During the night period, no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL. The applicable noise criteria identified are in line with the typical limit values for noise from licensed sites.

Assessment of Significance

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 10.11 below and is based on an example scale within the IEMA guidelines. The corresponding significance of effect presented in the EPA EIA Report Guidelines (2022) is also presented.

Table 10.11 Noise Effect Scale

Noise Level Change dB(A)	Subjective Response	Long Term Impact Classification (IEMA, 2014)	Impact Guidelines on the Information to be contained in EIA Report's (EPA)
≥ 0	No change	Negligible	Imperceptible
≥ 0 and < 3	Barely perceptible	Not Significant	Not Significant
≥ 3 and < 5	Noticeable	Minor	Slight Impact
≥ 5 and < 10	Clearly perceptible	Moderate	Moderate Impact
≥10	More than a doubling or halving of loudness	Major	Significant Impact

The significance table reflects the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the ratings specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

The night-time conditions will dictate the design of the development from an acoustic perspective so this will be focused on in this assessment as compliance with the night-time criterion infers compliance with the daytime one.

Recommended Criteria

Following review of relevant guidance, the following noise criteria are proposed for the proposed development:

Daytime Periods (Residential) – 55 dB $L_{Aeq,15min}$
Daytime Periods (Commercial) – 55 dB $L_{Aeq,15min}$
Evening Periods (Residential) – 50 dB $L_{Aeq,15min}$
Night-time Periods (Residential) – 45 dB $L_{Aeq,15min}$

These criteria apply at the façades of the locations.

Note plant noise emissions are to be designed such that they are not tonal and do not have impulsive characteristics or excessive low frequency noise at the nearest noise sensitive locations.

10.1.1.6 Operational Phase – Vibration Guidance

Guidance as to an acceptable magnitude of vibration during the operational phase of the development is best taken from British Standard BS 6472 (1992): *Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz)*. The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3mm/s by daytime and 0.2mm/s by night-time.

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

10.1.1.7 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

Prediction calculations for building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): Acoustics – *Attenuation of sound outdoors – Part 2: General method of calculation.*

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the UK Department of Transport in 1988.

10.2 THE PROPOSED DEVELOPMENT

The subject site is located at lands at Kilshane Road, Kilshane, Finglas, Dublin 11. The proposed development consists of the following;

- The construction of a new Gas Turbine Power Generation Station with an output of up to 293 Megawatts. The proposed station will consist of 1 no. Gas Turbine and 1 no. 28 m high Exhaust Stack partially enclosed by a 12 m high acoustic wall. 1 no. single storey Admin Building and Warehouse (c. 926 m^2), 1 no. single storey Packaged Electronic/Electrical Control Compartment (PEECC) (c. 72 m^2), 1 no. single storey Continuous Emission Monitoring System (CEMS) Shelter (c. 14.8 m^2), 1 no. 16.20m high x ⌀24.4m Fuel Oil Tank, 1 no. 15.30m high x ⌀9.2m Raw/Fire Water Tank, 1 no. 16.20m high x ⌀18.3m Demin Water Tank, and miscellaneous plant equipment.
- The demolition of a detached residential dwelling (c. 142 m^2 GFA) and associated farm buildings (c. 427 m^2 GFA) located in the north west corner of the subject site to facilitate the proposed development.
- Road improvement works to 493.34 m Kilshane Road (L3120), including the realignment of a portion of the road (293.86 m) within the subject site boundary and the provision of new footpaths, off-road cycle ways, together with the construction of a new roundabout linking the

proposed realignment of Kilshane Road back to the existing road network to the northeast of the subject site and to the proposed internal road network to serve the proposed development.
- The construction of entrance gates, low wall and railings fronting the realigned Kilshane Road and a private internal road network providing for vehicular, cyclist and pedestrian access to serve the development. Construction of 3 m high security fencing within development.
- Total provision of 26 no. car parking spaces including 1 no. disabled persons parking space and 2 no. EV electrical charging points.
- Provision of security lighting columns to serve the development and the installation of Closed-Circuit Television System (CCTV) for surveillance and security purposes.
- Provision of 20 no. sheltered bicycle parking spaces.
- Provision of hard and soft landscaping works, tree planting and boundary treatments including 3 m high security fence along Kilshane Road and the perimeter of the subject site boundary.
- Provision of new on-site foul sewer pumping station to serve the development.
- Provision of underground surface water attenuation areas to serve the development.
- All associated site development and excavation works, above and below ground, necessary to facilitate the development.

In respect of operating hours of the proposed development, the following section from Chapter 4 is relevant:

> *The plant is forecast to operate for between 22 and 95 hours in a year with an annual average of 46 hours. The plant is required to be available to follow dispatch instructions from EirGrid, the Transmission System Operator (TSO). The TSO will decide the actual operating hours of the unit depending on system needs at any point in time.*

In this assessment, the criteria in terms of noise level limits are appropriate for a continuously operating development, though as stated above the proportion of the time is equivalent to a number of days per year. The noise assessment presented here is therefore 'worst case'.

10.3 THE RECEIVING ENVIRONMENT

An environmental noise survey has been conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2007: Acoustics – Description, measurement and assessment of environmental noise. Specific details are set out below.

10.3.1 DATES AND TIMES OF NOISE SURVEYS

Noise measurements were conducted using an unattended noise monitoring over five days that encompassed typical day, evening and night-time periods. The night survey represents the time of night that provides a measure of existing background noise levels during a period where people are attempting to go to sleep or are sleeping. As the development will have capacity to operate at any time of day or night, the potential impact during night time periods is the critical issue. The survey was conducted during the following periods:

- UN1: 16:20 hrs on Wednesday 20 April 2022 to 10:50 hrs on Monday 25 April 2022, and
- UN2: 16:10 hrs on Thursday 21 April to 10:50 hrs on Monday 25 April 2022

10.3.2 PERSONNEL AND INSTRUMENTATION

AWN Consulting conducted the noise level measurements.

The noise measurements were performed using a Rion NL-52 Sound Level Analyzer (S/Ns 164427 and 186671). Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator

10.3.3 Measurement Locations

Figure 10.2 details the approximate location of the measurement positions identified above.

