

227501.0264NL01
21 June 2022



Echelon Clondalkin DC Services Limited
Unit 22,
The Cubes Offices,
Beacon South Quarter,
Sandyford, Dublin 18

The Tecpro Building,
Clonsaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

RE: RESPONSE TO ITEM 2 – REF: SD22A/0093

AWN Consulting Limited have been requested to prepare a detailed response to Item 2 of a request for additional information received from South Dublin County Council (SDCC) in relation to the planning application Ref: SD22A/0093.

A report Ref: 227501.0264NR01 has been prepared in response to Item 2 of the request for additional information. Section 2.0 of the referenced report reviews the content of the additional information request and identifies sections of this report that address the specific requests which is summarised as follows:

Item	Text	Relevant Section
2	The Applicant is requested to provide an Acoustic Assessment undertaken by a suitably qualified Acoustic Consultant describing and assessing the impact of noise emissions from the proposed alterations to include the accumulative noise impact from existing on-site activities. The investigation must include, but not be necessarily limited to, the following:	Overall Report Section 8.0 (Cumulative Assessment)
2a)	The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.	Section 4.0
2b)	The identification of all operations conducted onsite as part of the development proposal that are likely to give rise to a public nuisance for the neighbouring noise sensitive receivers.	Section 6.0
2c)	Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.	Section 4.0 Section 7.0
2d)	An assessment of the existing background ($L_{A90, 15 min}$) and ambient ($L_{Aeq, 15 min}$) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.	Section 7.0 Section 8.0
2e)	A statement outlining any recommended acoustic control measures that should be incorporated into the development to ensure the use will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties."	Section 9.0

Table A Review of Sections Responding to Additional Information

Please do not hesitate to contact these offices if you have any queries.

MIKE SIMMS
Senior Acoustic Consultant

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812

**AMENDMENTS TO
PERMITTED DATACENTRE
DEVELOPMENT -
NOISE ASSESSMENT**

**RESPONSE TO SDCC
ADDITIONAL INFORMATION**

Technical Report Prepared For

**Echelon Clondalkin DC Services
Limited
Unit 22,
The Cubes Offices,
Beacon South Quarter,
Sandyford, Dublin 18**

Technical Report Prepared By

Mike Simms BE MEngDc MIOA MIET

Our Reference

227501.0264NR01b

Date of Issue

21 June 2022



Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812

Document History

Document Reference		Original Issue Date	
MS/227501.0264NR01		14 June 2022	
Revision Level	Revision Date	Description	Sections Affected
a	16 June 2022	Client Address	Front Cover
b	21 June 2022	Various	Various

Record of Approval

Details	Written by	Approved by
Signature		
Name	Mike Simms	Stephen Smyth
Title	Senior Acoustic Consultant	Associate (Acoustics)
Date	21 June 2022	21 June 2022

EXECUTIVE SUMMARY

AWN Consulting Limited have been requested to prepare a detailed response to Item 2 of a request for additional information received from South Dublin County Council (SDCC) in relation to the planning application Ref: SD22A/0093.

This report has been prepared in response to Item 2 of the request for additional information. Section 2.0 reviews the content of the additional information request and identifies sections of this report that address the specific requests which is summarised as follows:

Item	Text	Relevant Section
2	The Applicant is requested to provide an Acoustic Assessment undertaken by a suitably qualified Acoustic Consultant describing and assessing the impact of noise emissions from the proposed alterations to include the accumulative noise impact from existing on-site activities. The investigation must include, but not be necessarily limited to, the following:	Overall Report Section 8.0 (Cumulative Assessment)
2a)	The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.	Section 4.0
2b)	The identification of all operations conducted onsite as part of the development proposal that are likely to give rise to a public nuisance for the neighbouring noise sensitive receivers.	Section 6.0
2c)	Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.	Section 4.0 Section 7.0
2d)	An assessment of the existing background ($L_{A90, 15 min}$) and ambient ($L_{Aeq, 15 min}$) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.	Section 7.0 Section 8.0
2e)	A statement outlining any recommended acoustic control measures that should be incorporated into the development to ensure the use will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties."	Section 9.0

Table A Review of Sections Responding to Additional Information

CONTENTS		Page
	Executive Summary	3
1.0	Introduction	5
2.0	Review of Item 2	6
3.0	Review of Relevant Noise Conditions	7
3.1	Planning Permission – SD18A/0068	7
3.2	Planning Permission – SD19A/0185	8
3.3	Planning Permission – SD20A0309	8
3.4	EPA Proposed Determination	10
3.5	Summary	11
4.0	Noise Sensitive Locations	12
5.0	Noise Survey of Receiving Environment	14
5.1	Survey Locations	14
5.2	Comment on Noise Levels	15
6.0	Outlined of Development	19
6.1	Building 1 & Speed to Market	19
6.2	Building 2 & 3 (Revised)	22
7.0	Noise Assessment	23
8.0	Cumulative Noise Review	30
9.0	Statement on Acoustic Control Measures	33
	Appendix A – Glossary of Acoustic Terminology	34
	Appendix B – Noise Modelling Details & Assumptions	37
	Appendix C – Noise Model Parameters	40

1.0 INTRODUCTION

AWN Consulting Limited have been requested to prepare a detailed response to Item 2 of a request for additional information received from South Dublin County Council (SDCC) in relation to planning application Ref: SD22A/0093:

Amendments to the development permitted under Reg. Ref. SD20A/0309 comprising: alterations to permitted ICT Facility buildings 2 and 3, to include internal reconfiguration of the ICT equipment halls, associated electrical and mechanical plant rooms, loading bays, maintenance and storage space, office administration areas, and reconfiguration of screened plant; alterations to the external facades of permitted ICT Facility buildings 2 and 3 to include modification and reconfiguration of fenestration, louvers, loading bays, and access doors, along with an increase in height of 1.2 metres to main parapet level and reduction in the height of rooftop plant to not exceed the parapet height of the buildings, along with the omission of previously permitted flues and exhaust ducts at roof level; omission of emergency generators and associated flues from permitted ICT Facility buildings 2 and 3; The proposed amendments to ICT Facility buildings 2 and 3 result in an increase in their gross floor area (GFA) of 2,511sq.m for each building, resulting in an overall increase in the GFA of the two buildings of 5,022sq.m; Alterations to the water storage tanks serving the permitted ICT Facility buildings, including total increase of 268 sq.m GFA to the permitted pumphooms and a reduction in the scale of the associated water storage tanks. All associated and ancillary works; The application site is subject to an EPA Industrial Emissions Licence relating to the Energy Centre permitted on site (under Reg. Ref.: SD18A/0068 as amended by Reg. Ref.: SD19A/0185).

This report has been prepared in response to Item 2 of the request for additional information. Section 2.0 reviews the content of the additional information request and identifies sections of this report that address the specific requests.

Appendix A of this report outlines a glossary of acoustic terminology used in this assessment.

