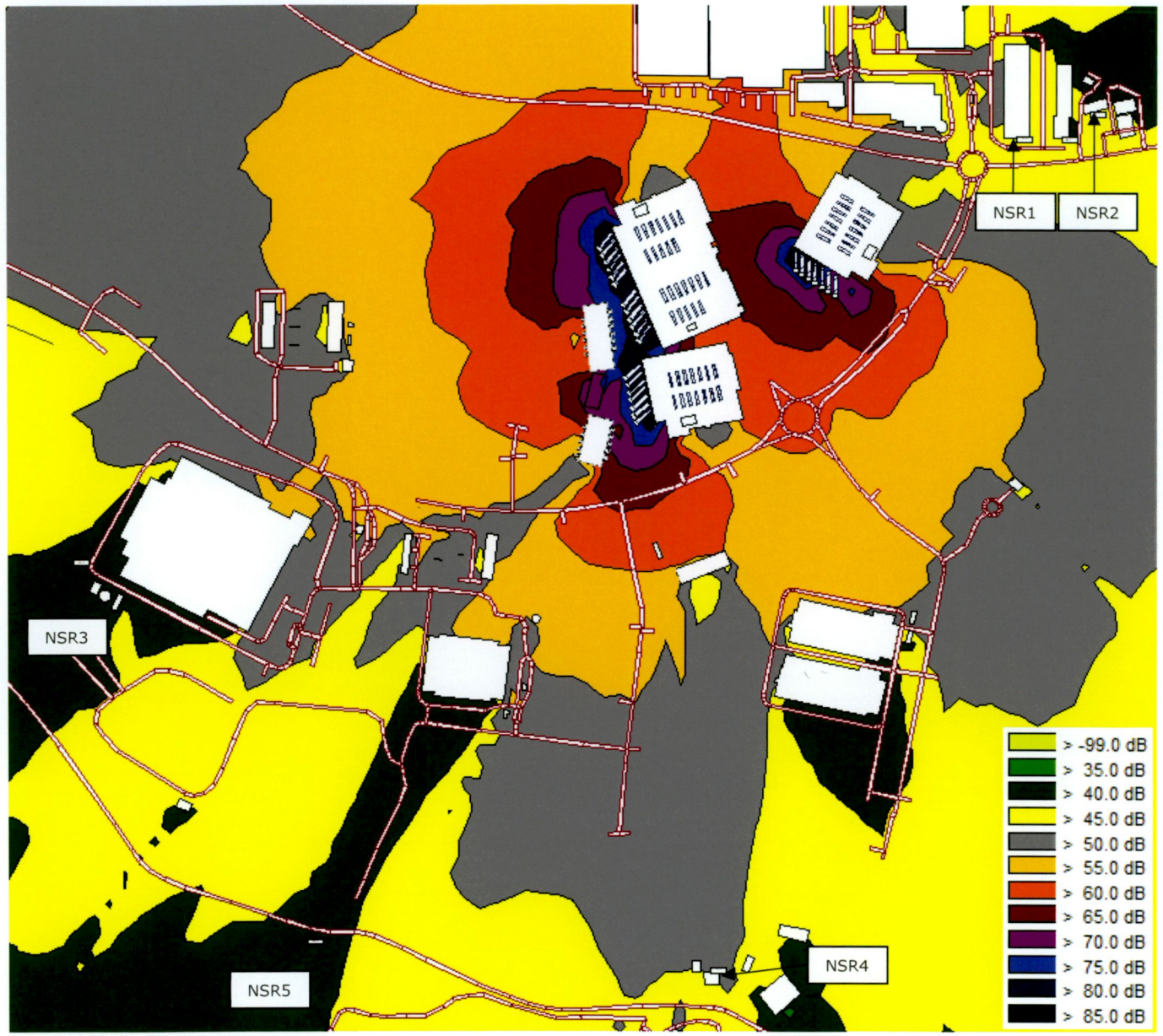

Figure 9-8: Scenario 3 emergency noise emissions at 4.0m above ground level

9.8.41 With reference to Scenario 3 (emergency operation) of Table 9-30, the predicted noise rating levels meet the required limits and are predicted to cause an increase over the predicted noise levels from DUB-1, of up to 2 dB. This constitutes a direct temporary brief **Slight**, **Negative** (low magnitude) effect which is **Not Significant** in terms of EIA for all NSRs (medium-high receptor sensitivity).

9.9 Additional Mitigation

Demolition and Construction Stage

9.9.1 No significant effects are identified therefore no additional mitigation is proposed.

9.9.2 The CEMP would include provision for monitoring to see that construction phase noise levels do not exceed thresholds above which significant effects may occur. Any complaints would be recorded and addressed with additional mitigation considered as appropriate.

Operation Stage

9.9.3 No significant effects are identified therefore no additional mitigation is proposed.

9.9.4 It is expected that compliance with the adopted criteria for plant noise emissions can be achieved through use of a suitably worded planning condition.

9.9.5 Noise and vibration monitoring has not been proposed during the operational phase of the proposed development.

9.10 Enhancement Measures

9.10.1 No enhancement measures are proposed in respect of noise and vibration.

9.11 Assessment of Residual Effects

Demolition and Construction Residual Effects

9.11.1 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the assessment of effects section.

- Demolition and Construction Noise
  - a **temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), (Not-significant in terms of EIA); and
  - a **temporary, Slight, Negative** (low magnitude) effects for receptors NSR2-5 (high sensitivity), (Not-significant in terms of EIA).
- Demolition and Construction Traffic
  - a **temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), (Not-significant in terms of EIA); and
  - a **temporary, Slight, Negative** (low magnitude) effects for receptors NSR2-5 (high sensitivity), (Not-significant in terms of EIA).
- Demolition and Construction Vibration
  - a **temporary, Not Significant, Negative** (low magnitude) effect for NSR1 (medium sensitivity), (Not-significant in terms of EIA); and
  - **temporary, Slight, Negative** (low magnitude) effects for receptors NSR2-5 (high sensitivity), (Not-significant in terms of EIA).

Operation Residual Effects

9.11.2 As no additional mitigation would be required, the residual operation effects remain as reported in the assessment of effects section.

- Scenario 1 (worst-case operation of the proposed development)
  - a **long-term to permanent Slight**, **Negative** (low magnitude) effect (Not-significant in terms of EIA) for all NSRs (medium-high receptor sensitivity).
- Scenario 2 (best-case operation of the proposed development)
  - a **long-term to permanent Slight**, **Negative** (low magnitude) effect (Not-significant in terms of EIA) (medium-high receptor sensitivity) for all NSRs.
- Scenario 3 (emergency operation of the proposed development)

- brief to temporary **Slight**, **Negative** (low magnitude) effect (Not-significant in terms of EIA)(medium-high receptor sensitivity) for all NSRs.

Summary of Residual Effects

9.11.3 Table 9-31 provides a summary of the outcomes of the noise and vibration assessment of the proposed development. Where **Significant Positive** effects are likely these are highlighted in bold green and where **Significant Negative** effects are predicted these are highlighted in bold red.

Table 9-31: Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
NSR1	Demolition and Construction Noise	None required	Not significant	-	L	D	IR	T
NSR2-5	Demolition and Construction Noise	None required	Slight	-	L	D	IR	T
NSR1	Demolition and Construction Traffic Noise	None required	Not significant	-	L	D	IR	T
NSR2-5	Demolition and Construction Traffic Noise	None required	Slight	-	L	D	IR	T
NSR1	Demolition and Construction Vibration	None required	Not significant	-	L	D	IR	T
NSR2-5	Demolition and Construction Vibration	None required	Slight	-	L	D	IR	T
Operation								
All NSRs	Scenario 1 (worst-case)	None required	Slight	-	L	D	IR	Lt to P
All NSRs	Scenario 2 (best-case)	None required	Slight	-	L	D	IR	Lt to P
All NSRs	Scenario 3 (emergency)	None required	Slight	-	L	D	IR	B to T

Notes:

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

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

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

9.12 Cumulative Effects

Intra-Project Effects

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

Inter-Project Effects

9.12.2 Table 9-32 provides a summary of the likely inter-project cumulative effects resulting from the proposed development and the cumulative developments.

Table 9-32: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
1. Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 [SD20A/0283]	No	Demolition and construction phases do not overlap and therefore no effects considered likely	No	Site emissions calculated to be up to 38 dB $L_{Ar,Tr}$ at the NSRs and Microsoft site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
2. UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the UBC site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below the construction noise levels associated with the Site, and therefore are not considered significant.	No	Site emissions calculated to be up to 38 dB $L_{Ar,Tr}$ at the NSRs receptors and UBC Properties site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
3. UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No		No	Site emissions calculated to be up to 38 dB $L_{Ar,Tr}$ at the NSRs and UBC Properties site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
4. Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	No	Already constructed	No	Operational noise included within the baseline characterisation for the site.
5. Cyrus One - Grange Castle Business Park,	No	Already constructed	No	Operational noise included within the baseline characterisation for the site.

Table 9-32: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Clondalkin, Dublin 22 [SD18A/0134]				
6. Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0295]	No	Already constructed	No	Operational noise included within the baseline characterisation for the site.
7. Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	No	Demolition and construction phases do not overlap and therefore no effects considered likely	No	Site emissions calculated to be up to 38 dB $L_{Ar,Tr}$ at the NSRs and Cyrus site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
8. Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the Centrica site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below the construction noise levels associated with the Site, and therefore are not considered significant	No	Site emissions calculated to be up to 38 dBA at the NSRs and Centrica site has been designed to 45 dBA emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
9. Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the Site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below the construction noise levels associated with the Equinix Site, and	No	Site emissions calculated to be up to 38dB $L_{Ar,Tr}$ at the NSRs and Equinix site has been designed to 45dB $L_{Ar,Tr}$ emissions limit. Worst-case 1dB cumulative level expected which is not significant.

Table 9-32: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
		therefore are not considered significant		
10. Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD22A/0156]	No	Details of the proposed construction phase are not known. If constructed at the same time as the proposed development, there is potential for cumulative effects to occur. However, the construction assessment for the proposed development has shown that significant effects are not likely as predicted construction noise levels are below the relevant construction noise threshold. The Equinix site is of greater distance from the assessed receptors. Therefore, construction noise levels would be attenuated due to distance to the nearest receptors. Significant effects are not expected.	No	The proposed development noise emissions are not expected to exceed the criteria. Therefore, if the cumulative scheme is designed to the same criteria, there is potential for background noise levels to increase slightly but would not be deemed to be significant.
11. Digital Netherlands VIII B.V - Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0217]	No	The predicted construction noise levels from the Digital Netherlands site are compliant with the construction noise thresholds. If constructed simultaneously with the proposed development, there is potential for cumulative effects to occur although effects would not be expected to be significant. The predicted construction noise levels in assessment INXN DUB15/16 dated 29/07/2021 would dominate at the nearest	No	The levels from the Digital Netherlands site are predicted to be 41 dBA and 55 dBA during typical and emergency operation, respectively, at NSR4 (NSR1 of assessment INXN DUB15/16 dated 29/07/2021). The cumulative scheme is predicted to have a greater impact on NSR4, as the site is closer to the receptor location. The cumulative levels could increase by 2dB for Scenario 1 of this assessment, 0 dB for Scenario 2 and 2 dB for

Table 9-32: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
		receptor for the proposed development assessment (NSR4) due to the distance between the receptor location and the Digital Netherlands site.		Scenario 3, which are not considered significant.
12. Vantage Data Centers Dub 11 Limited - Profile Park Business Park and partly within Grange Castle Business Park, Dublin 22 [An Bord Pleanála Ref - 312793]	No	The predicted construction noise levels as far below the relevant construction noise thresholds. Significant effects are not expected to occur.	No	Predicted noise emissions from the site are below the predicted noise emissions for the proposed development and are compliant with the limiting noise criteria. The noise emissions from this scheme have been considered in Scenario 2 of the assessments contained in this chapter. Significant effects are not expected.

Demolition and Construction Cumulative Effects

9.12.3 Whilst construction noise levels could increase for the NSRs if cumulative schemes are constructed simultaneously with the proposed development, it is not expected that the construction noise thresholds would be exceeded. Therefore, effects would be expected to be direct temporary Not Significant/Slight (low magnitude), **Negative** effects for the identified receptors (medium-high receptor sensitivity). Effects would not be **Not Significant** in terms of EIA.

Operation Cumulative Effects

9.12.4 On the basis of the above table, the background noise levels are likely to increase as a result of the committed developments shown. The baseline characterisation undertaken for the site would have therefore been undertaken when background levels were lower and, as such, the noise emissions limits set out in this assessment are likely to be significantly below future baseline noise levels. Therefore, effects would be expected to be direct long-term to permanent Not Significant/Slight (low magnitude), **Negative** effects for the identified receptors (medium-high receptor sensitivity). Effects would not be **Not Significant** in terms of EIA.

9.12.5 In the event of a power failure from the national grid, cumulative impacts would be expected from emergency plant from each development. This would be expected to result in a direct brief to temporary **Slight**, **Negative** (low magnitude) effect (Not-significant in terms of EIA) (medium-high receptor sensitivity) for all NSRs.

9.13 Summary of Assessment

Background

9.13.1 This chapter has detailed the potential noise and vibration effects due to the construction and operation stages of the proposed development. The assessment of has considered the relevant national and local guidance and regulations.

9.13.2 Attended and unattended noise monitoring surveys were undertaken to establish the existing noise climate across the site. The existing baseline noise climate is generally dominated by road traffic noise and noise from fixed plant installations associated with other industrial activity in the nearby vicinity (data centers). The results of the noise surveys have been used to assess construction, and operation effects attributable to the site.

Demolition and Construction Effects

9.13.3 The assessment of noise and vibration during the demolition and construction phase was undertaken in accordance with BS 5228:2009+A1:2014, using representative data for the various phases of the works. The assessment has considered the following phases of construction:

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

9.13.4 An assessment of demolition and construction traffic noise has also been undertaken to calculate the number of HGV movements permissible per hour, along with consideration of the distance at which perceptible levels of vibration may occur from construction activities.