Figure 10.2 Noise Survey Locations

10.3.4 Methodology

Sample periods for the noise measurements were 15 minutes. Results were saved to the instrument memory for later analysis. Survey personnel noted the primary noise sources contributing to noise build-up during installation and removal of the equipment form site.

10.3.5 Survey Results

10.3.5.1 Location UN1

The survey results for Location UN1 are summarised in Table 10.12 below.

Table 10.12 Review of Typical Noise Levels

Date	Day	Period	Ambient Noise dB $L_{Aeq,T}$	Background Noise dB $L_{A90,T}$
20/4/2022	Wednesday	Day	64	60
		Evening	64	56
		Night	60	50
21/4/2022	Thursday	Day	65	61
		Evening	64	58
		Night	61	52
22/4/2022	Friday	Day	66	62
		Evening	64	58
		Night	60	51
23/4/2022	Saturday	Day	65	61
		Evening	62	56
		Night	60	49
24/4/2022	Sunday	Day	65	59
		Evening	63	57
		Night	61	50
25/4/2022	Monday	Day	66	62
Overall		Day	65	60
		Evening	63	57
		Night	60	50

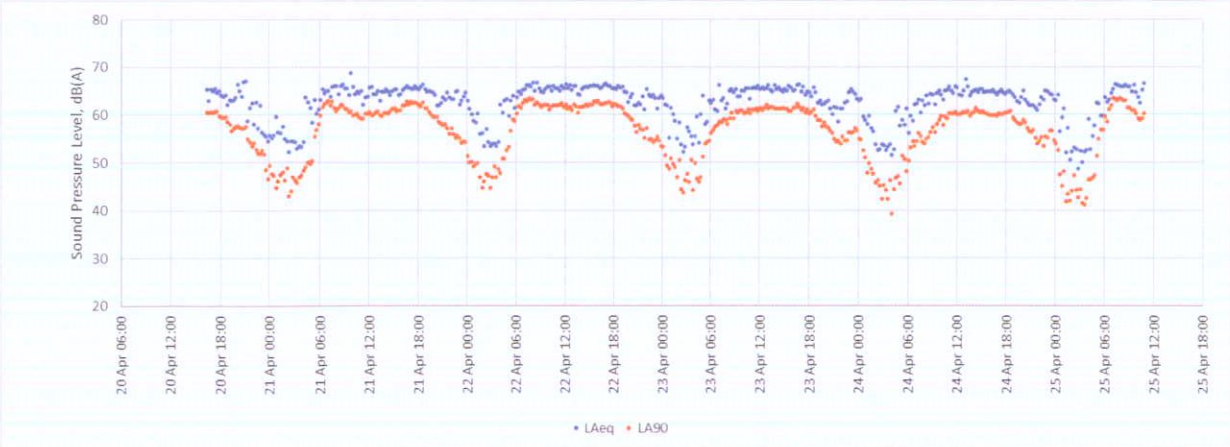

Figure 10.3 Time History of Measured Noise Levels at UN1

10.3.5.2 Location UN2

The survey results for Location UN2 are summarised in Table 10.13 below.

Table 10.13 Review of Noise Levels at UN2

Date	Day	Period	Ambient Noise dB $L_{Aeq,T}$	Background Noise dB L_{A90}
21/4/2022	Thursday	Day	69	67
		Evening	66	62
		Night	63	53
22/4/2022	Friday	Day	69	66
		Evening	66	61
		Night	62	53
23/4/2022	Saturday	Day	68	65
		Evening	65	60
		Night	61	51
24/4/2022	Sunday	Day	67	63
		Evening	65	60
		Night	63	52
25/4/2022	Monday	Day	69	66
Overall		Day	68	65
		Evening	65	61
		Night	62	52

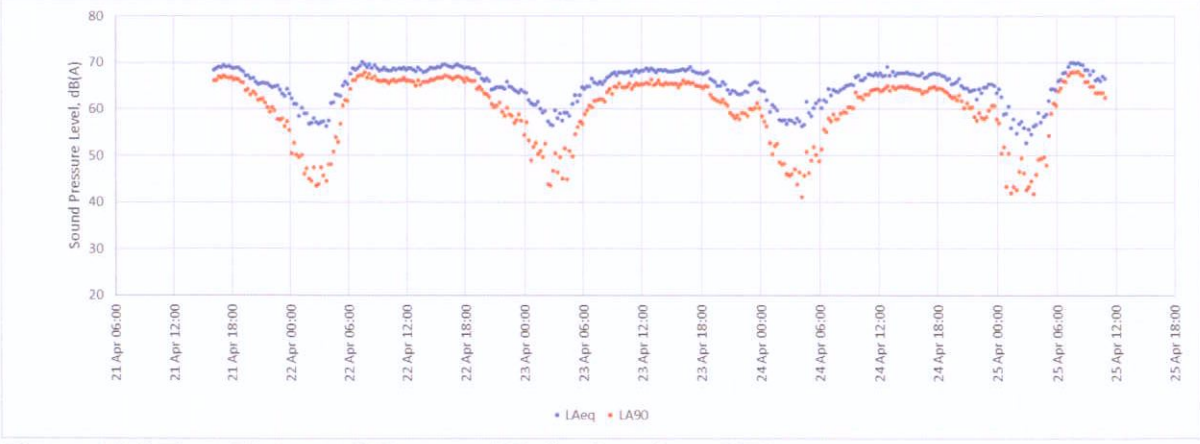

Figure 10.4 Time History of Measured Noise Levels at UN2

These typical noise levels have been considered when discussing appropriate noise criteria in relation to the development (see Section 10.1.1.5).

10.3.5.3 Nearest Noise-Sensitive Locations

In the first instance it is considered appropriate to define a noise sensitive location (NSL). In this context, it is considered prudent to give consideration to the definition supplied by the Environmental Protection Agency (EPA) which states the following:

"NSL – any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels."