2.0 REVIEW OF ITEM 2

Item 2 of the relevant request for additional information states the following:

- "2. *The Applicant is requested to provide an Acoustic Assessment undertaken by a suitably qualified Acoustic Consultant describing and assessing the impact of noise emissions from the proposed alterations to include the accumulative noise impact from existing on-site activities. The investigation must include, but not be necessarily limited to, the following:*
- a) *The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.*
 - b) *The identification of all operations conducted onsite as part of the development proposal that are likely to give rise to a public nuisance for the neighbouring noise sensitive receivers.*
 - c) *Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.*
 - d) *An assessment of the existing background ($L_{A90, 15 min}$) and ambient ($L_{Aeq, 15 min}$) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.*
 - e) *A statement outlining any recommended acoustic control measures that should be incorporated into the development to ensure the use will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties."*

Table 1 reviews the issues referred to in Item 2 of the additional information requests and identifies sections of this report where the issues are addressed.

Item	Text	Relevant Section
2	The Applicant is requested to provide an Acoustic Assessment undertaken by a suitably qualified Acoustic Consultant describing and assessing the impact of noise emissions from the proposed alterations to include the accumulative noise impact from existing on-site activities. The investigation must include, but not be necessarily limited to, the following:	Overall Report Section 8.0 (Cumulative Assessment)
2a)	The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.	Section 4.0
2b)	The identification of all operations conducted onsite as part of the development proposal that are likely to give rise to a public nuisance for the neighbouring noise sensitive receivers.	Section 6.0
2c)	Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.	Section 4.0 Section 7.0
2d)	An assessment of the existing background ($L_{A90, 15 min}$) and ambient ($L_{Aeq, 15 min}$) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.	Section 7.0 Section 8.0
2e)	A statement outlining any recommended acoustic control measures that should be incorporated into the development to ensure the use will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties."	Section 9.0

Table 1 Review of Sections Responding to Additional Information

3.0 REVIEW OF RELEVANT NOISE CONDITIONS

The following sections review the various noise criteria applied to the site as part of various planning permissions associated with it and in relation to the proposed licence determination received from the Environmental Protection Agency (EPA) in relation to aspects of the overall site operations.

3.1 Planning Permission – SD18A/0068

Condition 19 of this planning permission states the following:

“19. Noise.

The applicant shall adhere to the following requirements of the Environmental Health Officer in relation to noise:

- (i) *The applicant shall adhere to the noise and vibration monitoring and mitigation measures outlined in the Environmental Impact Assessment (section 10) submitted as part of this planning permission request. This includes the detailed remedial and mitigation measures for both the construction phase and the operational phase of the development.*
- (ii) *A commissioning noise survey shall be undertaken once the development becomes operational to ensure the relevant noise criteria put forward in the Environmental Impact Assessment Report are complied with.*
- (iii) *Noise due to the normal operation of the proposed development during the night time period, expressed as L_{Aeq} over 15 minutes at the facade in a noise sensitive location, shall not exceed 45dB(A) as per NG4 and the design goal stated in the EIAR. Noise due to the normal operation of the proposed development during the day time period, expressed as L_{Aeq} over 15 minutes at the facade in a noise sensitive location, shall not exceed 55dB(A) as per NG4 and this is the design goal used for emergency situation in the EIAR.*
- (iv) *Where intrusive machinery is required to be used at short notice, the main contractor shall ensure that nearby sensitive locations are informed prior to works commencing.*
- (iv) *The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations (NSLs) due to the facility operation.*
- (v) *The applicant shall put in place management procedures and a maintenance program for the external plant. All mechanical plant items such as motors, pumps, generators etc shall be regularly maintained to ensure that excessive noise generated by any worn or rattling components is minimised.*

REASON: In the interest of public health.”

3.2 Planning Permission – SD19A/0185

Condition 6 of this planning permission states the following:

“6. Noise.

The applicant/owner/developer shall comply with the following conditions of the Environmental Health Officer relating to noise:

- (a) *The applicant shall adhere to the noise and vibration monitoring and mitigation measures outlined in the EIAR (section 10) submitted as part of planning application SD18A/0068. This includes the detailed remedial and mitigation measures for both the construction phase and the operational phase of the development.*
- (b) *A commissioning noise survey must be undertaken once the development becomes operational to ensure the relevant noise criteria put forward in the Environmental Impact Assessment Report (SD18A/0068) are complied with.*
- (c) *Noise due to the normal operation of the proposed development and the main data centre (SD18A/0068) during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location, shall not exceed 45dB(A) as per NG4 and the design goal stated in the EIAR. Noise due to the normal operation of the proposed development during the day time period, expressed as L_{Aeq} over 15 minutes at the facade in a noise sensitive location, shall not exceed 55dB(A) as per NG4 and this is the design goal used for emergency situation in the EIAR.*
- (d) *No equipment or machinery (to include pneumatic drills, construction vehicles, generators, etc.) shall be operated on or adjacent to the construction site before 07:00 hours on weekdays and 09:00 hours on Saturdays nor after 19:00 hours on weekdays and 13:00 hours on Saturdays, nor at any time on Sundays, Bank Holidays or Public Holidays.*
- (e) *Where intrusive machinery is required to be used at short notice, the main contractor shall ensure that nearby sensitive locations are informed prior to works commencing.*
- (f) *The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.*
- (g) *The applicant shall put in place management procedures and a maintenance program for the external plant. All mechanical plant items such as motors, pumps, generators etc shall be regularly maintained to ensure that excessive noise generated by any worn or rattling components is minimised.*

REASON: In the interest of public health.”

3.3 Planning Permission – SD20A/0309

This is the parent permission to which amendments relate; Condition 11 of this planning permission states the following:

11 EHO

- (1) *No equipment or machinery (to include pneumatic drills, construction vehicles, generators, etc) shall be operated on or adjacent to the construction site before 07:00 hours on weekdays and 09:00 hours on Saturdays nor after 19:00 hours on weekdays and 13:00 hours on Saturdays, nor at any time on Sundays, Bank Holidays or Public Holidays. Any work outside of these hours*

shall only be permitted following a written request to the Planning Authority and subsequent receipt of the written consent of the Planning Authority, having regard to the reasonable justification and circumstances and a commitment to minimise as far as practicable any unwanted noise outside the hours stated above.