9.13.5 With the adoption of a CEMP and BAT implemented as part of the demolition and construction stage embedded mitigation, it is considered that the noise and vibration impacts can be controlled sufficiently to achieve acceptable levels at the surrounding sensitive receptors.

9.13.6 Overall, it is considered that the demolition of the existing residential buildings and construction of the proposed development would result in direct temporary Not Significant/Slight (low magnitude), Negative effects for the identified receptors (medium-high receptor sensitivity), and as such **would not give rise to Significant Effects** in terms of EIA.

Operation Effects

9.13.7 The proposed development would be designed to achieve the noise emission limits as stipulated by SDCC, which requires that the rating noise level does not exceed the representative background noise level, set in accordance with the principles of BS 4142:2014+A1 2019. The effects of noise emissions from proposed fixed items of plant have been considered for worst-case and best-case scenarios, along with consideration of emergency conditions in the event of the proposed development losing grid power. On the basis of the proposed design, noise emissions are predicted to meet the prescribed limits at the nearest noise sensitive receptors.

9.13.8 Overall, it is considered that the operation stage would result in a direct permanent long-term Slight, Negative effect (low magnitude), and as such **would not give rise to Significant Effects** on noise and vibration in terms of EIA (medium-high receptor sensitivity). During emergency conditions, there would be direct brief temporary Slight, Negative effect (low magnitude) that **would not give rise to Significant Effects** in terms of EIA (medium-high receptor sensitivity).

Cumulative Effects

9.13.9 The proposed development has the potential to result in cumulative effects when considered in combination with other committed developments. However, the proposed development has been designed to lower noise emissions levels than other committed developments. As such it is expected that the future baseline noise levels would be higher, irrespective of whether this development went ahead. As such, cumulative effects are **not considered significant** (low magnitude) in terms of EIA (medium-high receptor sensitivity).

10 WATER RESOURCES AND FLOOD RISK

10.1 Introduction

10.1.1 This chapter of the EIAR reports on the likely significant water resources and flood risk effects to arise from the demolition and construction stage and the operation stage of the proposed development.

10.1.2 The chapter describes the water resources and flood risk policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely water resources and flood risk effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and cumulative effects.

10.1.3 This chapter is supported by the following technical appendices in EIAR Volume 3:

- Technical Appendix 10.1: Kilgallen and Partners Consulting Engineers, Report on Site-Specific Flood Risk Assessment, DUB13-RP-00-C002-V0-PL-PIN, Issue PR1
- Technical Appendix 10.2: Pinnacle Consulting Engineers, Engineering Planning Report, DUB13-RP-00-C001-V0-WS3-PIN (includes drainage proposals)
- Technical Appendix 10.3: Pinnacle Consulting Engineers, Foul and Surface Water Drainage Layout, Drawing No. 201

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

- International Legislation:
  - Water Framework Directive (WFD) (2000/60/EC)1;
  - Environmental Quality Standards (EQS) Directive (2008/105/EC)[2] (as amended)[3];
  - Priority Substances Directive (2008/105/EC)[4];
  - Directive 2014/52/EU. The assessment of the effects of certain public and private projects on the environment[5]
- National Legislation and Policy:
  - Planning and Development Act, 2000, Updated to 16 July 2021[6];
  - The Planning System and Flood Risk Management, Guidelines for Planning Authorities[7]
  - Department of Housing, Local Government and Heritage's Guidelines for Planning Authorities and An Board Pleanála on carrying out Environmental Impact Assessment (2018)[8].
  - Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority (NRA), 2009)[9];
  - Government of Ireland Climate Action Plan (2021)[10];
- Regional and Local Policy:
  - South Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council[11];
  - Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0[12];
- Guidance and Industry Standards:
  - Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB)[13];
  - Inland Fisheries Ireland, 2016, Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters[14]
  - Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors[15];
  - Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements[16]

10.2 Assessment Scope

Technical Scope

10.2.1 Chapter 2: EIA Process and Methodology explains the assessment methodology used throughout this EIAR. The assessment in this chapter qualitative, and the evaluation of significance and effects is based on professional judgement.

10.2.2 This assessment has taken account of applicable legislation, guidance and policy.

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

- Contamination of controlled waters (surface water and/or groundwater) arising from demolition and construction works and associated drainage;
- Regular discharge of surface water, during operational use, and the associated effects on the water quality of the downstream receiving waterbodies;
- Tidal or fluvial flood risk, both in terms of impacts to the proposed development and changes to flood risk in the study areas or to downstream receptors as a result of the proposed development;
- Changes to the surface water runoff regime and associated downstream flood risks;
- Changes to local hydrogeology; and
- Demand of the local potable water network and on foul drainage infrastructure.

[1] European Union, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Document 32000L0060.
[2] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[3] European Union, 2013. Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance. Document 32013L0039.
[4] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[5] European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
[6] Government of Ireland, 2000. Planning and Development Act, Updated to 16 July 2021
[7] Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW), 2009. The Planning System and Flood Risk Management, Guidelines for Planning Authorities.
[8] Government of Ireland, 2019. Guidelines for Planning Authorities and An Bord Pleanala om carrying out Environmental Impact Assessment 2018 (last updated 19 December 2019)
[9] National Roads Authority (NRA), 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. NRA.
[10] Government of Ireland. Climate Action Plan (2021). Available at https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/ [Accessed 24/11/2021].
[11] Drainage Dublin, 2005. Greater Dublin Strategic Drainage Study Final Strategy Report
[12] Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council. Greater Dublin Regional Code of Practice V6.0
[13] Eastern Regional Fisheries Board, Fisheries Protection Guidelines. Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites
[14] Inland Fisheries Ireland, 2016, Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters
[15] CIRIA, 2001. Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA 532, 2001
[16] Institute of Geologists of Ireland, Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements

Spatial Scope

10.2.4 The study area has been defined based on professional judgment and comprises a 1 km radius from the site boundary as it is considered unlikely that effects would extend beyond this extent. However, surface water and groundwater quality are typically assessed at a river catchment level. Therefore, the potential for impacts on downstream water quality has been considered at a river catchment level in addition to the 1 km radius.

Temporal Scope

10.2.5 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary (<1 year) and from the operational stage which would be expected to be long-term (15-60 years) to permanent (>60 years) in nature.

10.3 Baseline Characterisation Method

Desk Study

10.3.1 In order to establish the existing baseline (discipline) conditions in the study area, relevant data was reviewed and assessed. The data sets and associated sources can be summarised as follows:

- Kilgallen and Partners Consulting Engineers, Report on Site-Specific Flood Risk Assessment, DUB13-RP-00-C002-V0-PL-PIN, Issue PR1 (Technical Appendix 10.1)
- Technical Appendix 10.2: Pinnacle Consulting Engineers, Engineering Planning Report, DUB13-RP-00-C001-V0-WS3-PIN (Technical Appendix 10.2)
- Pinnacle Consulting Engineers, Foul and Surface Water Drainage Layout, Drawing No. 201 (Technical Appendix 10.3)
- Environmental Protection Agency (EPA) Online Environmental Mapping and Spatial Data[17] ;
- Office of Public Works (OPW) flood mapping data[18] (www.floodmaps.ie);
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports; and
- Strategic Flood Risk Assessment (SFRA) for South Dublin County Council[19] .

Field Study

10.3.2 Field study/data collection was not required at the site as the data provided by other sources was deemed to be adequate and representative of the site conditions.

10.4 Assessment Method

Methodology

Demolition and Construction Stage

10.4.1 The identification of likely significant effects during the demolition and construction stage was based on a review of the presence of potential receptors, a qualitative assessment of the sensitivity of the receptors, the identification of potential impact pathways and an assessment of the magnitude of the potential impacts.

10.4.2 The assessment of potential impacts and likely effects has, therefore, comprised the following approach:

- Identification and establishment of the sensitivity of water resource receptors on the basis of their use, proximity to the site, existing quality or resource value;
- Consideration of potential source-pathway-receptor' linkages;
- Evaluation of the magnitude of potential impacts to water quality and hydrology as a result of the introduction of the demolition and enabling works;
- Consideration of embedded mitigation measures integral to the proposed development;
- Classification of the significance of likely effects;
- Identification of additional mitigation measures to eliminate or reduce adverse effects, where considered necessary; and
- Re-assessment to conclude the significance of residual effects.

Operation Stage

10.4.3 The demolition and construction stage methodologies have been applied to the identification of potential significant effects during the operation stage. The assessment has also been informed by the Flood Risk Assessment and Foul and Surface Water Drainage Layout (see Technical Appendices 10.1 and 10.2), which have been undertaken to assess in more detail the flood risk and to inform the design of the proposed development, and associated mitigation strategies, in order to minimise any increase in flood risk to both on-site and off-site receptors and to the proposed development itself.

Cumulative Stage

10.4.4 The potential for cumulative impacts to arise from the combined effects of several existing or proposed developments in combination with the proposed development, on water resources and flood risk have been considered in the assessment.

10.5 Assessment Criteria

10.5.1 The assessment of significance of effect with regards to Water Resources and Flood Risk is based on professional judgement of the sensitivity of the receptor and the magnitude of effect.

10.5.2 The general criteria used to assess if an effect is significant or not, is set out in Chapter 2, further details are provided herein. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement

Receptor Sensitivity/Value Criteria

10.5.3 The sensitivity of receptors has been classified as low, medium or high in accordance with the criteria set out in Table 10-1.

Table 10-1: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	Feature of low quality and rarity, with potential for substitution or tolerant of some change: • Surface water quality classified by EPA as A3 waters or seriously polluted • Heavily engineered or artificially modified watercourses • No surface water abstractions for public or private water supplies

[17] The EPA Geoportal website (available at https://gis.epa.ie)

[18] OPWs national flood information portal, providing location specific access to flood risk and flood management information (available at https://www.floodinfo.ie/)

[19] RPS, 2016. Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016-2022

Table 10-1: Receptor Sensitivity Criteria	
Sensitivity	**Criteria**
	GSI groundwater vulnerability "Low" to "Medium" classification and "Poor" aquifer importance.
Medium	Feature of medium quality and rarity, with some potential for replacement and reasonably tolerant of some change: • Surface water quality classified by EPA as A2. • Salmonid species may be present in the watercourse which may be locally important for fisheries. • Abstractions for private water supplies. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.
High	Feature of high quality and rarity, or with limited potential for replacement and highly sensitive to some change, e.g. • Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. • Surface water quality classified by EPA as A1 and salmonid spawning grounds present. • Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer

Impact Magnitude Criteria

10.5.4 The magnitude of impact has been classified as low, medium, or high, in accordance with the criteria set out in Table 10-2.

Table 10- 2: Impact Magnitude Criteria	
Magnitude of Impact	**Criteria**
Negligible	No perceptible alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
Low	Small alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
Medium	Medium alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
High	Large alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.

Scale of Effect Criteria

10.5.5 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 10-3.

Table 10- 3: Scale of Effect Criteria			
Magnitude	**Sensitivity of Receptors**		
	Low	**Medium**	**High**
Negligible	Imperceptible	Imperceptible	Imperceptible/Not Significant
Low	Imperceptible	Imperceptible/Not Significant	Slight/Moderate
Medium	Imperceptible/Not Significant	Moderate	Moderate/Significant
High	Slight/Moderate	Moderate/Significant	Very Significant/Profound

10.5.6 Based on Environmental Protection Agency's (EPA) Guidelines on the information to be contained in Environment Impact Assessment Reports[20] (2022), as described in Chapter 2: EIA Process and Methodology, effects ranging from 'moderate' to 'profound' are considered 'significant' in terms of EIA.

Nature of Effect Criteria

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

10.6 Assumptions and Limitations

10.6.1 The assessment has relied on data included within the Flood Risk Assessment (Technical Appendix 10.1) as well as publicly available data reported via the EPA online Environmental Mapping and Spatial Data Service and the OPW online Flood Mapping. It has been assumed that these datasets were correct at the time of reference.

10.7 Baseline Conditions

Existing Baseline

Existing Site

10.7.1 The site is predominantly greenfield and is understood to have historically been in agricultural use with a single residential property present in the northwest of the site and outbuildings and an area of hardstanding in the southeast of the site.

Existing Surface Water Features

10.7.2 The Baldonnel Stream crosses under Falcon Avenue and flows through the south of the site, entering the site in the southeast before meandering north-west and then leaving the site. Approximately 190 m downstream (west) it enters a short 0.6 m culvert, and approximately 300 m downstream it discharges to a long twin-pipe culvert. A visual assessment of the channel of the stream and the culverts reported in the FRA suggests that the twin-pipe culverts have a lower hydraulic capacity than the open channel sections. The Baldonnel Stream ultimately discharges to the River Griffeen and then to the River Liffey.

10.7.3 There are several small lakes and ponds in a golf course 200 m south-east.

[20] Environmental Protection Agency, 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

Surface Water Quality

10.7.4 The site is situated within the Liffey and Dublin Bay WFD Catchment, and the Liffy Sub-Catchment. Presently, the EPA classifies the Liffy sub-catchment as having a 'good' ecological status or potential and a 'Good' chemical surface water status.

10.7.5 The closest EPA monitoring stations are:

- Baldonnel Stream (RS09B090400) 400 m west of the site, downstream of Bolands Garage; and
- Griffeen (RS09G010200), located approximately 1.2 km west of the site.

10.7.6 The latest EPA biological assessment of surface water from the latter location indicated a score of Q3 (poor) in 1991. The main pressure preventing the achievement of 'Good Status' for the River Liffey WMU (Water Management Unit) identified by the EPA 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' which was due to its fish status and overall chemical status which each obtained a 'Bad' classification.

Existing Surface Water Drainage

10.7.7 There is not considered to be any existing engineered surface water drainage assets within the site, and none was identified in the FRA. There is an open ditch running along a portion of the western boundary that connects to the Baldonnel Stream.OPW and CFRAM Flood Mapping

10.7.8 The OPW online Flood Mapping service[21] which includes mapping prepared as part of the CFRAM programme does not indicate any records of historic flooding at the site. The closest instance of historic flooding is more than 1 km west and is not hydrologically connected to the site.