Figure 10.5 highlights the nearest noise sensitive locations for which noise predictions have been carried out. Descriptions of the locations are presented in Table 10.14

Figure 10.5 Noise-Sensitive Locations

Table 10.14 Noise-sensitive Locations

Location Ref	Description
R01	Commercial property on Kilshane Road
R02	Residential properties on Kilshane Road
R03	
R04	
R05	
R06	
R07	Residential properties on North of Kilshane Cross / on R135
R08	
R09	
R10	Residential properties on Kilshane Road
R11	
R12	Residential properties south of Kilshane Cross
R13	
R14	Residential properties at Ravenswood
R15	Residential properties on Kilshane Road to southwest of site
R16	

10.4 PREDICTED IMPACTS

The proposed development will involve the construction of gas-fired power plant and associated ancillary buildings and equipment, including the re-alignment of part of Kilshane Road, over an anticipated construction period of approximately 29 months.

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

The construction phase will involve extensive excavation, rock breaking, general site preparation over the development site and the erection of new buildings over a phased construction period. Comment will also be presented in the following sections in relation to construction traffic on local roads in terms of noise and vibration.

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

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

These issues are discussed in detailed in the following sections.

10.4.1 CONSTRUCTION PHASE

The largest noise and vibration impact of the proposed development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. However, the construction phase can be classed as a short-term phase.

The nearest residential NSLs to the site are at distances of approximately 50m from the nearest substantial construction works (i.e. the re-aligned road) and at more than 100m from the gas generator compound.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB L_{WA}. This worst-case scenario is the typical assumption made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Table 10.15 Predicted Construction Noise Levels

Description of Noise Source	Calculated noise levels at varying distances (dB $L_{Aeq,1hr}$)				
	50 m	60 m	70 m	80 m	100 m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously	70	68	67	66	64

The calculated noise levels in Table 10.15 show that there is predicted noise levels are within the adopted construction noise criteria of 70 dB $L_{Aeq,1hr}$. This indicates that construction noise effects are negative, not significant and short-term.

10.4.1.1 Construction Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited to excavations and piling works to be used for foundations. For the purposes of this assessment the expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

0.54mm/s at a distance of 5m, for auguring;
0.22mm/s at a distance of 5m, for twisting in casing;
0.42mm/s at a distance of 5m, for spinning off, and;
0.43mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the nearest buildings are not expected to pose any significance in terms of cosmetic or structural damage. In addition the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings. This indicates that construction vibration effects are negative, not significant and short-term.

10.4.1.2 Construction Traffic

In terms of the construction traffic on local roads that will be generated as a result of the proposed development the following comment is presented: Considering that, according to the calculation methods in Calculation of Road Traffic Noise (CRTN), in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25%. With reference to Table 10.9 t is considered that a 1dB increase in traffic noise levels on the local road network, due to the construction phase, will not result in a significant noise impact.

10.4.2 Operational Phase

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

- power plant noise, and
- additional vehicular traffic on public roads.

These issues are discussed in following sections. See Appendix 10.2 and 10.3 for details of the noise modelling undertaken for this assessment and associated assumptions.

10.4.2.1 Power Station Noise

In relation to the power plant noise there are two modes in which the dual-fuel power plant can operate:

- Gas fuel operation, and
- Liquid fuel operation.

Certain items of plant are relevant to only one mode: in gas fuel operation, the demineralised water pump, fuel oil pump and liquid fuel module do not operate; in liquid fuel operation, the fuel gas heater skid and separator skid do not operate. Both scenarios are evaluated in this assessment.

For details of the noise model and input information, see Appendices 10.2 and 10.3.

The results of the iterations of the noise model are presented and are compared to the relevant noise criteria as adopted for this assessment in Table 10.16 and Table 10.17. Note all plant will be selected such that no tonal or excessive low frequency noise emissions are evident at noise sensitive locations.

The predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption.

Noise contours for each scenario are presented in Figure 10.6 and Figure 10.7.

Table 10.16 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria

Location	Gas Fuel Operation			Liquid Fuel Operation		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
R01[A]	45	55 (Daytime)	✓	46	55 (Daytime)	✓
		--	--		--	--
		--	--		--	--
R02	44	55 (Daytime)	✓	45	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R03	42	55 (Daytime)	✓	42	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R04	44	55 (Daytime)	✓	44	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓			✓
R05	45	55 (Daytime)	✓	45	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓

Location	Gas Fuel Operation			Liquid Fuel Operation		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
		45 (Night)	✓		45 (Night)	✓
R06	39	55 (Daytime)	✓	40	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R07	41	55 (Daytime)	✓	42	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R08	41	55 (Daytime)	✓	41	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R09	41	55 (Daytime)	✓	41	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R10	44	55 (Daytime)	✓	45	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R11	44	55 (Daytime)	✓	44	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R12	41	55 (Daytime)	✓	43	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R13	43	55 (Daytime)	✓	45	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R14	37	55 (Daytime)	✓	40	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R15	35	55 (Daytime)	✓	37	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓
R16	35	55 (Daytime)	✓	37	55 (Daytime)	✓
		50 (Evening)	✓		50 (Evening)	✓
		45 (Night)	✓		45 (Night)	✓

Note A R01 is a commercial NSL therefore criteria are not provided for evening and night-time periods.