- (2) Noise levels arising from construction activities shall not be so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give rise to a noise nuisance affecting a person in any premises in the neighbourhood.
- (3) Noisy plant shall be situated as far away from sensitive properties as possible during the construction stage.
- (4) Noise due to the normal operation of the proposed development, expressed as L_{Aeq} over 15 minutes at the facade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time. Clearly audible and impulsive tones at noise sensitive locations during evening and night shall be avoided irrespective of the noise level.
- (5) Following commencement of the development the applicant is required to submit an Acoustic Verification report to South Dublin County Council. The report must confirm whether the development complies with Councils noise criteria relevant to this proposal: Noise due to the normal operation of the proposed development, expressed as L_{Aeq} over 15 minutes at the facade of a noise sensitive location shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time.
 - (a) This Acoustic Verification report should comprise of noise monitoring data at any noise sensitive locations. It should also include the cumulative noise level whereby the existing noise levels are included in assessment of the developments overall impact.
 - (b) Acoustic design criteria or performance specifications that have arisen from the acoustic report or any subsequent acoustic assessment into the proposed use shall be finalised and verified by a suitably qualified acoustic consultant.
 - (c) Following completion of all verification testing, measurement and reporting, a final acoustic compliance report referencing all testing, verification, noise measurement results and reports undertaken is to be submitted to the Environmental Health Department of South Dublin County Council. This will occur prior to commencement of the development. The report is to be prepared to the satisfaction of the Environmental Health Department and is to incorporate a clear statement certifying that the development or proposed use is fully capable of, complying with all the design criteria and operating within the requirements of the applicable acoustic and noise control conditions and criteria as set out within the planning consent.

REASON: In the interests of Public Health.

It is important to note the wording of the planning condition. This clearly states "Noise due to the normal operation of the proposed development, expressed as L_{Aeq} over 15 minutes at the facade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time." That is to say noise generated by the proposed development under consideration here shall not exceed (i.e. no be higher) than the existing background noise level. This is explicit in the wording of the issued planning condition.

The planning condition does not request that the proposed development does not increase existing background noise levels due to its operation. A review of conditions applied to date on nearby facilities does not identify a situation where the specific wording of a condition requires that existing background noise levels are not increased due to a new development. All conditions take the same approach adopted in the EIAR, and requested in the wording or the applied planning condition, i.e. the development must not give rise to noise levels that exceed the background level for evening and night time periods.

3.4 EPA Proposed Determination

The EPA has issued a proposed determination in relation to an operational licence for the previously permitted site. Schedule B.4 of the document puts forward the following noise limits in relation to the operation of the site:

“4.5 Noise

Noise from the installation shall not give rise to sound pressure levels ($L_{Aeq,T}$) measured at noise sensitive locations¹ (NSLs), which exceed the limit value(s).”

“B.4 Noise Emissions

Daytime dB $L_{Ar,T}$ (30 minutes)	Evening Time dB $L_{Ar,T}$ (30 minutes)	Night-time dB $L_{Aeq,T}$ (30 minutes)	Emergency Operations $L_{Aeq,T}$ (30 minutes)
55	50	45 ^{Note 1}	50 ^{Note 2}

Note 1: During night time hours there shall be no clearly audible tonal component of impulsive component in the noise emission from the activity at the installation boundary.

Note 2: Emergency Operations are only permitted to occur for a maximum of 72 hours per annum.”

Daytime, evening and night are defined as 07:00 to 19:00hrs, 19:00 to 23:00hrs and 23:00 to 07:00hrs respectively.

Note the planning permission detailed in Section 3.1 states that no tonal noise / impulsive emissions are allowed therefore in terms of daytime periods it is assumed that $L_{Ar,T}$ is equivalent to $L_{Aeq,T}$.

Due to the steady nature of site noise emissions the $L_{Aeq,30min}$ parameter stated in the proposed determination is directly comparable to the $L_{Aeq,15min}$ parameter stated in the planning condition outlined in Section 3.1.

In summary, the following limits are outlined in the planning noise condition associated with the site:

- Day to Day
 - Daytime 07:00 – 19:00hrs 55 dB $L_{Aeq,15min}$
 - Evening 19:00 – 23:00hrs 50 dB $L_{Aeq,15min}$
 - Night time 23:00 – 07:00hrs 45 dB $L_{Aeq,15min}$
- Emergency Operation 50 dB $L_{Aeq,15min}$

¹ “Noise-sensitive location (NSL) – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.”

It is assumed that the 50dB(A) Emergency Operation limit applies to evening and night time periods only.

3.5 Summary

Table 2 reviews the various noise criteria applied to the development based on the various relevant planning permissions and EPA proposed determination associated with various aspects of the overall site.

Period	SD18A/0068	SD19A/0185	SD20A/0309	EPA Proposed Determination
Day (07:00 – 19:00 hrs)	55	55	+10 dB above background	55
Evening (19:00 to 23:00hrs)	--	--	Not to exceed background	50
Night (23:00 to 07:00hrs)	45	45	Not to exceed background	45

Table 2 Review of Various Noise Conditions

Based on a review of the planning and EPA criteria the following noise limits are proposed for this assessment:

- Day to Day Daytime 07:00 – 19:00hrs 55 dB $L_{Aeq,15min}$
Evening 19:00 – 23:00hrs 50 dB $L_{Aeq,15min}$
Night time 23:00 – 07:00hrs 45 dB $L_{Aeq,15min}$
- Emergency Daytime 07:00 – 19:00hrs 55 dB $L_{Aeq,15min}$
Evening 19:00 – 23:00hrs 50 dB $L_{Aeq,15min}$
Night time 23:00 – 07:00hrs 50 dB $L_{Aeq,15min}$
- Tonal and impulsive noise not permitted at noise sensitive locations.

The above noise limits satisfy the planning requirements outlined in SD18A/0068 SD19A/0185, SD20A/0309 (the parent permission) and the proposed determination as issued by the EPA.

Commercial Properties

A number of commercial / industrial properties are located in the vicinity of the site. In terms of noise emissions from the site it is considered that an appropriate noise criterion at these locations is 55dB $L_{Aeq,15min}$. This criterion has been derived with consideration of BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* which recommends that for *Study and work requiring concentrations* in an *Executive office* a design range of 35 to 40 dB L_{Aeq} is desirable internally. Arriving at an external noise level of 55dB $L_{Aeq,15min}$ would ensure that this range of noise levels internally will be achieved.

4.0 NOISE SENSITIVE LOCATIONS

- 2 a) *The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.*
- 2 c) *Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.*

Figure 1 overall identifies the representative noise sensitive receivers located in the vicinity of the proposed development site to address item 2a).

Table 3 outlines the distances between the nearest site boundary and the identified noise sensitive locations in order to address the request of item 2c).

Ref.	Height (m)	Description	Distance to Nearest Site Boundary (m)
R01	4.5	Mayfield Park residential estate	≈175
R02	9	Block A, Áras na Cluaine	≈75
R03	14	Block A, Áras na Cluaine	≈75
R04	14	Block C, Áras na Cluaine	≈110
R05	4.5	28 Yellow Meadows Lawn	≈160
R06	4.5	29 Yellow Meadows Lawn	≈145
R07	4.5	32 Yellow Meadows Drive	≈170
R08	16.5	The Academy, Park West Pointe	≈220
R09	16.5	Beckett Way, Park West Business Park	≈175

Table 3 Distances to Noise Sensitive Locations

Note noise contours for the proposed site operation have been updated and included in Section 7.0. These illustrate the noise impacts associated with nearby commercial lands to the west and north of the site along with predicted noise levels along sections of the Royal Canal that run along the southern boundary of the site.