10.7.9 The majority of the site is shown in the mapping to be outside of the 'Low' fluvial flooding probability and is, therefore not predicted to be at risk of flooding during fluvial events with a 1 in 1,000 Annual Exceedance Probability (AEP). Only areas of the site directly adjacent to the Baldonnel Stream are indicated in the OPW mapping to be within an area of 'Low' fluvial flooding probability. A Low fluvial flooding probability designation represents the "*modelled extent of land that might be flooded by rivers in a very extreme flood event*". Low Probability flood events are indicated by the OPW to have a 1 in a 1000 AEP; i.e. they have a 0.1% chance of being exceeded in any year. The area of the site in the Low fluvial flood risk extent is very limited (<10 m from the stream).

10.7.10 The entire site is shown to be outside of the area of Medium fluvial flood probability (areas indicated by the OPW to have a 1 in a 100 AEP; i.e. land that could have a 1% chance of being flooded in any year).

10.7.11 The OPW mapping shows the 'Present Day' scenario (referred to as the Current Scenario in the Maps and Plans) which "were generated using methodologies based on historic flood data, without taking account of potential changes due to climate change". Flood level data is not provided by the OPW for the site.

10.7.12 The National Indicative Fluvial Mapping available in the OPW mapping indicates no potential flooding within the site.

SFRA Flood Mapping

10.7.13 Alternative mapping prepared as part of the SFRA for South Dublin County Council (SFRA Flood Zone Mapping Sheet 4) indicates the Baldonnel Stream channel through the site could be affected by the 0.1% AEP and 1.0% AEP flood events.

Hydraulic Modelling

10.7.14 A hydrological model was prepared as part of the FRA (Technical Appendix 10.1) to simulate flow patterns during the 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events. Peak flood flows were estimated using statistical methods for ungauged small catchments and the responses of the catchment to these flows was modelled using the River and Flood Analysis module of the industry standard package Infrastructure Ultimate Design Suite produced by Autodesk. The hydrological modelling within this module is itself based on the HEC-RAS modelling software produced by the US Army Corps of Engineers peak flood flows were estimated using statistical methods for ungauged small catchments. The site was found to be not affected by either 1% or 0.1% AEP flood risk zones.

Flood Defences and Structures

10.7.15 The Baldonnel Stream flows through two parallel 0.6 m internal diameter culverts downstream of the western boundary of the site. There are further culverted sections downstream of this between the site and the River Griffeen.

Groundwater

10.7.1 As set out in Chapter 12: Ground Conditions, there are three main bedrock aquifer classifications in Ireland (regionally important, locally important and poor aquifers) and the bedrock aquifers underlying the site (Dinantian Limestones) are classified as Locally Important; i.e. an aquifer which is moderately productive only in local zones. It is also reported in Chapter 12: Ground Conditions that, during a 2022 ground investigation, groundwater strikes were recorded as either seepages or slow ingress. In the case of trial pits, groundwater was recorded between 1.80 m below ground level and 2.0 m below ground level. The groundwater strikes are typically associated with recorded stratum of grey sandy clayey angular gravel of possible weathered rock; and within stiff gravelly clay. In case of the boreholes, groundwater was recorded between 1.50 m and 1.90 m. The groundwater strikes are typically associated with recorded stratum of stiff to very stiff sandy silty and gravelly clay of glacial till deposits. Groundwater is likely to be in continuity with the Baldonnel stream which runs through the centre of the site and given this the groundwater flow direction is likely to be towards the north.

10.7.2 The WFD Groundwater Body underlying the site is the Dublin GWB (EU GWB Code: IE_EA_G_008), which currently has 'good' status and has a GWB risk score of 'not at risk' (2010-2015 WFD status). The GSI classifies the aquifer vulnerability underlying the site to be high (H), with the subsoils being of low permeability.

10.7.3 The site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA. There are no wells or springs within 1 km of the site and the closest being approximately 3 km southeast. There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or adjacent the site.

Future Baseline

10.7.4 Per the methodology set out in Chapter 2: EIA Process and Methodology, effects of the proposed development are to be assessed against a future baseline comprising the implementation of the July 2022 consented DUB-1 development. This development proposes improvements to the Baldonnel stream floodplain, as well as maintenance regime for all drainage features within the site and for regular inspection of drainage features immediately upstream and downstream of the site as part of the Site-Specific Flood Risk Mitigation Plan. The only other additional changes to the future baseline with regard to water resources and flood risk are associated with climate change. The FRA and surface water drainage strategy (which is included within the Engineering Planning Report) are provided in Technical

[21] OPW online flood mapping (available at https://www.floodinfo.ie/map/floodmaps)

Appendices 10.1 and 10.2 respectively and take account of potential for increased fluvial flood risk and increased rainfall rates associated with climate change.

Sensitive Receptors

10.7.5 The receptors identified as sensitive to the proposed development, and which have been 'scoped-in' to the assessment are summarised in Table 10-4.

Table 10- 4: Summary of Sensitive Receptors

Receptor	Sensitivity
Surface Water Features Baldonnel Stream	Medium Baldonnel stream is heavily altered. Although the stream is classified as being of moderate WFD status, it is also given a biological assessment score of 'poor' downstream of the site.
Flood Risk (on-site or downstream terrestrial receptors within the catchment)	High The flood risk status of a site or receptor is considered to be of high sensitivity due to the potential implications of a flood event.
Groundwater	Medium The Dublin GWB underlying the site is of 'good status' and has a GWB risk score of 'not at risk', however the site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA.

10.7.6 Direct impacts on groundwater quality are scoped out of the subsequent assessment. Although groundworks and installation of foundations during the demolition and construction phase of the proposed development would involve an interaction with the on-site soils and water environment, the potential impacts are considered separately within Chapter 12: Ground Conditions. It is noted that demolition and construction works are to be undertaken in compliance with a CEMP which would be established and maintained by the contractors during the demolition and construction stage which will cover all potentially polluting activities and emergency response procedures. Chapter 12: Ground Conditions does not assess the potential for the proposed development to affect local recharge to the underlying aquifer. However, as the overall area of aquifer is large relative to the site area, the potential reduction in local recharge is considered in to have no potential for significant change in the natural hydrogeological regime and is therefore not considered further. However, the potential for localised disruption of groundwater is considered.

10.8 Assessment of Effects

Demolition and Construction Effects

10.8.1 The following effects on water resources and the water environment could arise during the demolition and construction stage of the proposed development:

- Contamination of Surface Water as a result of silt-laden runoff across the demolition and construction site and from stockpiles, polluting substances (e.g. fuels and chemicals) from accidental spillages and other wastes during general demolition and construction activity;
- Change in Surface Water Quality and Hydrodynamic Status (as a result of the proposed works/enhancements in the Baldonnel Stream floodplain);
- Disruption of Groundwater during construction excavations;
- Changes to Fluvial Flood Risk; and
- Water Supply and Foul Drainage During Construction.

Contamination of Surface Water

10.8.2 There are a range of embedded mitigation measures that are incorporated within the Proposed Development in order to reduce the potential for effects on the surface water environment. A project-specific Construction and Environmental Management Plan (CEMP) would be established and maintained by the contractors during the demolition and construction stage which would cover all potentially polluting activities and emergency response procedures. All personnel working on the site would be trained in the implementation of the procedures. The measures identified in this section and in Chapter 12, and those provided in Chapter 5: Demolition and Construction, would be included in the CEMP.

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

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

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

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
- Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
- Pumps or valves would be fitted with a lock and would be secured when not in use;
- All bowsers to carry a spill kit;
- Operatives must have spill response training; and
- Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:
- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they would be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

10.8.6 The aforementioned list of measures is non-exhaustive and would be included in the CEMP.

10.8.7 Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthworks operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.

10.8.8 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All runoff will be prevented from directly entering into any water courses or drainage ditches.

10.8.9 Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g. silt traps, 20 m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

10.8.10 Considering the embedded mitigation that would be specified within the CEMP, which in turn would be secured by means of an appropriately worded planning condition the effects would be of a low magnitude. Although the Baldonnel Stream passes through the south of the site, and is considered to be of Medium sensitivity, the likely effect would be only **Temporary, Imperceptible/Not Significant, Negative** (**Not Significant** in terms of EIA) and no further mitigation beyond that to be set out in the CEMP is necessary.

Change in Surface Water Quality and Hydrodynamic Status as a Result of Proposed Works in the Baldonnel Stream Floodplain

10.8.11 In order to reduce the potential effects of the proposed construction works in the floodplain on surface water quality and hydrodynamic status, mitigation is embedded within the design and within construction methodologies. It is proposed that the works would be carried out in line with the Irish Fisheries Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters, with appropriate protection measures to channel during construction works.

10.8.12 As described in the FRA, where the Baldonnel Stream crosses under the Falcon Avenue upstream of the site, this is through a twin-pipe culvert, each pipe 1400mm diameter. The proposed road crossing within the site is 20m downstream from the existing Falcon culvert. The initial designs considered within the FRA propose a box culvert to convey the Stream under the proposed crossing. The internal dimensions of the box culvert would be 1.4m in height and 3.5m in width such that it would have a significantly greater hydraulic capacity than that of the existing Falcon Avenue culvert.

10.8.13 Therefore, over the short term, improvements to the landscaping in the floodplain would be expected to result in a beneficial impact of low magnitude on the Baldonnel Stream (medium sensitivity) which equates to a **Temporary**, **Imperceptible/Not Significant**, **positive** effect i.e. **Not significant** in terms of EIA.

Effects on Groundwater during Construction Excavations

10.8.14 As set out previously, a ground investigation at the site encountered groundwater generally between 1.5m and 2.0m blow existing ground level. This groundwater is likely to be in continuity with the Baldonnel stream which runs through the south of the site. Given this, the groundwater flow direction is likely to be towards the south. Excavations could result in short-term changes to groundwater patterns. However, this is unlikely to lead to a significant change to hydrogeological conditions beyond the site boundary.

10.8.15 The proposed development would involve groundworks. This would therefore have an interaction with the on-site soils and water environment. Correct management of the excavations would be set out in the CEMP and would seek to minimise inflow of shallow/perched groundwater into any excavation. It is anticipated that water arising from excavations would be disposed of to the local sewer network if uncontaminated and following the removal of silt via settlement ponds or alternative sediment control measures.

10.8.16 Whilst the excavations and associated dewatering could result in a localised draw down of groundwater levels, given the scale of works relative to the total contributing catchment to the Baldonnel Stream, it is unlikely that the works would have a significant effect on overall groundwater contribution to the watercourse.

10.8.17 Therefore, it is assessed that the potential impact of the proposed development on groundwater flows (medium sensitivity) would be of negligible magnitude and the effect **Temporary, Imperceptible and Negative, i.e Not Significant** in terms of EIA.

Effects on Fluvial Flood Risk

10.8.18 The FRA assessed the site as not being affected by 1% or 0.1% AEP events. Changes to ground level as part of the proposed development would therefore not displace floodplain storage associated with fluvial flood risk.

10.8.19 The design of the proposed road crossing box culvert of the Baldonnel Stream would ensure that the hydrological capacity of the culvert is greater than that of the upstream culvert so that there is no restriction on flows and therefore, no effect on fluvial flood risk.

10.8.20 Therefore, the floodplain capacity of Baldonnel Stream would be unimpacted at all stages during construction such that the proposed works would result in low magnitude changes to the watercourse's floodplain capacity which would have low sensitivity on site, which equates to a **Temporary**, **Imperceptible** and **Neutral** effect i.e. **Not Significant** in terms of EIA.

Water Supply and Foul Drainage Capacity During Construction

10.8.21 As set out in Chapter 15: Material Assets, welfare facilities portable toilets would be required for the construction compound and workers. A temporary connection to the foul water drainage network may also be required to accommodate the site welfare facilities during construction. It will need to be confirmed that the network has sufficient available capacity for the wastewater discharges for the short-term demolition and construction stage. An alternative but less desirable option would be to collect and transport waste off-site.

10.8.22 Accordingly, foul drainage effects on the public sewerage network during the demolition and construction stage are considered to be **Temporary**, **Imperceptible** and **Neutral** i.e. **Not significant in terms of EIA**.

10.8.23 A temporary connection to the public mains water supply would be established for the construction phase. The water demand by site occupants during the construction phase will likely not be significant enough to affect existing pressures in the area. Effects associated with water supply during the demolition and construction stage are considered to be **Temporary**, **Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Operation Effects

10.8.24 The following potential impacts on water resources and flood risk could arise during the operation stage of the proposed development:

- Increased flood risk from the Baldonnel Stream;
- Surface Water Flood Risk: Increased surface water runoff volumes leading to flood risks off-site;
- Disruption of Groundwater: Potential to alter local groundwater flow paths and levels;
- Water Demand: Increase in water demand from the site to supply the new occupants of the proposed development; and
- Foul Sewer Capacity: Increase in discharge volumes of effluent to foul sewer.

Increased Flood Risk from the Baldonnel Stream

10.8.25 As set out previously, the site is not affected by either the 0.1% AEP and 1.0% AEP flood events. The proposed development and operation of the development are unlikely to change this fact unless there is blockage of the proposed crossing resulting in a backing up of the watercourse during a flood event.

10.8.26 As described previously, the Baldonnel Stream crosses under the Falcon Avenue through a twin-pipe culvert (each pipe 1400 mm diameter). The proposed road crossing is 20 m downstream from the Falcon Avenue culvert. A box culvert 1.4m in height and 3.5m in width is currently proposed under the crossing, which is a greater hydraulic capacity than the Park Road culvert. As noted in the FRA, to meet the requirements of the Office of Public Works (OPW) for granting Section 50 approval under the Arterial Drainage Act, culverts are typically required to have a minimum 300mm clearance between the 1% AEP water level and the soffit of the culvert. Because the box culvert will have 650mm clearance between the 1% AEP water level and the soffit level, it would meet and exceed OPW requirements.