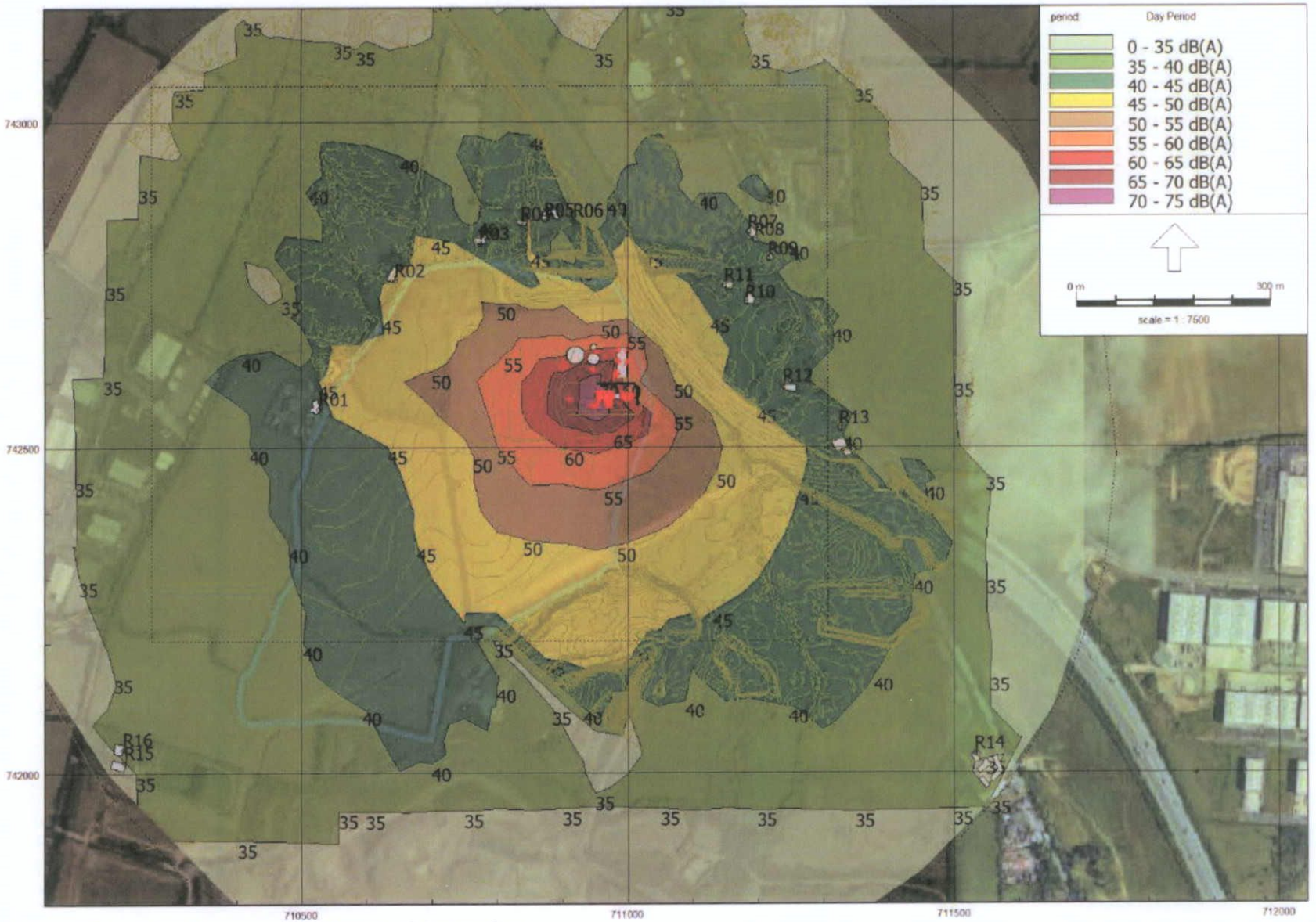

Figure 10.6 Noise Contours for Gas Fuel Operation

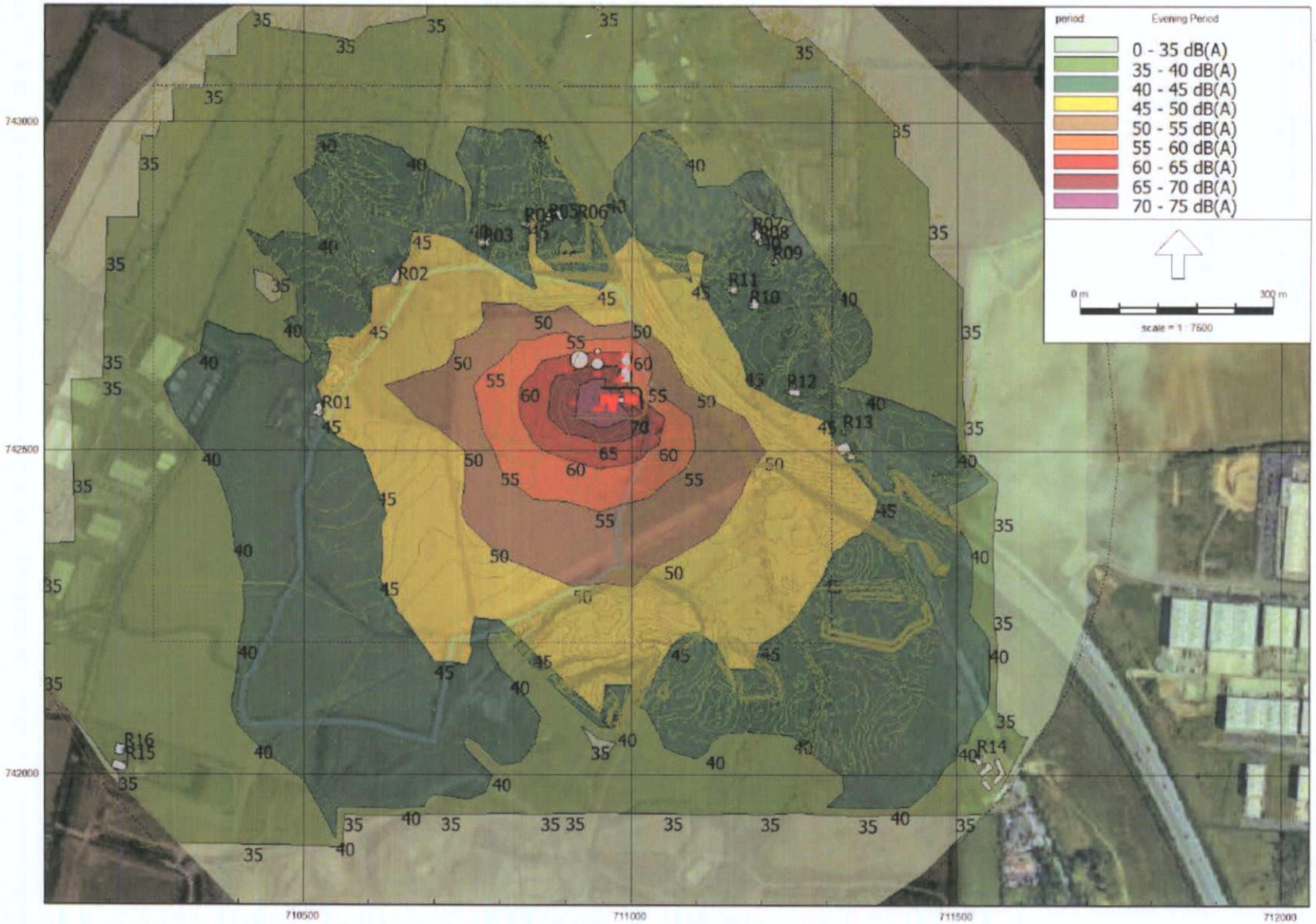

Figure 10.7 Noise Contours for Liquid Fuel Operation

10.4.2.2 Review of Increases in Noise Level

As the power plant may be required to operate during day, evening or night periods, this section of the assessment focuses on night-time periods which are the most sensitive. The average background noise levels during night-time periods are, as presented in section 10.3.1.5, 50 dB L_{A90} at UN1 and 52 dB L_{A90} at UN2. Inspection of the noise level variation over the noise survey shows that the background noise reduced to levels of the order of 45 dB L_{A90} during the quieter parts of the night. The level of 45 dB L_{A90} is used in Table 10.17 and Table 10.18 to provide a conservative assessment of the increase in noise level.

Table 10.17 Review of Increases in Night-time Noise Level – Gas Operation

Location	Predicted dB LAeq,T	Background dB LA90,15min	Cumulative	Change in Noise Level	EPA Glossary of Impacts
R01	45	45	48	+3	Slight
R02	44	45	48	+3	Slight
R03	42	45	47	+2	Not Significant
R04	44	45	48	+3	Slight
R05	45	45	48	+3	Slight
R06	39	45	46	+1	Not Significant
R07	41	45	47	+2	Not Significant
R08	41	45	47	+2	Not Significant
R09	41	45	47	+2	Not Significant
R10	44	45	48	+3	Slight
R11	44	45	48	+3	Slight
R12	41	45	47	+2	Not Significant
R13	43	45	47	+2	Not Significant
R14	37	45	46	+1	Not Significant
R15	35	45	45	0	Imperceptible
R16	35	45	45	0	Imperceptible

Review of the predicted increases in noise level for gas fuel operation at the nearest noise sensitive locations conclude that the associated effect ranges from 'imperceptible' at the R15 and R16 to the southwest, to 'not significant' and 'slight' at the locations closest to the proposed development.

Table 10.18 Review of Increases in Night-time Noise Level – Liquid Fuel Operation

Location	Predicted dB LAeq,T	Background dB LA90,15min	Cumulative	Change in Noise Level	EPA Glossary of Impacts
R01	46	45	49	+4	Slight
R02	45	45	48	+3	Slight
R03	42	45	47	+2	Not Significant
R04	44	45	48	+3	Slight
R05	45	45	48	+3	Slight
R06	40	45	46	+1	Not Significant
R07	42	45	47	+2	Not Significant
R08	41	45	47	+2	Not Significant
R09	41	45	47	+2	Not Significant
R10	45	45	48	+3	Slight
R11	44	45	48	+3	Slight
R12	43	45	47	+2	Not Significant
R13	45	45	48	+3	Slight
R14	40	45	46	+1	Not Significant
R15	37	45	46	+1	Not Significant
R16	37	45	46	+1	Not Significant

Review of the predicted increases in noise level for gas fuel operation at the nearest noise sensitive locations conclude that the associated effect ranges from 'not significant' and 'slight'.

10.4.2.3 Additional Vehicular Traffic on Public Roads

In terms of the additional traffic on local roads that will be generated as a result of this development, the following comment is presented. With reference to Chapter 4, the proposed development will not add a significant amount of additional traffic to the surrounding road network during operation. Considering that in order to increase traffic noise levels by 1dB, traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to the proposed development will not result in a significant noise impact.