Figure 1 Noise Sensitive Locations

5.0 NOISE SURVEY OF RECEIVING ENVIRONMENT

- 2d) *An assessment of the existing background ($L_{A90,15 \text{ min}}$) and ambient ($L_{Aeq,15 \text{ min}}$) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.*

Note this information was supplied as part of the EIAR prepared for the SD20A0309 application. This information is reproduced in the following sections in order to address item 2d) of the request for additional information.

An environmental noise survey was conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996-2:2017 Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels. Specific details are set out below. Note the results of this monitoring confirm the noise criteria outlined in Section 3.5 satisfy the requirements of Condition 11 of the SD20A0309 granted permission.

5.1 Survey Locations

Figure 2 illustrates the noise sensitive locations in the vicinity of the proposed development site at which noise monitoring was undertaken as part of the current assessment.



Figure 2 Noise Monitoring Locations

Noise measurements were conducted at two positions on the site that are representative of noise levels at the nearest noise sensitive receptors. Details for the particular locations are outlined below.

- Location USL01* Located on the eastern boundary of the site adjacent to the M50 motorway. This location is considered to be representative of noise levels arising at noise sensitive receptors located to the east of the M50.

Location USL02 Located on the southern boundary of the site adjacent to canal. This location is considered to be representative of noise levels arising at the nearest noise sensitive receptors located south of the New Nangor Road.

In order to inform the current application a further series of noise monitoring surveys were undertaken in order to consider the wider area. Details for the particular locations are outlined below and shown in Figure 10.3.

Location S01 Located to the North of the M50 Motorway adjacent to the western façade of the Yeats Way apartment complex.

Location S02 Located to the south of the canal on the New Nangor Road adjacent to the northern façade of the Aras Na Cluaine apartment complex, Clondalkin.

Location S03 Located to the south west of the canal adjacent to No. 29 Mayfield Park².

5.2 Comment on Noise Levels

The survey results of the baseline survey are summarised in Table 4 to 8.

Survey Location USL01

The survey results for location USL01 have been presented in Table 4.

Date	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)					
	Day (07:00 to 19:00hrs)		Evening (19:00 to 23:00hrs)		Night (23:00 to 07:00hrs)	
	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}
31 Jan 2018	61	58	61	59	58	54
1 Feb 2018	65	63	63	60	59	52
2 Feb 2018	63	60	60	57	59	53
3 Feb 2018	65	62	63	60	57	52
4 Feb 2018	66	63	63	61	58	53
5 Feb 2018	66	64	62	58	60	53
6 Feb 2018	66	64	62	58	58	50
7 Feb 2018	63	60	61	58	58	51
8 Feb 2018	63	60	60	57	58	51
9 Feb 2018	63	61	-	-	58	52
<i>Average</i>	<i>64</i>	<i>62</i>	<i>62</i>	<i>59</i>	<i>58</i>	<i>52</i>
<i>Max</i>	<i>66</i>	<i>64</i>	<i>63</i>	<i>61</i>	<i>60</i>	<i>54</i>
<i>Min</i>	<i>61</i>	<i>58</i>	<i>60</i>	<i>57</i>	<i>57</i>	<i>50</i>

Table 4 Survey Results – USL01

Road traffic noise from the M50 was the dominant noise source during the survey.

² It is noted that due to ongoing construction works to the east of Mayfield Park, this location was selected to ensure that construction noise did not influence the measured levels.

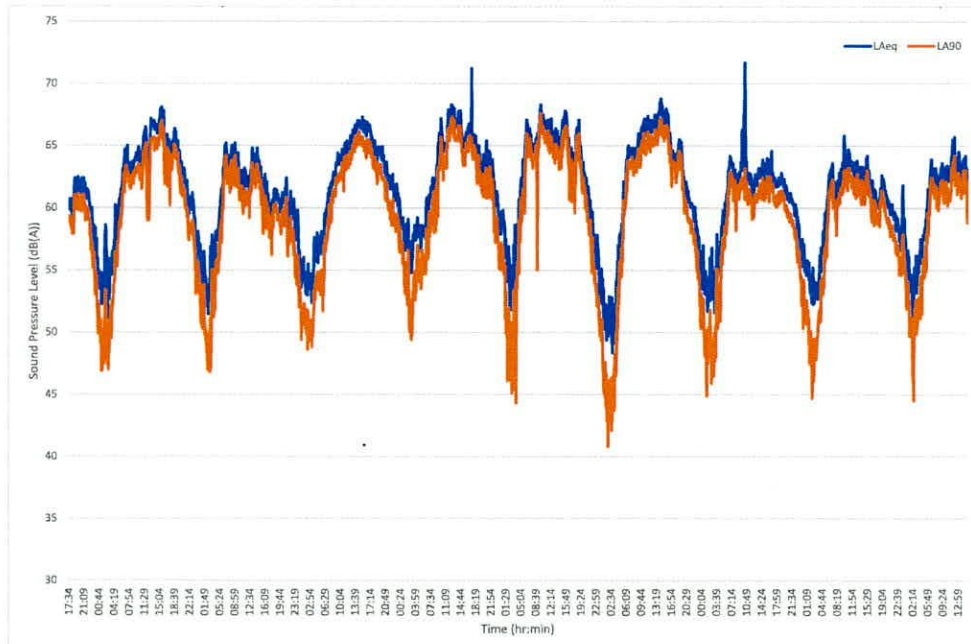


Diagram 1 Noise Profile at Location USL01

Survey Location USL02

The survey results for location USL02 have been presented in Table 5.

Date	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)					
	Day (07:00 to 19:00hrs)		Evening (19:00 to 23:00hrs)		Night (23:00 to 07:00hrs)	
	LAeq	LA90	LAeq	LA90	LAeq	LA90
31 Jan 2018	61	56	60	56	57	51
1 Feb 2018	63	60	61	57	57	50
2 Feb 2018	61	57	58	54	57	50
3 Feb 2018	63	59	61	58	56	49
4 Feb 2018	63	59	61	57	57	52
5 Feb 2018	63	60	59	54	57	50
6 Feb 2018	64	61	60	55	56	47
7 Feb 2018	62	57	59	54	56	49
8 Feb 2018	61	57	59	53	56	47
9 Feb 2018	61	57	-	-	56	49
<i>Average</i>	62	58	60	55	56	49
<i>Max</i>	64	61	61	58	57	52
<i>Min</i>	61	56	58	53	56	47

Table 5 Survey Results – USL02

Road traffic noise from the M50 was the dominant noise source during the survey.