10.8.27 As set out previously, a box culvert is proposed at the crossing. The design approach (which is not yet finalised) would need to ensures that the hydrological capacity of the culvert is greater than that of the upstream culvert so that there is no restriction on flows

10.8.28 In light of the existing upstream culvert, flood risk upstream of this location would be unaffected. Flood risk immediately upstream of the proposed box culvert would remain unaffected based on the assumption there is a sufficient hydrological capacity. With the positive impact of improvement to the Baldonnel stream in the form of wetland features and incorporated SuDS, overall, this would be considered a low magnitude impact on a high sensitivity receptor, and is a **long-term Positive, Slight/Moderate** impact and **Not Significant** in terms of EIA.

Surface Water Flood Risk

10.8.29 The FRA assessed that the site is not at risk of pluvial flood risk. Therefore, if unmitigated, the introduction of impermeable surfaces to the site would inhibit surface water infiltration and increase the discharge of surface water runoff compared to baseline levels.

10.8.30 Included in Technical Appendices 10.2 and 10.3, Pinnacle Consulting Engineers has produced a drainage design in compliance with the Greater Dublin Regional Code of Practice for Drainage Works and in accordance with the Irish Water Code of Practice. Additionally, the surface water drainage system for the proposed development is to comply with the Greater Dublin Strategic Drainage Study (GDSDS). Full compliance with GDSDS ensures the drainage system will have sufficient capacity to accommodate rainfall events up to 1% AEP (also taking int account the effects of climate change) without causing pluvial flood risk within the development and without leading to an increase in pluvial flood risk elsewhere.

10.8.31 The drainage strategy includes two attenuation ponds and a permeable paving sub-base to provide the required surface water attenuation, taking int account allowances for climate change. One pond will discharge to the Baldonnel Stream and the other attenuation pond and the permeable paving sub0base will discharge to the existing surface water sewer network. The outflow from the proposed development will be restricted by way of a Hydrobrake facility and will limit the total discharge to 2.8l/s, which is the calculated QBAR greenfield run-off rate.

10.8.32 With the implementation of the drainage strategy in compliance with the GDSDS, pluvial flood risk to the site would not be introduced and it is not expected that the proposed development would negatively impact on flood risk for downstream receptors and neighbouring sites. The proposed surface water management, which would include an allowance for climate change, would result in a positive impact of low magnitude on the flood risk status (High sensitivity) which equates to a **long-term Sight/Moderate, Positive** effect that is **Not significant** in terms of EIA.

Disruption of Groundwater: Potential to Alter Local Groundwater Flow Paths and Levels

10.8.33 No cuts greater than 1m are proposed based on the Pinnacle Consulting Engineers cut and fill information (sheet no. C126) with the exception of the retention ponds. Therefore, with ground levels not expected to decrease to elevations where groundwater is known to be present (1.5-2m below existing baseline ground level), groundwater flood risk at site is not expected increase. It is expected that foundations would require moderate scale excavations. However, it is also expected that the method of foundations would take account of the ground conditions and environmental considerations such that any long-term effects on groundwater flows (medium sensitivity) are therefore likely to be of low magnitude and the effect **long-term, Imperceptible/Not Significant, Negative** i.e**. Not Significant** in terms of EIA.

Water Demand and Foul Sewer Capacity

10.8.34 It is intended to serve the potable demand of the proposed development via connection off a 150mm diameter network water mains, as required. A Pre-Connection Enquiry application has been submitted to Irish Water in respect of the water supply and a response is still awaited at the time of writing. Assuming the applicant receives confirmation from Irish Water for potable and foul water, effects on water supply during the operation stage are considered to be **Permanent, Imperceptible** and **Neutral** i.e. **Not Significant**.

10.8.35 All foul connections and foul sewers are to comply with the requirements of the Irish Water specifications. The permanent foul connection to the wider network in Profile Park would be undertaken in consultation with Irish Water to ensure there is no impact on the network when the connection is made. Accordingly, foul drainage effects on the public sewerage network during the operation stage are considered to be **long term, Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

10.9 Additional Mitigation

10.9.1 As explained in the FRA, all developments include an element of residual flood risk that must be addressed during their operational life. To address this residual risk, it is recommended that a Site-Specific Flood Risk Mitigation Plan be prepared implemented, in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities. This would apply throughout the operational life of the proposed development and include a maintenance regime for all drainage features within the site in addition to regular inspection of drainage features immediately upstream and downstream.

10.9.2 It was revealed in a CCTV survey that a culvert downstream had significant blockages that greatly reduce its capacity. The condition and size of the culvert downstream of the blockages is unknown and there is potential of the stream surcharging to the site in the event of a collapse. It is therefore recommended that an overflow be constructed which would allow discharge to the stream immediately downstream of Nangor Road. This overflow could discharge to existing surface water drainage in the Nangor Road subject to available capacity.

10.10 Enhancement Measures

10.10.1 No enhancement measures are proposed.

10.11 Assessment of Residual Effects

Demolition and Construction Residual Effects

10.11.1 As no additional mitigation would be required, the residual construction effects remain as reported in the assessment of effects section:

- The likely effect of contamination of surface water is likely to be only **Temporary** and **Imperceptible/Not Significant, Negative** (**Not Significant** in terms of EIA) and no further mitigation beyond that to be set out in the CEMP is deemed necessary;
- Over the short term, improvements to the watercourse and associated landscaping would be expected to result in a beneficial impact of low magnitude on the Baldonnel Stream (medium sensitivity) which equates to a **Temporary**, **Imperceptible/Not Significant, Positive** effect (**Not Significant** in terms of EIA) on surface water quality and hydrodynamic status of the Baldonnel. Stream.

- The potential impact of the proposed development on groundwater flows (medium sensitivity) would be of negligible magnitude and the effect **Temporary**, **Imperceptible, Negative** i.e. **Not Significant** in terms of EIA.
- The floodplain capacity would be unchanged during construction such that the proposed works in the floodplain would result in no impact to the already low flood risk status (High sensitivity) which equates to a **Temporary Imperceptible, Neutral** effect i.e. **Not Significant** in terms of EIA; and
- Effects on the public sewerage and potable water supply networks during the demolition and construction stage are considered to be **Temporary**, **Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Operation Residual Effects

10.11.2 The FRA (Technical Appendix 10.1) mentions all developments would involve some element of residual flood risk. The Baldonnel Stream is culverted downstream of the site and there are presently blockages that reduce the capacity of the culvert. The condition of the culvert downstream of the blockages is unknown and there may be a potential for the stream to surcharge in the event of the culvert being compromised although backing up of such flood waters would not be expected to reach the site due to the distance upstream.

10.11.3 To mitigate this risk, the FRA for the July 2022 DUB-1 consented development, considered part of the future baseline, recommended that consideration be given to the construction of an overflow which would allow such excess flows to bypass the culvert.

10.11.4 The July 2022 DUB-1 consented development Site-Specific Flood Risk Mitigation Plan included a maintenance regime for all drainage features within the site and for regular inspection of drainage features immediately upstream and downstream of the site. Procedures have also been put in place for temporary measures to divert waters from the stream around the downstream culverts in the event that inspections identify defects in the culvert or if waters are observed to be surcharging upstream of the culvert. Such that flood risk could be managed until remedial works to repair the culvert could be implemented. The proposed development would also benefit from these measures.

10.11.5 The Site-Specific Flood Risk Mitigation Plan and associated maintenance regime for the proposed development would ensure that the long-term residual operation effects would remain as reported in the assessment of effects section:

- The proposed landscaping improvements and SuDS would result in some long-term improvements to the Baldonnel Stream such that there would be a beneficial impact of low magnitude on the flood risk status (High sensitivity) which equates to a **long-term, Slight/Moderate, Positive** effect which would be **Not Significant** in terms of EIA.
- The proposed surface water management, which would include an allowance for climate change, would result in a positive impact of low magnitude on the flood risk status (High sensitivity) which equates to a **Long-term, Slight/Moderate, Positive** effect which would be **Not Significant** in terms of EIA.
- Any long-term effects on groundwater flows (medium sensitivity) would be likely to be of negligible magnitude and the effect **long-term, Imperceptible/Not Significant, Negative** i.e. **Not Significant** in terms of EIA; and
- It is understood that there is adequate capacity within the existing foul drainage and water main network to supply the proposed development. As such, effects during the operation stage are considered to be **long-term, Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Summary of Residual Effects

Table 10-5 provides a summary of the outcomes of the Water Resources and Flood Risk assessment of the proposed development. Where **Significant Positive** effects are likely these are highlighted in bold green and where **Significant Negative** effects are predicted these are highlighted in bold red.

Table 10-5: Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Surface Water Receptors	Potential contamination as a result of silt-laden runoff across the demolition and construction site and potential for contaminants to be introduced to surface water by construction activities through leakages/spillages	None Required	Imperceptible/Not Significant	-	L	D	R	T
Surface Water Receptors	Direct impacts on surface water quality and hydrodynamic status as a result of construction works	None Required	Imperceptible/Not Significant	+	L	D	R	T
Groundwater Supply	Disruption of Groundwater during Construction Excavations	None Required	Imperceptible	-	L	D	R	T
Fluvial Flood Risk	Flood risk from the Baldonnel Stream	None Required	Imperceptible	+/-	U	D	R	T
Water Supply and Foul Drainage Network	Water Supply and Foul Drainage Capacity During Construction	None Required	Imperceptible	+/-	U	D	R	T
Operation								
Fluvial Flood Risk	Flood risk from the Baldonnel Stream	Site-Specific Flood Risk Mitigation Plan and associated maintenance regime	Slight/Moderate	+	L	D	IR	LT
Surface Water Flood Risk	Changes to flood risk as a result of changes to the surface water runoff regime of the site	None Required	Slight/Moderate	+	L	D	IR	LT

Table 10-5: Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Groundwater	Potential to alter local groundwater flow paths and levels	None Required	Imperceptible/Not Significant	-	L	D	IR	LT
Water Supply and Foul Drainage Network	Water Supply and Foul Drainage Capacity During Operation	None Required	Imperceptible	+/-	L	D	IR	LT

Notes:

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

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

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

10.12 Cumulative Effects

Intra-Project Effects

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

Inter-Project Effects

10.12.2 Consent would not be granted for any development that would increase flood risks off-site. Additionally, consent would not be granted to any surface water discharge from a proposed development if it would increase downstream flood risk. Discharge to sewer or to a fluvial watercourse would need to be restricted so that it provides betterment in terms of downstream capacity, taking account of predicted climate change. Because the proposed development would discharge at greenfield rates, there would be no detrimental impact on downstream flood risk. It is therefore reasonable to assume that any other development would similarly need to decrease flood risk and reduce pressures on downstream sewer or watercourse capacity such that any cumulative impact during the operation stage would be beneficial.

10.12.3 It is reasonable to assume that other schemes would similarly be required to demonstrate suitable surface water runoff management measures during construction in accordance with national and local policy, and that discharges of surface water would be subject to suitable treatment such that there would be no cumulative significant effects on downstream water quality during demolition and construction or operation. It would be expected to deliver improvements in respect of contamination, groundwater disruption, water demand and sewer capacity.

10.12.4 In light of this, it is unlikely that there would be any significant negative inter-project cumulative effects on flood risk or surface water quality resulting from the proposed development.

10.13 Summary of Assessment

Background

10.13.1 This chapter has assessed the potential water resources and flood risk effects arising from the demolition and construction and operation phases of the proposed development. The assessment of demolition and construction and operation stages has been undertaken taking into account the national and local guidance and regulations where applicable.

10.13.2 The site consists of undeveloped greenfield and one residential property. It is understood to have historically been agricultural in use. There is no evidence of existing drainage at the site other than an open ditch which runs along a portion of the western boundary, and the single property is assumed to have connections to septic tank. The FRA states that there is no evidence of standing groundwater. The Baldonnel Stream flows through the south of the site, entering in the southeast and flowing west. It flows under Falcon Avenue through a twin-pipe culvert upstream of the site and eventually enters a twin-pipe culvert further downstream beyond the site. A visual assessment of the channel of the stream and the culverts reported in the FRA suggests that the culverts will have a lower hydraulic capacity than the channel within the site so the restriction in flow caused by the upstream culvert (outside of the site demise) would reduce flood risk at the site, as confirmed in OPW mapping and hydraulic modelling.

10.13.3 The areas of the site which are in very close proximity to Baldonnel Stream are shown in the OPW mapping to have a 'Low' fluvial flooding probability, but this is not applicable to most of the site. Low Probability flood events are indicated by the OPW to have a 1 in a 1000 Annual Exceedance Probability (AEP); i.e. they have a 0.1% chance of being exceeded in any year. The site is shown to be entirely outside of the area of Medium fluvial flood probability (indicated by the OPW to have a 1 in a 100 AEP; i.e. they have a 1% chance of being exceeded in any year).

10.13.4 A hydrological model was prepared as part of the FRA (Technical Appendix 10.1) to simulate flow patterns during the 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events. The site was found to be not affected by either 1% or 0.1% AEP flood events.

10.13.5 The bedrock aquifer underlying the site (Dinantian Limestones) is classified as 'Locally Important'; i.e. an aquifer which is moderately productive only in local zones. The site is not situated in a Groundwater Drinking Water Protection Area or Groundwater SPA. There are no wells or springs within 1 km of the site and the closest is approximately 3 km southeast and east of the site. There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or adjacent the site.

Demolition and Construction Effects

10.13.6 During demolition and construction, there is the potential for the following impacts on water resources and flood risk:

- Disruption or contamination of groundwater during construction excavations;
- Contamination of surface water as a result of silt-laden runoff across the demolition and construction site and from stockpiles, polluting substances (e.g. fuels and chemicals), accidental spillages and other wastes during general demolition and construction activity;
- Changes to surface water quality and hydrodynamic status as a result of the proposed works in the Baldonnel Stream floodplain;

10.13.7 Overall, when considering the embedded mitigation through the CEMP and the design of the proposed crossing of the stream, it is considered that the demolition and construction of the proposed development would **not give rise to significant effects** on water resources and flood risk.