10.4.2.4 Summary of Operational Impacts

In terms of noise associated with the operation of the site, the associated effect is stated to be negative, imperceptible to slight and long-term.

There are no sources of vibration associated with the operation of the development will give rise to impacts at nearby noise sensitive locations. In terms of these the operational phase of the development the associated vibration effect is stated to be neutral, imperceptible and long-term

10.5 MITIGATION MEASURES

10.5.1 CONSTRUCTION PHASE

With regard to construction activities, reference will be made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. The following mitigation measures will be applied during the construction of the proposed development:

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

Furthermore, a variety of practicable noise control measures will be employed including:

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

Vibration from construction activities to off-site residences be limited to the values set out in Table 10.7. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes will proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

10.5.2 OPERATIONAL PHASE

10.5.2.1 Power Station Noise

The sound power levels of the proposed plant items are detailed in Appendix 10.2. Noise from external plant will be minimised by purchasing low noise generating equipment and incorporating appropriately specified in line attenuators for stacks and exhausts where necessary. With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment.

The 12m high barrier also presented in Appendix 10.2 was designed in conjunction with the project engineering team to reduce noise levels at NSLs

10.5.2.2 Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required

10.6 RESIDUAL IMPACTS

This section summarises the likely noise and vibration impact associated with the proposed development, taking into account the mitigation measures.

10.6.1 Construction Phase

During the construction phase of proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 10.5, Table 10.6), along with implementation of appropriate noise and vibration control measures (as summarised in Section 10.6.1), will ensure that noise and vibration impact is kept to a minimum. Also it is reiterated that any construction noise effects will be not significant, negative and short term in nature.

10.6.2 Operational Phase

10.6.2.1 Power Station Noise

Proprietary noise and vibration control measures have been employed including plant selection and acoustic screening, in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions will be broadband in nature and will not contain any tonal or impulsive elements. The resultant noise effect is negative, not significant to slight and long-term.

10.6.2.2 Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is expected to be imperceptible. The resultant noise effect is neutral, imperceptible and long term.