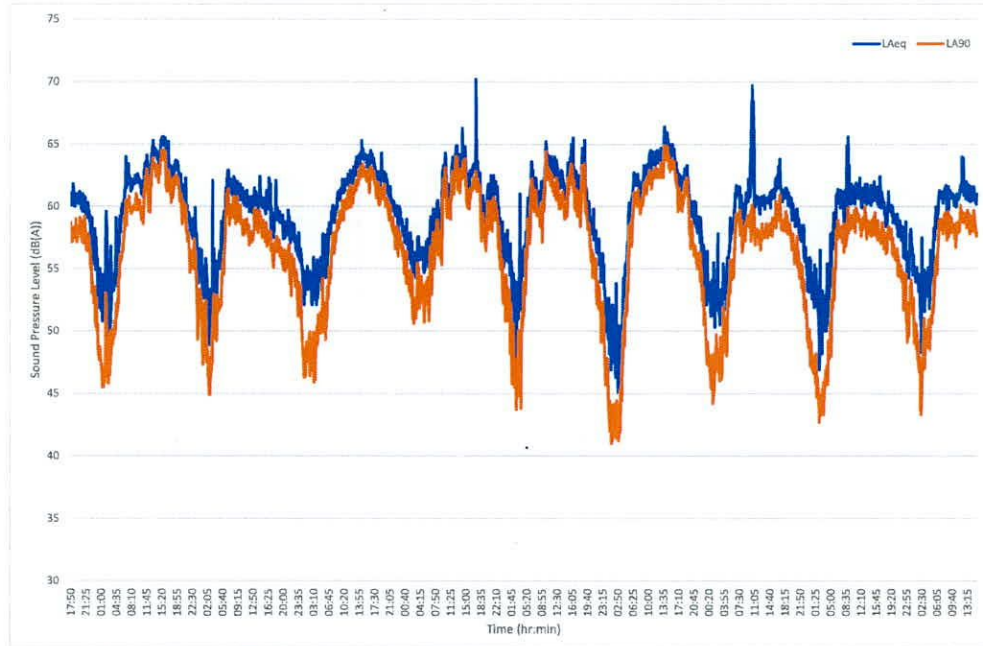


Diagram 2 Noise Profile at Location USL02

Survey Location S01

Period	Survey Time	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)	
		LAeq	LA90
Day	12:52 - 13:07	71	70
	14:26 - 14:41	70	69
Evening	22:04 - 22:19	67	63
Night	23:47 - 23:57	64	61
	00:52 - 01:02	63	59

Table 6 Survey Results – Survey Location S01

During the daytime survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the M50. Measured ambient noise levels fell in the range 70 to 71 dB LAeq whilst background noise levels fell in the range 69 to 70 dB LA90.

During the evening survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the M50. Some localised activity within the car park on site also influenced the measurement. Measured ambient noise levels were of the order of 67 dB LAeq whilst background noise levels were of the order of 63 dB LA90.

During the night survey period, the dominant intermittent noise source influencing the ambient noise level was road traffic noise from the M50. Measured ambient noise levels fell in the range 63 to 64 dB LAeq whilst background noise levels fell in the range 59 to 61 dB LA90.

Survey Location S02

Period	Survey Time	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)	
		L _{Aeq}	L _{A90}
Day	13:21 - 13:36	73	65
	13:36 - 13:51	74	66
Evening	22:26 - 22:41	66	55
Night	00:07 - 00:17	68	53
	00:17 - 00:27	68	52

Table 7 Survey Results – Survey Location S02

During the daytime survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels fell in the range 73 to 74 dB L_{Aeq} whilst background noise levels fell in the range 65 to 66 dB L_{A90}.

During the evening survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels fell in the range of 66 dB L_{Aeq} whilst background noise levels were of the order of 55 dB L_{A90}.

During the night survey period, the dominant intermittent noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels were of the order of 68 dB L_{Aeq} whilst background noise levels fell in the range 52 to 53 dB L_{A90}.

Survey Location S03

Period	Survey Time	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)	
		L _{Aeq}	L _{A90}
Day	14:02 - 14:17	62	57
	14:49 - 15:04	62	57
Evening	22:46 - 23:01	57	46
Night	00:34 - 00:44	54	47
	01:10 - 01:20	55	47

Table 8 Survey Results – Survey Location S03

During the daytime survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels were of the order of 62 dB L_{Aeq} whilst background noise levels were of the order of 57 dB L_{A90}.

During the evening survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels were of the order of 57 dB L_{Aeq} whilst background noise levels were of the order of 46 dB L_{A90}.

During the night survey period, the dominant noise source influencing the ambient noise level was road traffic noise from the R134 (New Nangor Road). Measured ambient noise levels fell in the range 54 to 55 dB L_{Aeq} whilst background noise levels were of the order of 46 dB L_{A90}.

No significant source of vibration was noted during the survey periods at any location.

6.0 OUTLINE OF DEVELOPMENT

- 2b) *The identification of all operations conducted onsite as part of the development proposal that are likely to give rise to a public nuisance for the neighbouring noise sensitive receivers.*

In the first instance it should be stated that, with due consideration in detailed design, it is considered that there are no operations on site that "are likely to give rise to a public nuisance". The following sections outline the noise sources associated with the various buildings on the site. This includes a reproduction of the data and recommendations outlined for Building 1 and the Building 4 building as per the noise assessment detailed in the EIAR supporting the SD20A/0309 application. The noise source information associated with the revised Buildings 2 and 3 that are subject of the current application are also presented.

As part of final detailed design alternative plant/approaches may be adopted. A noise assessment of the final design will be prepared in order to confirm that the relevant noise conditions and associated criteria associated with the site are complied with.

6.1 Building 1 & Building 4

The noise modelling completed indicates the following limits in relation to various items of plant associated with the overall site development. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise). In addition, plant will be selected such that noise emissions are not tonal or impulsive in nature at nearby noise sensitive locations.

The following tables present the noise data assumed for the various buildings. Data has been supplied by the operator unless otherwise stated.

Type	Description	Octave Band Sound Power Level dB L _w								dB L _{wA}
		63	125	250	500	1k	2k	4k	8k	
AHU ^{Note A}	AHU Air Intake	92	93	85	73	65	62	62	72	81
	AHU Air Exhaust	87	90	83	78	72	68	66	77	82
Chillers ^{Note B}	Outdoor Unit	86	85	88	91	91	78	68	60	93
Standby Generators ^{Note C}	Dry Air Coolers	--	--	--	--	84	--	--	--	84
	Casing Sides	77	92	83	88	87	88	84	79	96
	Casing Front	61	76	75	82	76	72	68	71	85
	Air Intake	76	81	73	77	77	77	71	76	86
	Breakout Roof	67	87	76	82	80	80	78	76	90
	Air Discharge	70	84	65	60	62	58	57	72	84
	Engine Exhaust	76	74	70	70	70	64	61	66	80

Table 9 Summary of Noise Data for Building 1

Note A AHU Air Intake

Intake AHU sound power level (L_w) assumed to be 81 dB(A) as corrected from supplied data sheet Ref: "Technical data_700kW_with humidifier and CW coil_second floor_rev11".

Spectrum shape assumed from supplied fan data sheet Ref: "Supply fan_with humidifier & CW coil_second floor unit" 24 units assumed.

Assumed the casing sound power levels are at least 10dB below the intake sound power levels.

Louvred sections to open AHU areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

AHU Air Exhaust

Intake AHU sound power level (L_w) assumed to be 82 dB(A) as corrected from supplied data sheet Ref: "Technical data_700kW_with humidifier and CW coil_second floor_rev11".