Operation Effects

10.13.8 During operation, there is the potential for the following impacts on water resources and flood risk:

- Residual flood risk from the Baldonnel Stream due to culvert blockage;
- Increased surface water runoff volumes leading to increased surface water flood risks on-site and off-site;
- Some disruption to groundwater from small alterations to local groundwater flow paths and levels;
- Increase in water demand from the site to supply the new occupants of the proposed development; and
- Increase in discharge volumes of foul water effluent to foul sewer.

10.13.9 The proposed development includes a drainage strategy designed to mitigate any increase in surface water discharge and limit it to greenfield rates through attenuation methods including a new pond with a native wetland margin. This would result in no increase in pluvial flood risk. A Site-Specific Flood Risk Mitigation Plan would be prepared to set out measures required to maintain proposed surface water drainage and flood risk mitigation measures, and to indicate proposed response to flood incidents. This management of residual flood risk considered in the operation stage of development would result in a Slight Positive effect on flood risk at the site and for downstream receptors, and as such would be expected to give rise to Slight to Moderate Positive effects.

10.13.10 Improved landscaping and habitat setting of the Baldonnel Stream floodplain would also be expected to result in long term slight positive changes in terms of surface water quality and hydrodynamic status. As such, no significant effects are expected. Additionally, any long-term changes to groundwater flow paths, as well as to water supply and foul water assets, are expected to be **not significant**.

Cumulative Effects

10.13.11 Consent would not be granted for any development that might increase off-site flood risks. Consent would also not be granted to any surface water discharge from a proposed development if it would lead to increased downstream flood risk. For this reason, the overall scale of water resources and flood risk cumulative effects would be no greater than that of the proposed development in isolation. Therefore, it is **unlikely that there would be any significant negative cumulative effects** on flood risk or surface water quality.

11 ECOLOGY/BIODIVERSITY

11.1 Introduction

11.1.1 This chapter of the EIAR reports on the likely significant ecological effects to arise from the demolition and construction stage, and the operation stage of the proposed development.

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

11.1.3 This chapter is supported by the following technical appendices in EIAR Volume 3:

- Appendix 8.1: Ecological Impact Assessment;
- Appendix 8.2: Appropriate Assessment Screening;
- Appendix 8.3: Biodiversity Management Plan.

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

International Legislation:

- EU Habitats Directive 92/43/EEC[1];
- The Birds Directive 2009/147/EC[2];
- Environmental Liability Directive 2004/35/EC[3]; and
- Bern Convention[4].

National Legislation and Policy:

- The Wildlife Act 1976 (as amended)[5];
- EC (Birds and Natural Habitats) Regulations 2011 (amended 2015)[6];
- Flora Protection Order 2015[7];
- The EC (Water Policy) Regulations 2003[8]; and,
- The National Development Plan 2021-2030[9].

Local Policy:

- South Dublin Development Plan 2022–2028[10].

National guidance and industry standards:

- BS 42020:2013 Biodiversity[11]
- CIEEM Guidelines:
- Ecological Impact Assessment[12]
- Ecological Report Writing[13].

11.1.5 Further details are provided in EIAR Volume 3: Technical Appendix 8.1.

11.2 Assessment Scope

Technical Scope

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

- Disturbance/injury/death of a protected species, both during the demolition and construction stage and the operation stage (including lighting impacts and effects on bats);
- Disturbance of breeding birds;
- Direct loss of habitats;
- Reduction in local biodiversity;
- Damage to local ecology through pollution;
- Chemical or physical pollution of aquatic habitats and consequent effects on designated sites;
- Accidental trapping of mammals in excavations;
- Habitat fragmentation and loss of ecological connectivity / commuting pathways for wild and protected species;
- Loss or damage of habitats as a result of dust and other air- or water-borne pollution; and
- Potentially consequent population-level effects of these impacts on wild species and groups including bats, badger, otter, birds, herptiles, invertebrates and flora.

11.2.2 The following have been considered in terms of embedded mitigation:

- Standard practice pollution prevention measures (see Chapter 5: Demolition and Construction Environmental Management);
- Preparation and implementation of a Site Waste Management Plan (SWMP);
- Environmental monitoring during the demolition and construction stage, to be specified in a Construction Environmental Management Plan (CEMP) as outlined in Chapter 5 Demolition and Construction Environmental Management;
- Cowling of lighting, plus reduction of light levels to 1 lux where possible Setting of noise and vibration limits, with associated monitoring during the Demolition and Construction stage (see Chapter 5: Demolition and Construction Environmental Management).

Spatial Scope

11.2.3 The study area for international/European statutory designations has been determined by means of reference to published guidance (Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities[14]), and covers an area of 15 km from the site boundary. The study area for national

[1] Council Directive 92/43/EEC of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora.
[2] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds.
[3] Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on Environmental Liability with Regard to The Prevention and Remedying of Environmental Damage.
[4] The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats, 1979. Bern.
[5] Government of Ireland. The Wildlife Act 1976 (as amended). Available from: http://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/html#zza39y1976
[6] Government of Ireland. S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).
[7] Government of Ireland. S.I. No. 356/2015 - Flora (Protection) Order, 2015.
[8] Government of Ireland. S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003.
[9] Government of Ireland, 2021. National Development Plan 2021-2030 (last updated 4 October 2021) [online]. Available at: https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/ [Accessed on 23/08/2022].
[10] South Dublin County Council. South Dublin Development Plan 2022-2016. Dublin. South Dublin County Council
[11] British Standards Institution, 2013. BS 42020:2013 Biodiversity. Code of practice for planning and development. London. BSI
[12] Chartered Institute of Ecology and Environmental Management, 2019. Guidelines for the Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Winchester. CIEEM
[13] Chartered Institute of Ecology and Environmental Management, 2017. Guidelines on Ecological Report Writing. Winchester. CIEEM
[14] Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. Available at www.npws.ie

statutory designations follows standard professional practice as accepted in a number of similar planning applications. This covers an area of 5 km from the site boundary. The study area for protected and priority species has been derived by reference to CIEEM Guidelines for Preliminary Ecological Appraisal[15] and consideration of their ecological characteristics, and covers an area of 2 km from the site boundary. The study area for the Fossitt habitat survey has been determined with reference to CIEEM Guidelines for Preliminary Ecological Appraisal[16]. All of the above also consider the scale and nature of the proposed development.

11.2.4 Sensitive receptors in the study area include;

- Rye Water Valley/Carton Special Area of Conservation (SAC; 5.88 km north-west of the site),
- Glenasmole Valley SAC (8.05 km south-east of the site),
- Wicklow Mountains SAC (9.76 km south-east),
- Red Bog, Kildare SAC (14.44 km south-west),
- South Dublin Bay SAC (15.21 km east),
- North Dublin Bay SAC (17.90 km north-east),
- Wicklow Mountains Special Protection Area (SPA; 12.88 km south-east),
- South Dublin Bay and River Tolka SPA (14.81 km east),
- North Bull Island SPA (19.71k m east),
- Grand Canal proposed Natural Heritage Area (pNHA; 1.39 km north) and
- Liffey Valley pNHA (4.57 km north).

Temporal Scope

11.2.5 The assessment has considered impacts arising during the demolition and construction stage, which would be expected to be temporary(less than a year) in nature, and from the operation stage which would be expected to be long-term (15 to 60 years) to permanent in nature (i.e. more than 60 years).

11.3 Baseline Characterisation Method

Desk Study

11.3.1 In order to establish the existing baseline (discipline) conditions in the study area, relevant data was reviewed and assessed. The data sets and associated sources can be summarised as follows:

- National Biodiversity Data Centre (NBDC); and
- National Parks and Wildlife Service (NPWS).

11.3.2 Further details are provided in EIAR Volume 3: Technical Appendix 8.1.

Field Study

11.3.3 A Fossitt habitat survey was undertaken on 20 July 2022 by Eiméar Rose Cunningham. This encompassed all lands within the red line boundary and up to 50 m outside, where access allowed.

11.3.4 Bat activity surveys were completed in August 2022. Two dusk emergence surveys; one of the shed in the south-west and one of the house in the north-west of the site were undertaken by Eiméar Rose Cunningham, Dylan Donoghue and Dara Dunlop on the 3 August and the 30 August 2022. All bat surveys were designed based on Bat Conservation Trust guidance[16].

11.3.5 Further details are provided in EIAR Volume 3: Technical Appendix 8.1.

[15] CIEEM, 2017. Guidelines for Preliminary Ecological Appraisal. Available at www.cieem.net

11.4 Assessment Method

Methodology

Demolition and Construction Stage

11.4.1 The evaluation of ecological receptors is based upon CIEEM guidelines , which suggests that the value or potential value of an ecological resource or feature (for example a habitat type, species or ecosystems) should be determined within a geographical context (e.g. rare at a local level).

11.4.2 At the demolition and construction stage, the impact assessment process involves:

- Identifying and characterising impacts and their effects, giving regard to embedded mitigation;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after additional mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

11.4.3 Potential impacts and effects have been assessed in accord with the following proposals for the demolition and construction stage:

11.4.4 Treelines and hedgerows at the boundaries of the site would be retained and enhanced where possible. Additional planting of trees and shrubs would occur within the riparian strip alongside the stream channel, with native shrubs adding shelter and food sources for a variety of different species. Trees and shrubs planted would be managed in line with the Biodiversity Management Plan (BMP) (see Technical Appendix 8.3) and the landscape proposals.

11.4.5 Planting on the banks of the Baldonnel stream would include aquatic species such as yellow iris and fool's watercress.

11.4.6 Areas of wet wildflower meadow would be created in the north-west of the site. This area would also act as an attenuation pond, in periods of heavier flow. Species in this area have been selected in order to thrive in a wetter area and create habitat for wetland species, particularly invertebrates.

11.4.7 All habitats on site would be managed sensitively, to promote biodiversity. Further detailed are outlined in the BMP (Technical Appendix 11.3).

Operation Stage

11.4.8 Assessment methods used for the operation stage follow the same process as demolition and construction stage with only slight variation.

11.4.9 Impact assessment during the operation stage emphasises the potential for disturbance of wild and protected species, including through lighting impacts on bats, rather than the wider range of potential impacts during the demolition and construction stage.

Cumulative Stage

11.4.10 The potential for cumulative impacts to arise from the combined effects of a number of existing or proposed developments in combination with the proposed development on ecology has been considered as set out in Chapter 2: EIA Process and Methodology.

11.5 Assessment Criteria

11.5.1 The assessment of significance of effect with regards to Ecology is based on professional judgement of the sensitivity of the receptor and the magnitude of effect.

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

11.5.2 The general criteria used to assess if an effect is significant or not, is set out in Chapter 2: EIA Methodology, further details are provided herein. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement

Receptor Sensitivity/Value Criteria

11.5.3 The sensitivity of receptors has been classified as low, medium or high in accordance with the criteria set out in Table 11-1.

Table 11-1: Receptor Sensitivity Criteria

Sensitivity	Criteria
International	An internationally designated site (e.g. SAC, SPA, Ramsar site). Site meeting criteria for international designations or qualifying species of a SAC where there is connectivity. Species present in internationally important numbers (>1% of biogeographic populations).
National	A nationally designated site (NHA, pNHA), or sites meeting the criteria for national designation or qualifying species where there is connectivity. Species present in nationally important numbers (>1% Irish population).
Regional	Species present in regionally important numbers (>1% of regional population). Areas of valuable habitat falling below criteria for selection as an NHA (e.g. areas of ancient woodland larger than 0.25 ha).
Local	Areas of ancient woodland smaller than 0.25 ha. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows. Baldonnel Stream.
Negligible	Usually widespread and common habitats and species. Features falling below local value are not normally considered in detail in the assessment process.

Impact Magnitude Criteria

11.5.4 The magnitude of impact has been classified as low, medium, or high, in accordance with the criteria set out in Table 11-2.

Table 11-2: Impact Magnitude Criteria

Magnitude of Impact	Criteria
Negligible	Minimal impact on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.
Low	Would lead to a not significant effect upon the feature or its viability. For example, less than 10% habitat loss, damage or gain.
Medium	Would lead to a slight to moderate effect on the feature or its viability. For example, between 10 - 20% habitat loss, damage or gain.
High	Would lead to a significant effect on the feature or its viability. For example, more than 20% habitat loss, damage or gain.
Very High	Would cause the loss of the majority of a feature (>80%) or would be sufficient to damage a feature enough to affect its viability immediately. For positive effects, would e.g. create over 80% habitat gain.

Scale of Effect Criteria

11.5.5 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 11-3.

Table 11-3: Scale of Effect Criteria

Magnitude	Sensitivity of Receptors				
	Negligible	**Local**	**Regional**	**National**	**International**
Negligible	Imperceptible	Imperceptible	Imperceptible / Not Significant	Imperceptible / Not Significant	Imperceptible / Not Significant
Low	Imperceptible	Imperceptible	Not Significant / Slight	Moderate	Moderate
Medium	Imperceptible	Not Significant	Moderate	Significant	Significant
High	Imperceptible	Slight	Significant	Significant	Very Significant / Profound
Very High	Imperceptible	Slight	Significant	Very Significant / Profound	Very Significant / Profound

11.5.6 In line with CIEEM guidance, the duration of effects should be defined in relation to the lifespan of each organism in question. The criteria used to determine duration of effects under this approach is provided in Table 11-4.

Table 11-4: Effect Duration Criteria

Magnitude	Criteria
Momentary	Effects lasting from seconds to minutes.
Short-term	Up to (but not including) 5 years; for short-lived species, a single season or part of a season.
Medium-term	From 5 years up to (but not including) 15 years; for short-lived species, a single generation.
Long-term	From 15 years up to (and including) 30 years; for short-lived species such as invertebrates, multiple generations.
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken here as 30+ years), except where there is likely to be substantial improvement after this period in which case the category Long-term may be more appropriate.

Table 11-4: Effect Duration Criteria	
Reversible	Effects that can be undone, for example through remediation or restoration.