10.7 CUMULATIVE IMPACTS

10.7.1 Existing Developments

The environmental noise surveys (Section 10.3) take account of any noise emissions from existing developments. It was noted that the existing ambient noise levels in the area were dominated by aircraft and road traffic noise from the local road network.

At certain locations during night-time periods where existing background noise levels were measured in the range of 45 to 50 dB $L_{A90,15min}$, low levels of plant noise from the proposed development may be audible during lulls in other sources (e.g. aircraft). Notwithstanding this, the resulting cumulative background noise levels will be within the adopted night-time noise criteria outlined in relevant EPA noise criteria that are applicable to the development.

10.7.2 Related Developments

There are two closely related projects that are not part of the subject proposal but are integral to its operation:

- an Above Ground Installation (AGI);
- a Gas Insulated Switchgear (GIS) facility.

Neither of these projects likely to give rise to significant noise or vibration effects in their own right, during either the construction phase or the operational phase. Therefore, there is accordingly no likely significant noise or vibration effect when considered cumulatively with the proposed power station development.

10.7.3 Future Developments

10.7.3.1 Substation & Grid Connection

As part of a separate application, a substation is proposed within the development boundary, together with an associated grid connection along public roads to Cruiserath substation.

In the following extract from the "EirGrid Evidence Based Environmental Studies Study 8: Noise – Literature review and evidence based field study on the noise effects of high voltage transmission development (May 2016) states the following in relation to noise impacts associated with 220KvA transformer installations:

> *"The survey on the 220kv substation at Gorman indicated that measured noise levels (LAeq) were approximately 43dB(A) at 5m from the most affected boundary of the substation. This is marginally above the WHO night-time threshold limit for preventing disturbance to sleep (i.e. 42dB). Spectral analysis of the noise from the Gorman substation demonstrated that there are a number of distinct tonal elements to noise in the low to mid frequency range. To avoid any noise impacts from 220kV substations at sensitive receptors, it is recommended that a distance of 20m is maintained between the nearest site boundary and the nearest sensitive receptor."*

Considering the distance between the proposed substation and the nearest off site locations of some 150m noise from this installation is not predicted to be an issue off site.

10.7.3.2 Other Developments

The Fingal County Council planning file has been reviewed and a number of developments in the local area have been identified, as listed in the accompanying Planning Application Report. These specific developments have been reviewed for any likelihood of a significant cumulative noise impact.

In respect of noise, taking into account the additional distance from these developments to noise-sensitive locations assessed here, and that the low number of operations hours per year of the proposed Kilshane Energy Centre, it is not considered that a significant cumulative noise or vibration impact is likely.

10.8 COMMENT ON AIRPORT NOISE ZONE

As a final comment it is noted that the development lands in question fall within the adopted Noise Zone A as outlined in Variation No. 1 of the Fingal Development Plan 2017-2023.

Figure 10.8 Airport Noise Zones

The members of Fingal County Council resolved to adopt Variation No. 1 of the Fingal Development Plan 2017-2023 at a Council meeting on 9 December 2019. Variation No. 1 outlines revised Noise Zones and policy objectives in relation to aircraft noise from Dublin Airport.

Four noise zones (Zone A to D) are now indicated representing potential site exposure to aircraft exposure. Table 10.19 below outlines the objectives to be adhered to by applicants for developments in each zone. In the first instance the following comment in relation to the aim of Zone A should be noted:

"To resist new provision for residential development and other noise sensitive uses."

Table 10.19 Airport Noise Zones

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
A	≥ 63 dB $L_{Aeq, 16hr}$ and/or ≥ 55 dB L_{night}	To resist new provision for residential development and other noise sensitive uses. "All noise sensitive developments within this zone may potentially be exposed to high levels of aircraft noise, which may be harmful to health or otherwise unacceptable. The provision of new noise sensitive developments will be resisted."

On the basis the development will operate primarily during the daytime period, the worst-case daytime aircraft noise level incident to the façade would fall in the region of 63 dB $L_{Aeq,16\ hour}$.

10.8.1 Guidance on Intrusive Noise Levels

The Dublin Noise Action Plan and relevant guidance referenced therein call for developments to have a good level of sound insulation in accordance with best Irish practice. There is no Irish standard guidance that is directly applicable to this scenario, hence it is proposed to make reference to BS8233 for the purposes of arriving at appropriate design goals.

The British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings sets out recommended internal noise levels for several different building types from external noise sources such as road and air traffic. The guidance is primarily for use by designers, hence BS8233 may be used as the basis for the development of an appropriate schedule of noise control measures.

The recommended indoor ambient noise levels in a commercial building are shown in Table 10.20.

Table 10.20 Airport Noise Zones

Activity	Location	Design range dB $L_{Aeq,T}$
Speech or telephone communications	Department Store, Canteen, Kitchen	50 – 55
Typical noise levels for acoustic privacy in shared spaces	Open Plan Office	45 – 50
Study and work requiring concentration	Meeting Room	35 – 45

10.8.2 Calculation of Future Intrusive Aircraft Noise Levels

10.8.2.1 Proposed Façade Elements

Calculation of noise break-in from the outside environment to the control room, meeting room and office spaces in the development have been carried out in order to select a minimum sound reduction performance for the glazing and vents in order to provide a good internal noise environment in accordance with the criteria in Table 10.20.

The specification of glazing elements including lab or estimated sound insulation performance values have been presented in Table 10.21. Values are also provided for fresh air vents, for the case where they are to be incorporated at detailed design stage.

Table 10.21 Façade Element Specification

Element	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Glazing	23	17	27	39	44	38
Vents (2 per room)	36	28	26	28	30	30

10.8.2.2 Predicted Internal Noise Levels

Using the noise levels relevant to Noise Zone A and the sound reduction performances of the building elements in Table 10.21, the predicted intrusive noise levels for office space within the open plan office areas of the development has been calculated in accordance with BS EN ISO 12354-3:2017 Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Airborne sound insulation against outdoor sound.