Spectrum shape assumed from supplied fan data sheet Ref: "Return fan_second floor unit_7x GR50". 24 units assumed.

Assumed the casing sound power levels are at least 10 dB below the intake sound power levels.

Louvred sections to open AHU areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

Note B Assumed chillers will operate during daytime and evening periods only.

Note C Spectra presented are A weighted. Initial assumption is that generator units have a noise rating of 75dB(A) at 1m. Data has been generated using AWN database assuming generator housing dimensions of 14m (L) x 2.5m (W) x 5m (H). Data based on CAT data supplied for other assessments.

Louvred sections to open generator areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

Type	Description	Octave Band Sound Power Level dB L_w								dB L_{WA}
		63	125	250	500	1k	2k	4k	8k	
AHU ^{Note A}	AHU Air Intake	92	93	85	73	65	62	62	72	81
	AHU Air Exhaust	87	90	83	78	72	68	66	77	82
Chillers ^{Note B}	Outdoor Unit	86	85	88	91	91	78	68	60	93
Standby Generators ^{Note C}	Dry Air Coolers	--	--	--	--	84	--	--	--	84
	Casing Sides	77	92	83	88	87	88	84	79	96
	Casing Front	61	76	75	82	76	72	68	71	85
	Air Intake	76	81	73	77	77	77	71	76	86
	Breakout Roof	67	87	76	82	80	80	78	76	90
	Air Discharge	70	84	65	60	62	58	57	72	84
	Engine Exhaust	76	74	70	70	70	64	61	66	80

Table 10 Summary of Noise Data for Building 4

Note A AHU Air Intake

Intake AHU sound power level (L_w) assumed to be 81 dB(A) as corrected from supplied data sheet Ref: "Technical data_700kW_with humidifier and CW coil_second floor_rev11".

Spectrum shape assumed from supplied fan data sheet Ref: "Supply fan_with humidifier & CW coil_second floor unit" 24 units assumed.

Assumed the casing sound power levels are at least 10dB below the intake sound power levels.

Louvred sections to open AHU areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

AHU Air Exhaust

Intake AHU sound power level (L_w) assumed to be 82 dB(A) as corrected from supplied data sheet Ref: "Technical data_700kW_with humidifier and CW coil_second floor_rev11".

Spectrum shape assumed from supplied fan data sheet Ref: "Return fan_second floor unit_7x GR50". 24 units assumed.

Assumed the casing sound power levels are at least 10 dB below the intake sound power levels.

Louvred sections to open AHU areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

Note B Assumed chillers will operate during daytime and evening periods only.

Note C Spectra presented are A weighted. Initial assumption is that generator units have a noise rating of 75dB(A) at 1m. Data has been generated using AWN database assuming generator housing dimensions of 14m (L) x 2.5m (W) x 5m (H). Data based on CAT data supplied for other assessments.

Louvred sections to open generator areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

Remainder of Site

The following text in relation to the EIAR submitted for the permitted development is of note here:

"In relation to the proposed Energy Centre all significant noise sources are located within the building. Detailed design will ensure that the building envelope offers sufficient sound insulation in order to attenuate internal noise sources in an appropriate manner. Any air intake or exhaust points associated with the Energy Centre will incorporate suitable atmosphere side attenuation in order that overall site noise emission comply with the adopted noise criteria outlined in this assessment. Radiators proposed for the roof of the Energy Centre are understood to have a low noise rating associated with them and are not considered significant in terms of off-site noise impacts."

6.2 Building 2 & 3 (Revised)

The following tables present the noise data assumed for the various buildings. Data has been supplied by the operator unless otherwise stated.

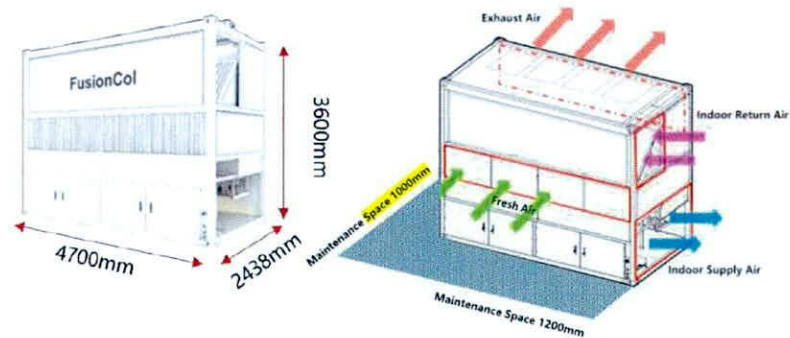
Type	Description	Octave Band Sound Power Level dB L _w								dB L _{wA}
		63	125	250	500	1k	2k	4k	8k	
AHU ^{Note A}	Overall	74	88	86	84	81	77	73	67	86
Chillers A ^{Note B}	Outdoor Unit	88	89	93	92	92	84	76	67	95
Chillers B ^{Note B}	Outdoor Unit	87	88	92	91	91	83	75	66	94
AHU A	Fresh Air	76	71	62	54	50	49	44	47	60
	Exhaust Air	86	92	87	87	84	82	79	78	90
	To Surroundings	76	73	66	54	49	49	45	40	62
AHU B	Fresh Air	68	62	57	50	44	45	41	42	54
	Exhaust Air	80	90	84	82	79	74	72	74	85
	To Surroundings	70	65	61	49	44	44	42	35	56
AHU C	Fresh Air	74	70	58	52	50	48	42	45	58
	Exhaust Air	85	88	85	86	81	78	74	74	87
	To Surroundings	74	72	62	50	48	47	42	37	59
Condenser A	Outdoor Unit	--	--	--	--	83	--	--	--	83
Condenser B	Outdoor Unit	--	--	--	--	78	--	--	--	78
Condenser C	Outdoor Unit	--	--	--	--	83	--	--	--	83
Condenser D	Outdoor Unit	--	--	--	--	88	--	--	--	88

Table 11 Summary of Noise Data for Building 2 & 3

Note A AHU Air Intake

Some 36 units per data hall. Operation on a N5 + 1 basis. Data supplied for proposed Huawei IDEC units.

Huawei IDEC Dimension and Air Flow Diagrams



20 Huawei Confidential



Louved sections to open AHU areas are assumed to be formed from a 50% free area acoustic louvre with the following insertion loss.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Louvre	5	8	12	16	22	18	15	14

Note B Assumed chillers will operate during daytime and evening periods only.

7.0 NOISE ASSESSMENT

2c) Distances between the development and the nearest noise sensitive receiver and the predicted level of noise ($L_{Aeq, 15min}$) from any development activities when assessed at the boundary of that receiver.