11.5.7 Based on Environmental Protection Agency's (EPA) Guidelines on the information to be contained in Environment Impact Assessment Reports[17] (2022), as described in Chapter 2: EIA Process and Methodology, effects ranging from 'moderate' to 'profound' are considered 'significant' in terms of EIA.

Nature of Effect Criteria

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

11.6 Assumptions and Limitations

11.6.1 The assessment has relied on data provided by NBDC and NPWS. It has been assumed that these data sets have been reported correctly.

11.6.2 At the time of the Fossitt survey, access was only permitted within the landownership boundary. The areas of land which formed the Ecological Study Area (ESA) which were not within the landownership boundary were viewed from field boundaries, with the use of binoculars, where needed. Areas that could not be assessed have not been mapped in the habitat map (Please see Figure 8-1 below). It is considered that the limited access to areas of land directly adjacent to the Proposed Development boundary has not unduly impacted upon the findings of the habitat or species scoping surveys.

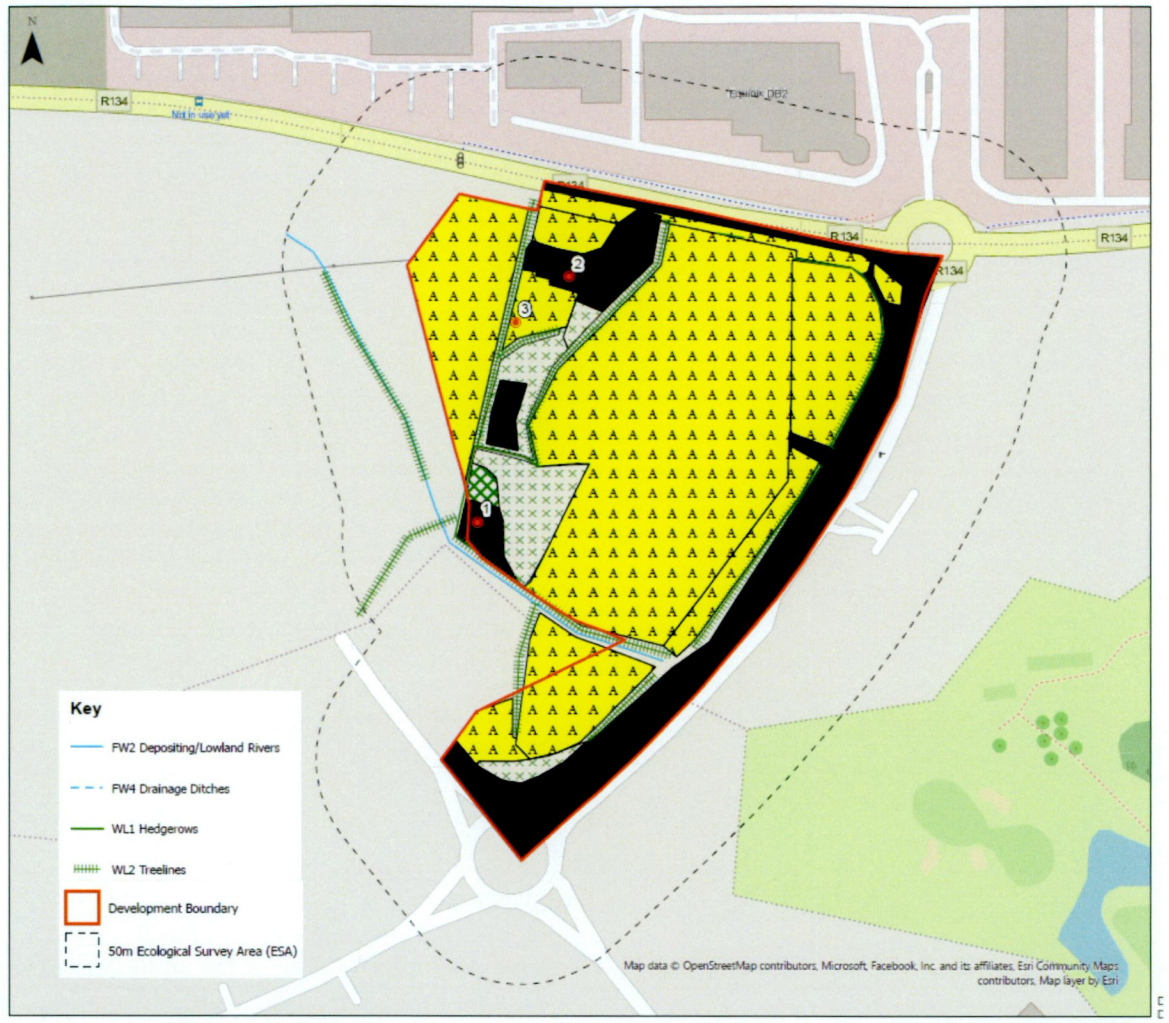

Figure 11-1: Ecological Study Area

11.6.3 Results of the survey undertaken are representative of the time that surveying was undertaken.

11.6.4 The absence of specific species records returned during the data search does not necessarily indicate absence of a species or habitat from an area, but rather that these have not been recorded or are perhaps under-recorded within the search area.

11.6.5 A Fossitt habitat survey does not aim to produce a full botanical or faunal species list or provide a full protected species survey, but enables competent ecologists to ascertain an understanding of the ecology of the site in order to:

- Identify broadly the nature conservation value of a site and preliminary assess the significance of any potential impacts on habitat/species recorded; and/or
- Confirm the need and extent of any additional specific ecological surveys that are required to identify the true nature conservation value of a site.

[17] Environmental Protection Agency, 2022. Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)

12 GROUND CONDITIONS

12.1 Introduction

12.1.1 This chapter of the EIAR reports on the likely significant ground condition effects to arise from the demolition and construction stage and the operation stage of the proposed development.

12.1.2 The chapter describes the ground condition policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely ground condition effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and cumulative effects.

12.1.3 This chapter is supported by the following technical appendices in EIAR Volume 3:

- Technical Appendix 12.1: IGSL Ltd, 2022. Data Center Project 3 Profile Park – Ground Investigation Report Factual; and
- Technical Appendix 12.2: Ramboll UK Limited, 2022. Vantage Data Centers DUB13, Dublin. Contaminated Land Interpretative Report.

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

- International Legislation:
  - Water Framework Directive (WFD) (2000/60/EC)1;
  - Environmental Quality Standards (EQS) Directive (2008/105/EC)2 (as amended)3;
  - Priority Substances Directive (2008/105/EC)4;
- National Legislation and Policy:
  - European Communities Environmental Objectives (Groundwater) Regulations 20105;
  - Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements' (Institute of Geologists of Ireland (IGI), 2013)6;
  - Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority (NRA), 2009)7;
  - Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (Environmental Protection Agency (EPA), 2013)8; and
  - Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007)9.

12.1.5 For human health assessments from impacts to soil, there are no statutory thresholds in Ireland for the assessment of soil contamination. For human health, the EPA recommends the use of Generic Assessment Criteria (GAC), based on the UK Environment Agency Contaminated Land Exposure Assessment (CLEA) model, either produced by the UKEA itself (known as Soil Guideline Values (SGV)) or values generated using the CLEA model by reputable third-party organisations. Where GAC have not been published or if practitioners do not use human health GAC publications, values should be generated by appropriately qualified and experienced professionals using the CLEA model for consistency with the EPA approach.

12.1.6 The 'Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites' indicates that values for screening of the impact on groundwater may come from several sources, including the European Communities Environmental Objectives (Groundwater) Regulations 2010, the EPA's Groundwater Threshold Values (GTV), the EPA's Interim Guideline Values (IGV) or relevant Environmental Quality Standards (EQS). The latter guidelines are used when considering a surface water receptor.

12.1.7 There are no provisions to create a contaminated land database in the Republic of Ireland (RoI) and since contaminated land regulations have not yet been enforced. It is unlikely that there is a dedicated contaminated land officer at South Dublin County Council (SDCC), however, most counties have an Environmental Department responsible for waste management; environmental enforcement; litter control; pollution control; environment education and awareness; and water quality.

12.2 Assessment Scope

12.2.1 There is no statutory definition of 'contaminated land' in the RoI, and in contrast to the UK, there is no framework within which the regulatory agencies are required to undertake an assessment of contaminated sites or create a register of contaminated land. Furthermore, there are currently no Irish standards in relation to the clean up or rehabilitation of contaminated land.

12.2.2 The 'Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites' (2007) established a risk based approach for soil and groundwater assessment and remediation in line with the UK Environment Agency's document 'Model Procedures for the Management of Land Contamination: Contaminated Land Report No. 11 (CLR 11) – Note CLR 11' (2004) , now replaced in the UK by 'Contaminated Land Risk Management' (2020) guidance. In 2013, the EPA published 'Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites' (e.g. large scale industrial activities, large petrol storage facilities, waste sites).

12.2.3 As there is no published or formalised technical guidance relating to the assessment of ground contamination (including controlled waters) effects, professional judgement, experience and best practice methods have therefore been drawn upon to assess the significance of the potential ground contamination (including controlled waters) effects of the proposed development. The assessment has taken account of all applicable legislation, guidance and policy as previously outlined.

Technical Scope

12.2.4 The potential pollutant linkages and contamination impacts for both the demolition and construction stage and the operation stage of the proposed development have been assessed.

[1] European Union, 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Document 32000L0060.
[2] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[3] European Union, 2013. Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance. Document 32013L0039.
[4] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[5] Government of Ireland, 2010. European Communities Environmental Objectives (Groundwater) Regulations 2010. S.I. No. 9 of 2010.
[6] Institute of Geologists of Ireland (IGI), 2013. Guidelines for the preparation of the Soils, Geology and Hydrogeology chapters of an Environmental Impact Assessment Report (EIARs). Published 30 April 2013. IGI.
[7] National Roads Authority (NRA), 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. NRA.
[8] Environmental Protection Agency (EPA), 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. EPA.
[9] EPA, 2007. Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites. EPA.

12.2.5 The technical scope of the assessment includes the potential for existing contamination to be present within the soil and shallow groundwater on the site and the risks to human health and the water environment waters associated with the potential presence and mobilisation of existing contamination.

12.2.6 Accordingly, the following potential pollutant linkages, which have the potential to present an unacceptable risk, have been considered:

- Exposure of construction workers to contaminated soil;
- Generation of dust and potentially contaminated dusts, including asbestos;
- Exposure of construction workers to ground gases;
- Exposure of construction workers to contaminated groundwater (if present);
- Mobilisation of contamination in surface water and groundwater through excavations and foundation works, including those for the underground fuel storage tanks;
- Mobilisation of site materials and pollutants during rainfall events;
- Changes in ground level as a result of earthworks and cut and fill activities may increase vulnerability of the underlying bedrock aquifer;
- Contaminants introduced by construction activities through leakages/spillages; and
- Loss of agricultural land.

12.2.7 During the operation stage there would be no interaction between the proposed development and deep groundwater beneath the site. As such, deep groundwater has not been assessed for the operation stage.

Spatial Scope

12.2.8 The study area is defined as that within a radius of up to 2 kilometres (km) from the site boundary. The study area has been used to identify potential historical land uses which may have contributed to contamination issues associated within the site; as well as potentially sensitive land uses in the wider surrounding area that could be impacted if existing contaminants were mobilised as a result of the proposed development.

Temporal Scope

12.2.9 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary (less than a year) in nature; and from the operation stage which would be expected to be long term (15 to 60 years) to permanent (> 60years) in nature.

12.3 Baseline Characterisation Method

Desk Study

12.3.1 In order to establish baseline geology and soil conditions in the study area, relevant data was reviewed and assessed. Data was also obtained from the following sources:

- Geological Society of Ireland (GSI)[10] - online Public Viewer mapping , which includes Geohazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping;
- Teagasc soil and subsoil database[11];
- EPA website mapping and database information[12]; and
- National Parks and Wildlife Services (NPWS) – Protected Site Register[13].

Field Study

12.3.2 An intrusive ground investigation was undertaken between July and August 2022 by IGSL to characterise the ground of the site. The factual results of this investigation are reported within Appendix 12.1 of EIAR Volume 3.

12.3.3 Interpretation of the IGSL data is provided in Appendix 12.2 of EIAR Volume 3.

12.4 Assessment Method

Methodology

Demolition and Construction Stage

12.4.1 The identification of likely significant effects during the demolition and construction stage was based on a review of the presence of potential receptors, a qualitative assessment of the sensitivity of the receptors, the identification of potential impact pathways and an assessment of the magnitude of the potential impacts.

12.4.2 The assessment of potential impacts and likely effects has, therefore, comprised the following approach:

- Identification and establishment of the sensitivity of receptors on the basis of their use, proximity to the site, existing quality or resource value;
- Consideration of potential source-pathway-receptor linkages;
- Evaluation of the magnitude of potential impacts from potential contamination as a result of the introduction of the proposed development;
- Consideration of embedded mitigation measures integral to the proposed development;
- Classification of the significance of likely effects;
- Identification of additional mitigation measures to eliminate or reduce residual effects, where considered necessary; and
- Re-assessment to conclude the likely significance of residual effects.

Operation Stage

12.4.3 The demolition and construction stage methodology has been applied to the identification of likely significant effects during the operational stage.

Cumulative Stage

12.4.4 With respect to potential inter-cumulative effects, the assessment reviews the potential effects on geology and soils of the cumulative development (through review of project details for potential effects on geology of their sites and locality) and discusses whether and how any likely effects of the proposed development may interact with them, resulting in a cumulative effect.

12.5 Assessment Criteria

12.5.1 The criteria used to assess if an effect is significant or not in terms of EIA, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the

[10] Geological Survey Ireland, 2021. Data and Maps [online]. Available at: https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx (Accessed on 15/09/2022).
[11] Teagasc, 2017. County Soils Maps [online]. Available at: https://www.teagasc.ie/crops/soil--soil-fertility/county-soil-maps/
[12] Environment Protection Agency, 2021. Maps [online]. Available at: https://gis.epa.ie/EPAMaps/
[13] National Parks and Wildlife Service, 2020. Information [online]. Available at: https://www.gov.ie/en/organisation-information/09575-national-parks-and-wildlife-service/

duration of the effect, the geographical extent of the effect and the application of professional judgement.