Based on the expected external noise level and the constructions detailed above the predicted internal noise levels within the building arising from future aircraft noise levels are of the order of 45 dB $L_{Aeq,T}$. It is important to note that this falls within the recommended values as outlined in 10.20 above. It is concluded that no further mitigation measures are required in respect of inward impact of environmental noise.

10.9 INTERACTIONS

Chapter 12, Material Assets, Traffic and Transport was reviewed in the preparation of this chapter.

10.10 REFERENCES

- EPA Guidelines on Information to be contained in Environmental Impact Statements (2002).
- Draft 'Guidelines for Noise Impact Assessment' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.
- British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.
- Transport Infrastructure Ireland (TII) publication Good Practice Guidelines for the Treatment of Noise and Vibration in National Road Schemes.
- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 5228-2: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Vibration.
- BS 4142:2014: Methods for rating and assessing industrial and commercial sound.
- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016).
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.
- British Standard BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz).
- ISO 9613 (1996): Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.
- Calculation of Road Traffic Noise (CRTN) issued by the Department of Transport in 1988.
- BS EN 1793-1:1998: Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 1: Intrinsic characteristics of sound absorption
- BS EN 1793-2:1998: Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation.
- BS EN 1794-1:2003: Road traffic noise reducing devices. Non-acoustic performance. Mechanical performance and stability requirements
- BS EN 1794-2:2003: Road traffic noise reducing devices. Non-acoustic performance. General safety and environmental requirements.

11 LANDSCAPE & VISUAL IMPACT

11.1 INTRODUCTION

This landscape and visual impact assessment has been prepared to identify and assess the effects on the appearance and character on the local environs arising from the proposed development.

This chapter analyses the existing landscape character and significance, and provides an evaluation of the potential for landscape and visual impacts of the development. The assessment is made having regard to the vulnerability of the landscape to change and to the location of visual receptors relative to the proposed development.

Visual Impacts are a combination of effects on visibility and on the overall character of the area. The main landscape features and landscape character areas were identified through a combination of site visit and documentation surveys.

Landscape impacts were analysed based on:

- The capacity of the existing landscape to absorb the proposed development;
- Effects on landscape character and features (e.g., removal or alteration);
- Proximity of sensitive viewpoints (e.g., routes) and visual receptors (dwellings)
- The details of the development.

Visual impacts are evaluated taking account of:

- The potential level of visual intrusion (i.e., effect impinged upon a view);
- The potential for visual impact dependant on the proximity and elevation of structures to a sensitive viewpoint/visual receptor.

The County Development Plan and Draft County Development Plan was consulted to identify Landscape Character Areas and significant landscape features. Related provisions of the Plan – such as the proximity of Protected Structures to the site, were also considered.

11.1.1 ASSESSMENT METHODOLOGY

Photomontages are used to simulate the likely visual changes that would result from the proposed development and are produced by combining computer generated renders of the proposal with photographs of the existing site.

Photo-montage production.
Photographs are taken from locations as advised by client with a full frame SLR digital camera and prime lens. The photographs are taken horizontally with a survey level attached to the camera. The photographic positions are marked (for later surveying), the height of the camera and the focal length of the image recorded.

In each photograph, a minimum of 3no. visible fixed points are marked for surveying. These are control points for model alignment within the photograph. All surveying is carried out by a qualified topographical surveyor using Total Station / GPS devices.

The photographic positions and the control points are geographically surveyed and this survey is tied in to the site topographical survey supplied by the Architect / client.

The buildings are accurately modelled in 3D CAD software from CAD drawings supplied by the Architect. Material finishes are applied to the 3D model and scene element, such as trees and planting are added to represent the proposed landscaping.

Where visible, new planting is represented at three stages of growth – Year 1, 3 and 5. Appendix 11 contains illustrations of visibility at these years.

Virtual 3D cameras are positioned according to the survey co-ordinates and the focal length is set to match the photograph. Pitch and rotation are adjusted using the survey control points to align the virtual camera to the photograph. Lighting is set to match the time of day the photograph is taken. The proposed development is output from the 3D software using this camera and the image is then blended with the original photograph to give an accurate image of what the proposed development will look like in its proposed setting.

In the event of the development not being visible, the roof line of the development is outlined in red.

11.1.2 WORST CASE ASSESSMENT

In accordance with EIAR methodology, best practice is to include the identification and description 'worst case' impacts along with representative views of how the development would affect the general area.

In the case of Landscape and Visual Impact Assessment this involves the following viewing points from where the development could possibly be seen:

- Views from gates and entrances offering the most unscreened views of the development site
- Views at locations where roadside hedges have gaps or gates offering unscreened views of the development site
- Views from Protected Structures and their context/setting
- Consideration of likely views in winter foliage of areas where trees offer screening.

Views were selected on the basis of the scoping described above, site visits as well as the consideration of 'worst case' described above.

View locations have been selected in an attempt to satisfy the following criteria:

- To obtain views from locations where the development would typically be visible from the public realm
- To illustrate 'worst case' views
- Concentrations of potential viewers
- Locations of amenity significance
- Locations of heritage significance

On the basis of these considerations, views were examined and modelled from 7 locations. The locations are shown on the following page while the following table provides a description of each location together with the reason for the selection of each.

A detailed description and photograph is given in Section 11.3.5 of the significance and sensitivity of f x v w (' ') m f ff v w in given in Section 11.

11.1.3 SCOPING

Figure 11.1 View location map (Note that location of View 8 lies to North East of main map area)

Table 11.1 View location & reason for selection

View	Location	Reason for Selection	Landscape Significance
1	North of site, on L3120 Kilshane Rd. beside site boundary	Opposite entrance to a dwelling Nearest northern view	Local residential significance Low general significance
2	North of site on L3120 Kilshane Rd. beside site boundary	Opposite entrance to a dwelling Nearest northern view	Local residential significance Low general significance
3	78m north-east of site, on L3120 Kilshane Rd. beside site boundary	On elevated bridge with expansive views across site and distant countryside	Medium general significance on account of elevated vista
4	On R135 586m south-east of site – beside Ravenswood Estate	Expansive and unscreened views across open countryside Nearest south-eastern view	Local residential significance Low general significance
5	45m west of site on L3120 Kilshane Rd. beside site boundary	Direct view toward site	Low general significance
6	260m south-west of site on L3120 Kilshane Rd.	Nearest south-western public road	Low general significance
7	613m west of site on Bay Lane	Potential view from road oriented towards site.	Low general significance
8	Dunsoughly Caste	A Protected Structure	High Local Significance

11.2 THE PROPOSED DEVELOPMENT

A description of the project is included in Chapter 4 - *Project Description* of the EIAR. The construction proposal is described in the accompanying Preliminary Construction and Environmental Management Plan (PCEMP).