Following the approach adopted in the EIAR four scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A – Proposed Data storage facility – Normal Operation – Day/Evening
- Scenario B – Proposed Data storage facility – Normal Operation – Night
- Scenario C – Proposed Data storage facility – Emergency
- Scenario D – Proposed Data storage facility – Generator Testing

Scenarios A and B would be considered to be the most representative of normal operation during daytime./evening and night-time periods respectively. Scenario C is representative of emergency situation when a power outage or issue with supply from the national grid has occurred. It should be noted that such an event is an extremely rare occurrence.

Scenario D considers the impact associated with the occasional testing of proposed back-up generators on the site. Typically, five generator units will be tested at any one time. The assessment presented here assumes the closest generators to existing noise sensitive locations are running when presenting expected noise levels associated with the generator testing.

Figure 1 highlights the nearest noise sensitive locations at which predictions have been carried out. Various noise contours are also presented for scenarios A, B, C and D in order to demonstrate the noise impact of the proposed development over a wider area.

The results of the iterations of the noise model are presented in Table 12. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Location	Height (m)	Approx. Distances to Boundary (m)	Predicted dB $L_{Aeq,15min}$			
			Scenario A	Scenario B	Scenario C	Scenario D
			Day/Evening	Night	Emergency	Gen Test Day
R01	4.5	115	38	34	43	41
R02	9	95	44	41	49	47
R03	14	90	45	43	50	48
R04	14	105	44	42	48	47
R05	4.5	160	42	40	45	44
R06	4.5	150	41	39	44	43
R07	4.5	170	41	38	44	42
R08	16.5	185	41	40	43	42
R09	16.5	200	43	42	45	44

Table 12 Predicted Plant Noise Levels for Various Scenarios

The above 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.

Location	Period	Scenario A & B			Scenario C			Scenario D		
		Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies ?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies ?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies ?
R01	Day	38	55	✓	43	50	✓	41	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R02	Day	44	55	✓	49	50	✓	47	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R03	Day	45	55	✓	50	50	✓	48	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R04	Day	44	55	✓	48	50	✓	47	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R05	Day	42	55	✓	45	50	✓	44	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R06	Day	41	55	✓	44	50	✓	43	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R07	Day	41	55	✓	44	50	✓	42	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R08	Day	41	55	✓	43	50	✓	42	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	
R09	Day	43	55	✓	45	50	✓	44	55	✓
	Evening		50	✓			--	--	--	
	Night		45	✓			--	--	--	

Table 13 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria



Figure 3 Scenario A – Proposed Data storage facility – Normal Operation (Day/Evening) Noise Contour



Figure 4 Scenario B – Proposed Data storage facility – Normal Operation (Night) Noise Contour

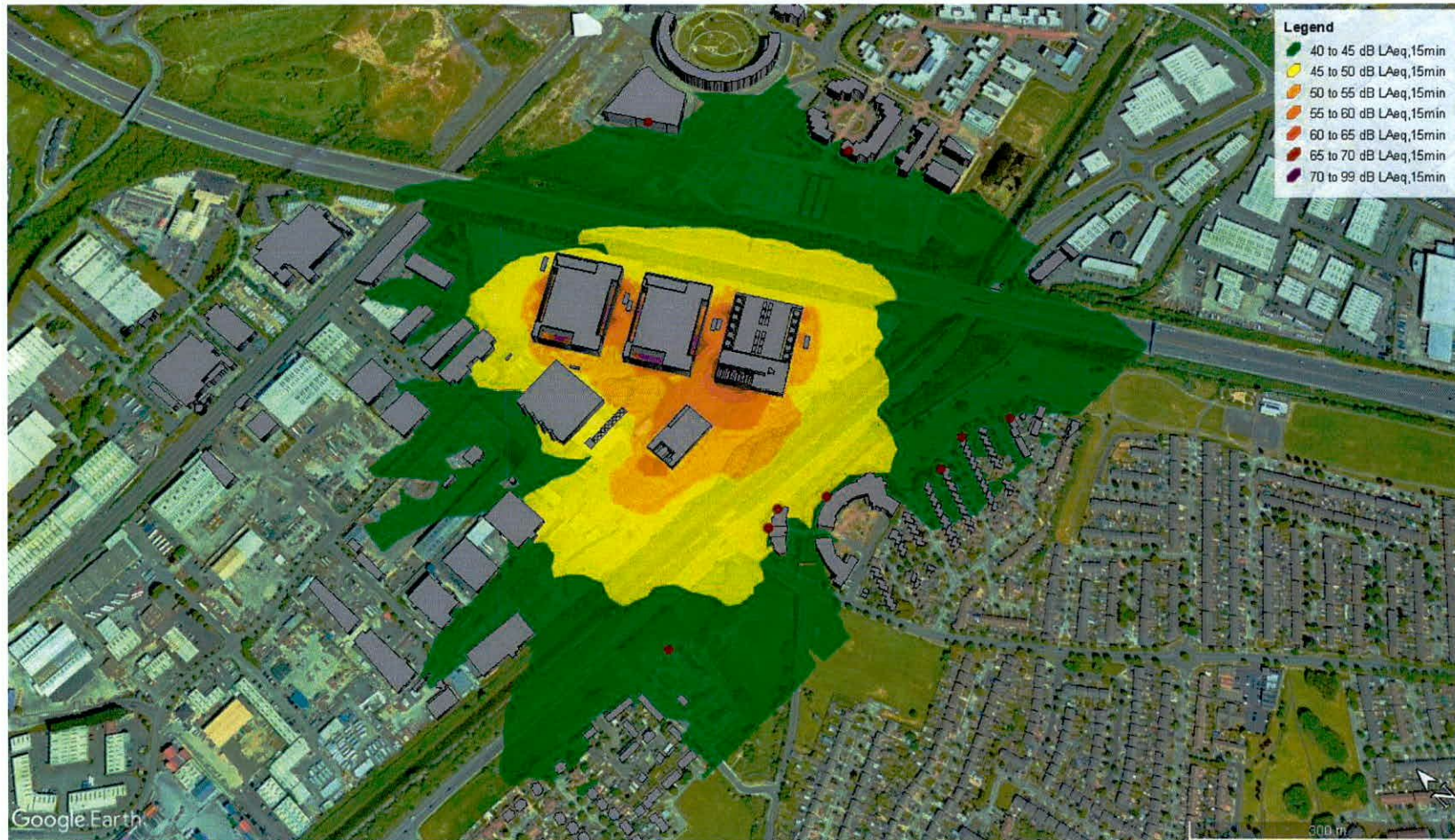


Figure 5 Scenario C – Proposed Data storage facility – Generator Testing Noise Contour