12.5.2 Although there is no framework or Irish standards in relation to the assessment of risks associated with contamination, often the UK framework is adopted. This framework allows for the categorisation of risks and is undertaken in terms of consequence (i.e., severity of risk) and probability (i.e., likelihood of the risk being realised), which are combined to produce an overall classification of the risk of harm occurring. Whilst this classification is not directly translatable into the EIA process, the principles and land use scenarios from the framework have been used to allocate criteria that can be used in EIA.

12.5.3 The human health criteria, set out in Tables 12-1 and 12-2, have been based on that principle for the assessment of risks associated with contaminated land. Criteria for surface and groundwater have been based on a variety of sources including Water Framework Directive (WFD) Protected Area designations, GSI and EPA aquifer classifications.

Receptor Sensitivity/Value Criteria

12.5.4 The sensitivity of receptors has been classified as low, medium or high in accordance with the criteria set out in Table 12-1.

Table 12-1: Receptor Sensitivity/Importance Criteria

Sensitivity	Criteria (Examples)
Low	Human health: low sensitivity land use such as commercial or industrial.
	Surface water: • Has no or minimal ecosystem present; • Does not form or supply water to a designated site; • Provides low/no amenity value; • Is not used as a commercial or private water supply; • Is substitutable in short-term; and • Does not form part of a designated fishery.
	Groundwater: • Poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu). • Is classified as having low aquifer vulnerability; • Does not supply baseflow to local rivers; • Resource is such that there is some potential for substitution; • Is classified by the EPA as not being at risk; • Is not located within a groundwater source protection area (SPA); • Is not used as a commercial or private water supply; • Does not supply a groundwater dependent terrestrial ecosystem (GWTE); • No hazardous substances recorded within the aquifer; and • Is not threatened by, or sensitive to, saline intrusion.
Medium	Human health: medium sensitivity land use such as public open space.
	Surface water: • Has an ecosystem that has low sensitivity to water quality or quantity changes; • Provides amenity value on a local basis; • Is used as a water supply for industrial, commercial or agricultural purposes; • May be substitutable in the long-term; and • Is or forms part of a cyprinid fishery.
	Groundwater: • Is a locally important aquifer. These are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). • Is classified as having low or intermediate aquifer vulnerability; • Contributes some baseflow to local rivers; • May be substitutable in the long-term; • Is classified by the GSI as probably not being at risk; • Is located within a groundwater SPA (source catchment area); • Provides water for agricultural or industrial use with limited connection to surface water; • Supplies a GWTE that has species that are not protected or listed. They are abundant/common and not critical for GWDTE functions; • Shows a downward trend in hazardous substances; • Is potentially at risk from or sensitive to saline intrusion; and • Is extracted such that extraction could potentially put water balance at risk.
High	• Human health: high sensitivity land use such as schools or residential without private gardens.
	Surface water: • Has an ecosystem that has moderate sensitivity to water quality or quantity changes; • Supports protected aquatic flora and fauna of national importance; • Is or supplies water to nationally designated sites (e.g. National Park or Nature Reserve); • Is regularly used for recreation (where water immersion sports are practiced regularly) and commercial navigation, important on a local or regional basis; • Is used as a local water supply for potable water supply purposes; • Is not substitutable in the short- or long-term; • Is or forms part of a salmonid fishery; and • Is a designated Shellfish water.
	Groundwater: • Is a regionally important aquifer. These are 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). • Regionally important aquifer with high vulnerability; • Contributes some baseflow to regionally important rivers; • Is not substitutable in the short- or long-term; • Is classified by the GSI as being probably at risk; • Is located within a groundwater SPA (outer catchment); • Provides water for a private water supply or locally important industrial, commercial or agricultural purposes; • Provides locally important resource or supports aquatic ecosystems; • Shows a stable pattern of hazardous substances; • Quality is sensitive to or likely to be threatened by saline intrusion; and • Is extracted such that extraction is putting water at risk.
Very High	Human health: very high sensitivity land use such as allotments or residential with private gardens.

- Variably weathered rockhead recovered as dark grey sandy clayey angular GRAVEL within the trial pits; and
- Bedrock consisting of dark grey and black LIMESTONE with thin horizons of fissile SHALE or MUDSTONE.

12.7.7 Published GSI mapping indicates faults to be present to the south and north-west of the site but not within the site boundary.

12.7.8 The GSI Public Viewer was reviewed to identify sites of geological heritage for the site and surrounding area. There are no recorded geological heritage sites on the site and there is no evidence of any geological heritage site which could be considered suitable for protection from the proposed development. Likewise, there are no identified geological heritage sites in the SDCC Development Plan 2016-2022 associated with the site.

Hydrogeology

12.7.9 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; cubic meters per day), specific capacity ($m^3/d/m$; cubic meters per day per m depth) and groundwater throughput (mm^3/d; cubic millimeters per day). 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 comprises 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).

12.7.10 The bedrock aquifers underlying the site according to the GSI National Draft Bedrock Aquifer Map (see earlier reference to GSI – online Public Viewer mapping) 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.

12.7.11 During the IGSL 2022 ground investigation, the groundwater strikes were recorded as either seepages or slow ingress in TP06 to TP10, and in RC/BH-01, RC/BH-03 and RC/BH-06. In the case of trial pits, groundwater was recorded between 1.80 m below ground level (in TP07 and TP09) and 2.0 m below ground level (in TP06, TP08 and TP10). The groundwater strikes are typically associated with recorded stratum of grey sandy clayey angular gravel of possible weathered rock (in TP07 to TP09); and within the stiff gravelly clay in TP10. In case of the boreholes, groundwater was recorded between 1.50 m (in RC/BH-03) and 1.90 m (in RC/BH-06). The groundwater strikes are typically associated with recorded stratum of stiff to very stiff sandy silty and gravelly clay of glacial till deposits.

12.7.12 The groundwater is likely to be in continuity with the Baldonnel Stream which runs through the southern portion of the site, flowing from east to west. Given this, the groundwater flow direction is likely to be towards the stream.

12.7.13 There is no evidence of springs or karstification in this area according to the GSI Karst database[10].

Groundwater Quality Status and Groundwater Bodies

12.7.14 With reference to the WFD, the Groundwater Body (GWB) underlying the site is the Dublin GWB (EU GWB Code: IE_EA_G_008), which under WFD is of 'good status'. The risk score is currently under review, however, in previous cycle the GWB risk score was marked as 'not at risk' (2013-2018 WFD status).

12.7.15 The GSI currently classifies the aquifer vulnerability underlying the site to be high (H) with the subsoils being of low permeability.

12.7.16 The site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA and there are no wells or springs within 1km of the site, with the closest being approximately 3km south-east and east of the site.

12.7.17 There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the site.

Hydrology

12.7.18 The site is situated within the sub-catchment of the Griffeen River and Baldonnel Stream which are tributaries of the River Liffey. The Baldonnel Stream runs approximately east to west through the south of the site.

Surface Water Quality Status and Surface Water Bodies

12.7.19 The review of WFD waterbody status (2013-2018) indicates that the Baldonnel Stream is classified as having 'moderate status'. The nearest EPA monitoring stations are at Baldonnel Stream (RS09B090300 and RS09B090400) located approximately 430 m south and 660 m west of the site, respectively; and at Griffeen (RS09G010200), located approximately 2.1 km west of the site. The latest EPA biological assessment of surface water from Griffeen monitoring location indicated a score of Q3 (poor) in 1991.

Ground Gases (including Radon)

12.7.20 According to the Radon Risk Map (EPA, Environmental Protection Agency), 'about 1 in 20 homes in the area is likely to have high radon levels'.

Mining and Quarrying

12.7.21 According to the GSI there are no active quarries located in the immediate vicinity of the site with the nearest quarry being located approximately 3.1 km south-east at Belgard Quarry. EPA mapping indicates there are no mines on or near the site.

Geomorphology and Designated Sites

12.7.22 No designated geological or geomorphological areas or sites are present on-site or adjacent to the site. As such, the proposed development is not considered to adversely impact on such receptors. The closest geological heritage site is the Belgard Quarry, located 3.1 km to the south-east of the site.

Current Regulated Activities and Industrial Uses including Landfills

12.7.23 According to the EPA, there are a number of licensed Integrated Pollution Prevention and Control (IPPC) and waste facilities; however, these are located approximately 5 km from the site.

12.7.24 Information gained from surrounding planning applications indicates that there no known illegal or historic landfills within 500 m of the site, however it is understood that uncontrolled waste operations are undertaken at the car centre 240 m west of the site.

Sources of Contamination

12.7.25 Based on review of desk study information, the current and former uses of the site indicated that there is a low to moderate potential for significant or widespread soil and groundwater contamination. However, due to the lack of development at the site and the generally agricultural uses of the site, the risk of contamination is more likely to be low.

12.7.26 No particular types of potential contaminants were identified from the current and historical use of the site, and therefore the 2022 ground investigation carried out by ISGL included a typical contaminated land chemical testing suite comprising of; heavy metals, total petroleum hydrocarbons (TPHs),

asbestos, organic contaminants such as polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

12.7.27 The findings of the initial contaminated land assessment (i.e., comparison of soil and leachate contaminant levels against GAC) as detailed in Appendix 12.2 of EIAR Volume 3 is as follows:

- There are no potentially significant contaminative activities on-site;
- No significant visual or olfactory field evidence of contamination within soils was found on-site;
- Very low levels of soil and soil leachate contamination were recorded on-site, typical of a greenfield site at concentrations that do not present a significant risk to potential receptors;
- No asbestos was detected on-site; and
- No significant potential off-site contamination sources were identified.

12.7.28 Additionally, low levels of contamination in groundwater typical of a greenfield site were found at the site immediately west of the subject site. The concentrations were deemed to be representative of general background groundwater quality in the site's urban industrial setting reflective of the subject site's groundwater quality in absence of sources of potential contamination at the subject site.

12.7.29 Below is a summary of the site sensitivity in relation to geology, hydrogeology, hydrology and contamination:

- The site has been predominantly greenfield and agricultural use historically. There is no evidence of any historical waste disposal or source of contamination.
- The site is underlain by a LI aquifer.
- The site is underlain by the Lucan formation comprising dark grey to black limestone and shale from the Carboniferous Age.
- Very low levels of soil and soil leachate contamination were recorded typical of a greenfield site at concentrations that do not present a significant risk to potential receptors.

Future Baseline

12.7.30 As per the methodology set out in Chapter 2: EIA Process and Methodology, effects of the proposed development are to be assessed against a future baseline, which considers the July 2022 DUB-1 permitted development as operational.

Sensitive Receptors

12.7.31 The receptors identified as sensitive to the proposed development, and which have been 'scoped-in' to the assessment are summarised in Table 12-4.

Table 12-4: Summary of Sensitive Receptors

Receptor	Sensitivity
Construction workers	Low
Adjacent site users	Low
Future site users	Low
Water environment (Baldonnel Stream)	Medium
Groundwater beneath the site (aquifers)	Medium

[15] EPA, 2018. Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous. July 2018 EPA
[16] HazWasteOnline, 2012. Waste Assessment Tool [online]. Available at: https://www.hazwasteonline.com/ [Accessed on 28/07/2021].

12.8 Assessment of Effects

Demolition and Construction Effects

Embedded Mitigation

12.8.1 This section identifies a range of embedded mitigation measures that are incorporated within the Proposed Development.

Construction Environment Management Plan

12.8.2 A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractors during the demolition and construction stage which will cover all potentially polluting activities and emergency response procedures. All personnel working on the site would be trained in the implementation of the procedures.

12.8.3 The measures identified in this section (including those in relation to control of soil excavation, material export, fill materials, fuel and chemical handling, transport and storage and control of water) would be included in the CEMP.

Control of soil excavation

12.8.4 Subsoil will be excavated to facilitate the construction of access roads, car parking areas, expansion of drainage connections and other ancillary works (SUDs / attenuation ponds etc.). The proposed development will incorporate the reduction, reuse and recycle approach in terms of on-site soil excavations. The proposed works will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Reuse of on-site excavated soil and capping with hardstand will minimise any increase in aquifer vulnerability. Construction works will require local removal of soil cover where levelling of the site is required and its use for re-instatement elsewhere on the site. It is envisaged that any soil excavated will be retained on-site and reused as fill material orlandscaping.

12.8.5 Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil. In the unlikely event that any potentially contaminated soils are encountered, the soil should be tested and classified as hazardous or non-hazardous in accordance with the EPA's Waste Classification –List of Waste & Determining if Waste is Hazardous or Non-Hazardous'[15] publication, HazWasteOnline tool[16] 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[17]. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

12.8.6 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 within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.

12.8.7 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

12.8.8 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

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

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[18]. 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.

12.8.9 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 for further information.

Sources of fill and aggregates

12.8.10 All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers would be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

Fuel and chemical handling

12.8.11 The following procedures will be included in the CEMP in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
  - Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
  - The pump or valve would be fitted with a lock and would be secured when not in use;
  - All bowsers to carry a spill kit;
  - Operatives must have spill response training; and
  - Drip trays used on any required mobile fuel units.

12.8.12 In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:

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

12.8.13 The aforementioned list of measures is non-exhaustive and would be included in the CEMP.

Control of water during construction

12.8.14 Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.

12.8.15 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses or drainage ditches.

12.8.16 Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g., silt traps, 20 m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

Groundworks

12.8.17 The proposed development would involve groundworks, which would inevitably have an interaction with the on-site soils and water environment. As outlined above, demolition and construction works will be undertaken in compliance with a CEMP.