11.3 THE RECEIVING ENVIRONMENT

This section provides a description of the existing appearance and character of the area which establishes a reference - or 'baseline' against which to assess the likely effects of the project.

The northern urban fringe of Dublin City provides the overall receiving landscape environment for this project. These areas, occurring along the major roads that radiate outward into the commuter towns, and controlled by successive County Development Plans, are now beginning to radiate less by growing in parallel to the orbital M50 motorway.

Dublin has a relatively compact form with relatively high levels of land-use homogeneity that creates landscape zones of internally consistent character and appearance.

The immediate environs of the proposed development is one such area where medium-to-large-scale commercial, retail and light industrial developments occur adjacent to rural areas that consist of medium-large pasture fields. These rural areas are relatively level in the immediate vicinity resulting in a pattern of relatively regularly shaped fields – that are usually enclosed by mature field boundaries that contain many mature trees. Roads in the area contain related concentrations of individual dwellings – with larger plots on older major roads and smaller plots on side roads.
Throughout most of this area the older rural roads are lined with tall hedgerows that typically restrict visibility of the surrounding countryside. Modern roads and motorways in the area generally have landscaped edges that consist of shrub and tree planting that screen views of the surrounding area.

These developments together with a general restructuring of agriculture means that this is a dynamic landscape that is continuing to experience development.

11.3.1 CONTEXT

The project will take place within the Kilshane adjacent to Northwest Business Park. The site is currently a greenfield site and is surrounded by the N2 to the east and industrial units to the west. Figure 11.2 below shows the site in the context of the local landscape.

The area also contains urban fringe land uses, that in the immediate environs include:

- Dublin Airport
- Industrial and commercial large-medium-scaled buildings of an industrial/commercial character
- Northwest Business Park to the west
- The N2 National Road – to the east

Beyond the immediate environs lie pasture lands to the west and continuous urban fabric to the east.

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ADDITIONAL INFORMATION
REGISTRY

Figure 11.2 Local landscape context

11.3.2 CHARACTER

The established character of the area arises from the mixture of land-uses and structures. The landscape character is of a type that is abundant in County Dublin and other cities in Ireland. The landscape character of the area is also robust – on account of the quantum of recent development.

The County Development Plan[30] identifies that the proposed Kilshane energy site is located in an area classified as "*High Lying Agriculture".*

The local character comprises '*urban and urban fringe'* because it is now largely surrounded by industrial, infrastructural and commercial development. This is reflected in the zoning of these lands as **HI - Heavy Industry - Provide for heavy industry.**

11.3.3 SENSITIVITY

Landscape Sensitivity can be defined as the extent to which a landscape can accommodate change without unacceptable loss of existing character or interference with values.

11.3.3.1 General Sensitivities

The location has a low sensitivity to significant change of character arising from new development based on the Figure 11.2 and the County Development Plan. The land context and setting are not within or adjacent to any key scenic views or prospects as listed in Section 5 of the County Development Plan.

11.3.3.2 Landscape classification areas in County Dublin

The County Development Plan identifies that the proposed Kilshane energy site is located in an area classified as "Medium Sensitivity" in the County Development Plan 2017 - 2023. This is defined as area of *"existing development and infrastructure. New development reinforces existing desirable land use patterns*

11.3.3.3 Local Sensitivities

The environs have relatively low sensitivity to change for two reasons.

1. The established pattern of urban fringe development is well-established and pervasive. New developments of the same type and scale in this context have a very low potential to become conspicuous or the significantly alter the established appearance and character of the area.

2. The relatively flat topography and the heights of the ubiquitous 20 – 25m height of trees in field boundaries mean that visual impacts are generally confined unless new structures significantly exceed the height of a 5 – 7 storey building.

11.3.4 SIGNIFICANCE

The urban fringe occurs within the Lowland Farming Landscape of Dublin. These are the relatively flat areas of well drained, good quality soils.

These landscapes are of general significance because throughout history, they support most of the more intense agriculture of the county. As a result, these landscapes have significantly higher concentration of historic and archaeological remains – including large 18th C demesne landscapes. Today these working landscapes are more densely occupied than all other parts of the county – except coastal and urbanizing areas with associated concentrations of hedges, smaller settlements and associated roads and utilities.

While the local landscapes are of considerable significance as contexts for local communities and individual sites and structures, the do not have an overall significance arising out of scarcity or sensitivity.

11.3.5 EXISTING VIEWS

The following pages provide a description of the existing views from 7 selected locations.

It should be noted that the numbering of the views which follow correspond to the numbering used in Appendix 11 which provides full page reproductions of each image shown in this chapter of the EIAR.

View	Location	Reason for Selection
VP 1	North of site, on L3120 Kilshane Rd. beside site boundary	Unscreened views opposite entrance to a dwelling Nearest northern view
Landscape Significance	Local residential significance Low general significance	

Figure 11.3 Existing view 1

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 Existing	05/11/21	74°	24mm	32m	Canon EOS 5DS

digital dimensions
architectural visualisation

View	Location	Reason for Selection
VP2	North of site on L3120 Kilshane Rd. beside site boundary	Opposite entrance to a dwelling Nearest northern view
Landscape Significance	Local residential significance Low general significance	

Figure 11.4 Existing view 2

View	Location	Reason for Selection
VP3	78m north-east of site, on L3120 Kilshane Rd. beside site boundary	On elevated bridge with expansive views across site and distant countryside
Landscape Significance	Medium general significance on account of elevated vista	

Figure 11.5 Existing view 3