12.8.18 Proposed activities that are likely to be occurring at the site during the demolition and construction stage which could involve, or which could affect the ground, are as follows:

- Formation of landscape bunds, SUDs / attenuation ponds and improvements to the Baldonnel Stream;
- Re-use of excavated material within construction works where possible in order to minimise off-site material movements, including excavated soils, roads and demolition materials;
- Foundations;
- Soil stripping, excavation and/or exposure of underlying materials;
- Topsoil and subsoils would be segregated during the works;
- Excavations for foundations, drainage works or services (standard open trenching techniques would be used for excavations);
- Dewatering of excavations (if required);
- Site-won material would be re-used on-site wherever possible, subject to relevant geotechnical testing. Imported materials would also be required to provide engineered fill as part of the construction of structures and embankments;
- Where waste material is to be disposed of off-site this would be to a licensed waste facility in accordance with a Materials Management Plan (MMP) or equivalent;
- Establishment of a temporary construction compound(s), storage and use of fuels or chemicals – the establishment stage sits prior to the installation of appropriate bunds and other pollution control measures and as such represents the highest risk. All storage areas for fuels and oils would be appropriately bunded in line with best practice guidance;
- Movement of plant and machinery within the proposed development and to/from the compound;
- Wheel washing facilities would be provided during the demolition and construction stage for plant and vehicles; and
- Vehicles moving across soils within the site.

12.8.19 As outlined above the activities required for the demolition and construction stage 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.

[18] Article 27 of the European Communities (Waste Directive) Regulations 2011,

12.8.20 Taking the above into account, the likely effects associated with contamination during the demolition and construction stage are as follows:

- A proportion of the development area would be covered in hardstanding, which 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 would have no significant change in the natural hydrogeological regime.
- Excavated and stripped soil can be disturbed and eroded by site vehicles during the works. 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 on-site is low. Nonetheless material, which is exported from site, if not correctly managed or handled, could impact negatively on human beings (on-site and off-site) as well as water and soil environments. However, it is currently anticipated that all soil would be reused on-site.
- As with all construction projects, there is potential for water (e.g., surface water, groundwater) to become contaminated with pollutants associated with the demolition and construction works. Contaminated water which arises from construction sites can pose a risk to groundwater quality for the duration of the construction if contaminated water is allowed to percolate to the underlying aquifer. The potential main contaminants include:
  - Increase in suspended solids due to muddy water with increase turbidity, arising from excavation and ground disturbance;
  - Spills and releases of cement and concrete causing an increase turbidity and pH arising from the use of these construction materials; and
  - Spills and releases of wastewater (nutrient and microbial rich) arising from poor on-site toilets and washrooms.

12.8.21 With consideration of the embedded mitigation measures outlined above predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the demolition and construction stage (low magnitude). Effects would be temporary to temporary, **Imperceptible** to **Imperceptible/Not Significant Negative** i.e., **Not Significant** in EIA terms.

Accidental spills and leaks

12.8.22 During the construction of the proposed 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.

12.8.23 Accidental spillages may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoils 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 protectionthey provide to the underlying aquifer. However, capping of site with impermeable paving and building and associated drainage infrastructure will provide additional protection following construction.

12.8.24 With consideration of the embedded mitigation measures outlined predicted impacts on the hydrogeological environment from accidental spills and leaks would be unlikely to occur during the demolition and construction stage (low magnitude). Effects would be temporary to short-term, **Imperceptible/Not Significant Negative** i.e., **Not Significant** in EIA terms.

Loss of agricultural land

12.8.25 There would be local loss of approximately 2.30 Ha of agricultural soil within the site as a result of the proposed development; however, the area of development is small in the context of the overall agricultural land available in the region. Furthermore, the site has been zoned under Objective EE of the SDCC Development Plan 2016-2022 to provide for enterprise and employment uses.

12.8.26 There would be no impact to mineral resources (such as sands and gravels / or quarried stone) in the area as a result of the proposed development.

12.8.27 As such effects would be permanent and **Imperceptible Negative** i.e., **Not Significant** in EIA terms.

Operation Effects

Embedded Mitigation

Environmental procedures & Fuel Storage

12.8.28 As detailed in Chapter 4: Description of Development, the Applicant would implement an Environmental Safety and Health Management System for the proposed development. Prior to operation of the proposed development, a comprehensive set of operational procedures would be established which will include site-specific mitigation measures and emergency response measures.

12.8.29 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.

12.8.30 In order to minimise any impact on the underlying subsurface strata from material spillages, the fuel storage tank is located above ground in designated fuel storage bund with an impervious base. One 40,000 litre bunded tank will be provided next to the data centre. The tank will be bunded to volume of 110 % of the capacity of the tank within the bund (plus an allowance of 30 mm for infiltration). Drainage from the bunds is be diverted for collection and safe disposal. Fuel delivery to the bulk storage tank would take place within designated bunded unloading area. Diesel would be piped from the bulk storage tank to belly tank at the back-up generator unit. The belly tank would be double skinned. Delivery of fuel will be undertaken following a documented procedure which minimises risk of spills and spill containment or clean-up kit shall be readily available on-site. It is anticipated, based on the Applicant's experience, that the back-up generator would rarely be used.

Operational Activities

12.8.31 Reasonably foreseeable activities or factors during the operational stage which could affect or be affected by the ground are as follows:

- Periodic maintenance which could involve small scale excavations;
- Areas of soft landscaping and planting; and
- Drainage and storm water attenuation.

12.8.32 These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined below.

12.8.33 With consideration of the embedded mitigation measures outlined above predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the operation stage (low magnitude). Effects would be long term to permanent, **Imperceptible** to **Imperceptible / Not Significant Negative**, and **Not Significant** in EIA terms.

Accidental spills and leaks

12.8.34 During the operational stage 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, there is a potential

for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental spillages and leaks of oil, petrol or diesel could cause soil/groundwater contamination if the spillages and leaks are unmitigated.

12.8.35 In the event of an on-site fire, firewater would also need to be contained or it may contaminate soils and/or groundwater.

12.8.36 With consideration of the embedded mitigation measures outlined above predicted impacts on the hydrogeological environment would be unlikely to occur during the operation stage (low magnitude). Effects would be long term to permanent, **Imperceptible / Not Significant Negative**, and **Not Significant** in EIA terms.

12.9 Additional Mitigation

12.9.1 No additional mitigation measures are proposed.

12.10 Enhancement Measures

12.10.1 No enhancement measures are proposed.

12.11 Assessment of Residual Effects

Demolition and Construction Residual Effects

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

- Temporary Imperceptible to Imperceptible/Not Significant effect from groundworks.
- Temporary **Imperceptible/Not Significant** effect from accidental spills/leaks.
- Permanent **Imperceptible** effects from loss of agricultural land.

Operation Residual Effects

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

- Permanent, **Imperceptible** to **Imperceptible/Not Significant** effects associated with general operation activities such as periodic maintenance including with areas of soft landscaping and planting and use of the site's drainage network.
- Permanent, **Imperceptible/Not Significant** effects associated with accidental spills and leaks.

Summary of Residual Effects

12.11.3 Table 12-5 provides a summary of the outcomes of the ground conditions assessment of the proposed development. Where **Significant Positive** effects are likely these are highlighted in bold green and where **Significant Negative** effects are predicted these are highlighted in bold red.

Table 12-5: Summary of Residual Ground Conditions Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P
Demolition and Construction								
Construction workers	Impact to human health from exposure to contaminated soils / dust / ground gases / water during enabling and construction works.	None required	Imperceptible	-	U	D	IR	T
Adjacent site users	Impact to human health from exposure to contaminated dust during enabling and construction works.	None required	Imperceptible	-	U	I	IR	T
Water environment (Baldonnel Stream)	Increased potential for leaching of contaminants from soils and mobilisation of contamination in surface water and groundwater during earthworks and foundation works. Also, contaminants introduced to surface water by construction activities through leakages/spillages.	None required	Imperceptible/not significant	-	U	D	IR	T
Groundwater beneath the site (aquifers)		None required	Imperceptible/not significant	-	U	D	IR	T
Agricultural Land	Loss of agricultural land	None required	Imperceptible	-	U	D	IR	P
Operation								
Adjacent site users	Impact to human health from exposure to residual contaminated soils / dust /	None required	Imperceptible	-	U	I	IR	Lt to P
Future site users		None required	Imperceptible	-	U	D	IR	Lt to P

Table 12-5: Summary of Residual Ground Conditions Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P
	ground gases / water.							
Water environment (Baldonnel Stream)	Contaminants released by operation activities through leakages/spillages.	None required	Imperceptible/not significant	-	U	D	IR	Lt to P
Groundwater beneath the site (aquifers)		None required	Imperceptible/not significant	-	U	D	IR	Lt to P

Notes:

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

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

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

12.12 Cumulative Effects

Intra-Project Effects

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

Inter-Project Effects

12.12.2 Table 12-6 provides a summary of the likely inter-project cumulative effects resulting from the proposed development and the cumulative developments.

Table 12-6: Inter-Project Cumulative Effects

Cumulative Schemes	Demolition and Construction & Operation	
	Cumulative Effects Likely?	Reason
SD20A/0283 Microsoft, Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 VA06S.308585 SD20A/0121 UBC Properties, townlands within Grange Castle Business Park, Baldonnel, Dublin 22	No	Cumulative effects are unlikely as each site would be mitigated through an appropriate staged approach to contaminated land assessment and ground investigation as required under EPA (2013) guidance, *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*. Cumulative effects are unlikely from other operational sites nearby as each site would have spill response procedures and will have been subject to contaminated land assessment and ground investigation as required under EPA (2013) guidance. Similarly, each development site would

Table 12-6: Inter-Project Cumulative Effects

Cumulative Schemes	Demolition and Construction & Operation	
	Cumulative Effects Likely?	Reason
308585 UBC Properties - Grange Castle South Business Park, Dublin 22 SD17A/0377 Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 SD18A/0134 Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 SD20A/0295 (amendment to SD18A/0134) Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 VA06S.309146 Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 SD21A/0167 Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 SD21A/0186 Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (SD22A/0156 amendment to SD21A/0186) SD21A/0217 Digital Netherlands VIII B.V - Profile Park, Nangor Road, Clondalkin, Dublin 22 312793 Vantage Data Centers Dub 11 Limited - Profile Park Business Park and partly within Grange Castle Business Park, Dublin 22		have embedded mitigation through their site specific contaminated land management procedures documented in the site environmental management systems.

Demolition and Construction Cumulative Effects

12.12.3 Cumulative effects from other developments nearby are unlikely as each development site would be mitigated through an appropriate staged approach to contaminated land assessment and ground investigation as required under EPA (2013) guidance, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Similarly, each development site would have embedded mitigation through their site-specific contaminated land management procedures documented in the site CEMP.

Operation Cumulative Effects

12.12.4 Cumulative effects from other operational sites nearby are unlikely as each site would have spill response procedures to manage storage and use of potential polluting fuels and chemicals and will have been subject to contaminated land assessment and ground investigation as required under EPA (2013) guidance, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Similarly, each development site would have embedded mitigation through their site-specific contaminated land management procedures documented in the site environmental management systems.

12.13 Summary of Assessment

Background

12.13.1 This chapter has detailed the potential ground condition effects due to the demolition and construction and operational stages of the Proposed Development. The assessment of effects has been undertaken using the relevant national and local guidance and regulations.

12.13.2 Baseline assessment has been made using, publicly available information supplemented by a ground investigation assessing soil quality. The assessment of the baseline information and ground investigation results indicate that:

- The site has been predominantly greenfield and agricultural use historically. There is no evidence of any historical waste disposal or source of contamination within the site itself.
- The site is underlain by the Lucan formation comprising dark grey to black limestone and shale from the Carboniferous Age.
- The site is underlain by a locally important aquifer with the Baldonnel Stream running through the southern area of the site.
- Very low levels of soil contamination were recorded typical of a greenfield site at concentrations that do not present a significant risk to potential receptors.

12.13.3 Overall, the results of the baseline assessment identified no significant sources of ground contamination in soils.

Demolition and Construction Effects

12.13.4 The proposed development would involve groundworks, which would have an interaction with the on-site soils and water environment.

12.13.5 The activities that could affect the ground, are:

- ;
- Formation of landscape bunds, SUDs / attenuation ponds and improvements to the Baldonnel Stream;
- Re-use of excavated material within construction works where possible in order to minimise off-site material movements, including excavated soils, roads and demolition materials;
- Excavations for foundations, drainage works or services (standard open trenching techniques would be used for excavations) and any dewatering of excavations (if required);
- Movement of plant and machinery within the proposed development and to/from the compound;
- Wheel washing facilities would be provided during the demolition and construction stage for plant and vehicles; and
- Vehicles moving across soils within the site.

12.13.6 With consideration of the embedded mitigation measures outlined above, predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the demolition and construction stage. Effects would be temporary, Imperceptible to Imperceptible/Not Significant i.e., not significant in EIA terms.

12.13.7 Also, during the construction, 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.

12.13.8 Again, with consideration of the embedded mitigation measures outlined predicted impacts on the hydrogeological environment from accidental spills and leaks would be unlikely to occur during the demolition and construction stage. Effects would be Imperceptible/Not Significant Negative i.e., not significant in EIA terms.

12.13.9 Overall, it is considered that the demolition of the existing site and construction of the proposed development would result in a temporary and Imperceptible/Not Significant effect on the ground conditions and identified receptors, and as such **would not give rise to significant effects**.

Operational Effects

12.13.10 During the operational stage 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, there is a potential for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental spillages and leaks of oil, petrol or diesel could cause soil/groundwater contamination if the spillages and leaks are unmitigated.

12.13.11 With consideration of the embedded mitigation measures predicted impacts on the hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, Imperceptible to Imperceptible/Not Significant i.e., not significant in EIA terms.

12.13.12 Reasonably foreseeable activities or factors during the operational stage which could affect or be affected by the ground are as follows:

- Periodic maintenance which could involve small scale excavations;
- Areas of soft landscaping and planting; and
- Drainage and storm water attenuation.

12.13.13 With consideration of the embedded mitigation measures predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, Imperceptible/Not Significant i.e., not significant in EIA terms.

12.13.14 Overall, it is considered that the operation of the proposed development would result in an imperceptible/Not Significant effect on the ground conditions and identified receptors, and as such **would not give rise to significant effects**.