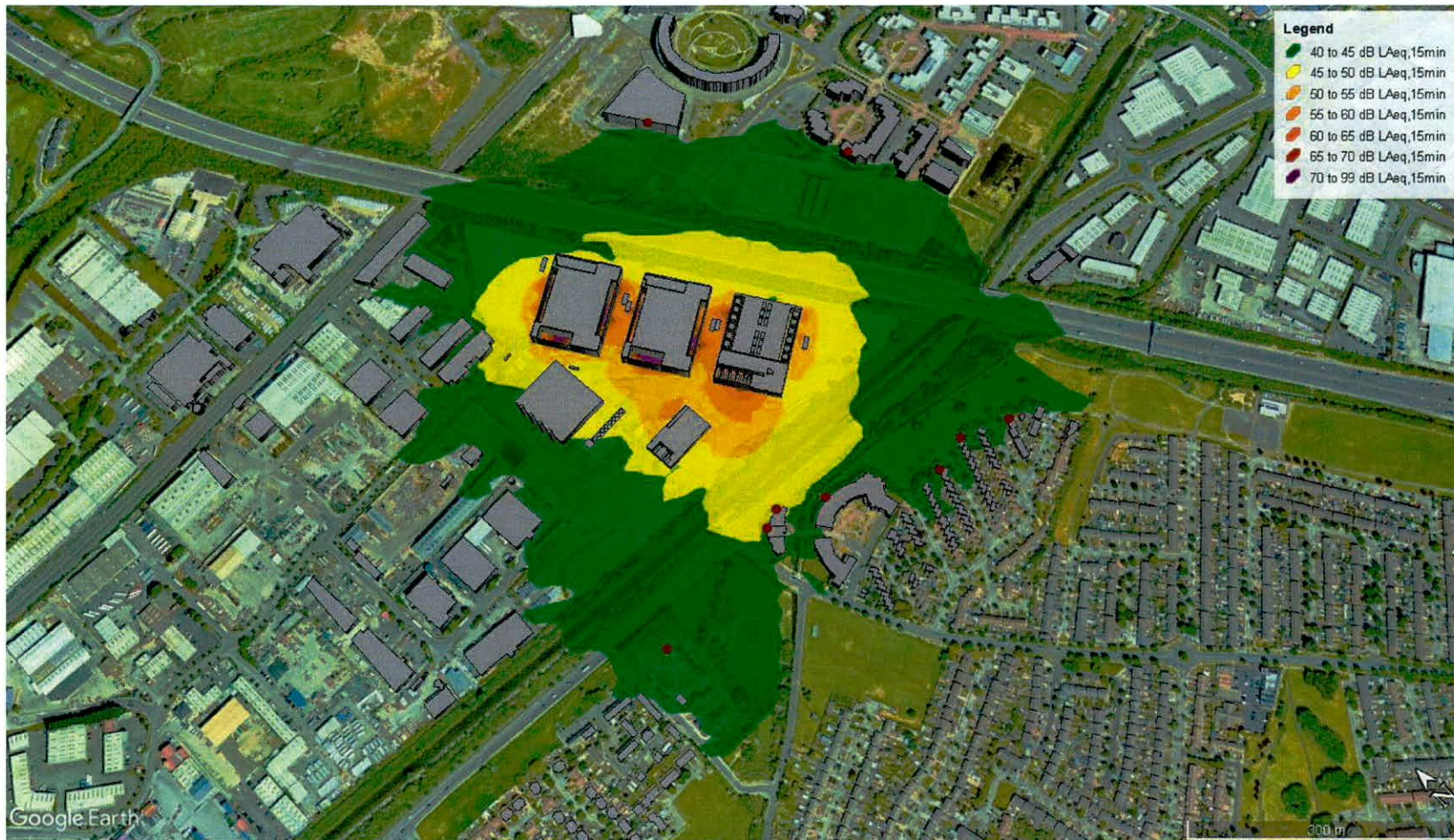


Figure 6 Scenario D – Proposed Data storage facility – Generator Testing Noise Contour

The predicted noise levels presented in Table 12 have been compared to the relevant noise criteria as adopted for this assessment, presented in Section 3.5. It should be noted that the back-up generator testing shall take place only at times between 09.00 and 17.00hrs. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times where the testing is expected to exceed 1 hour in duration.

Scenario A/B All locations are within the relevant adopted daytime, evening and night-time limits. All locations comply with the adopted criteria in relation to day to day operations. Figure 3 presents a noise contour for Scenario A and Figure 4 presents a noise contour for Scenario B.

Scenario C All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 5 presents a noise contour for Scenario C.

Scenario D All locations are within the relevant adopted daytime limits during periods when a set of generators is undergoing routine testing. Figure 6 presents a noise contour for Scenario D.

Summary

Scenarios A and B are representative of the typical day to day operations envisioned for the site during daytime, evening and night time periods. Review of the predicted noise levels and associated noise contours confirms that the site-specific levels comply with the noise criterion adopted for this assessment and are compliant with those typically espoused by the EPA.

Scenario C is representative of emergency situations such as a power outage on the national grid. Review of the predicted noise levels and associated noise contours confirm that the site-specific levels comply with the noise criterion that has been adopted for these situations following review of relevant guidance.

Scenario D is representative of generator testing, which shall take place only at times between 09.00 and 17.00hrs.

8.0 CUMULATIVE NOISE REVIEW

- “2. The Applicant is requested to provide an Acoustic Assessment undertaken by a suitably qualified Acoustic Consultant describing and assessing the impact of noise emissions from the proposed alterations to include the accumulative noise impact from existing on-site activities.”

The ‘Guidelines for Environmental Noise Impact Assessment’ produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in relation to the potential impact of changes in the ambient noise levels during the construction and the operational phases of the proposed development.

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 14 below is based on an example scale within the IEMA guidelines. The corresponding significance of impact presented in the ‘Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’ (EPA, 2022) is also presented.

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
≥ 3 and < 5	Noticeable	Minor	Slight – Moderate
≥ 5 and < 10	Up to a doubling or halving of loudness	Moderate	Moderate – Significant
≥10	More than a doubling or halving of loudness	Major	Significant – Profound

Table 14 Noise Impact Scale

The significance table reflects the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(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 criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Tables 15, 16 and 17 present the predicted changes in noise level associated with the development at the nearest noise sensitive locations to the site.

Loc.	Scenario A – Typical Operation Daytime				
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Impacts
R01	38	62	62	0	Imperceptible
R02	44	62	62	0	Imperceptible
R03	45	62	62	0	Imperceptible
R04	44	62	62	0	Imperceptible
R05	42	62	62	0	Imperceptible
R06	41	62	62	0	Imperceptible
R07	41	62	62	0	Imperceptible
R08	41	58	58	0	Imperceptible
R09	43	58	58	0	Imperceptible

Table 15 Review of Predicted Changes in Existing Noise Levels – Day

Note A Location USL01 assumed for Locations R01 to R07 and USL02 assumed for Locations R08 & R09

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is '*Imperceptible*' at all locations for Scenario A – Typical Operation daytime periods.

Loc.	Scenario A – Typical Operation Evening				
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Impacts
R01	38	59	59	0	Imperceptible
R02	44	59	59	0	Imperceptible
R03	45	59	59	0	Imperceptible
R04	44	59	59	0	Imperceptible
R05	42	59	59	0	Imperceptible
R06	41	59	59	0	Imperceptible
R07	41	59	59	0	Imperceptible
R08	41	52	52	0	Imperceptible
R09	43	52	53	+1	Not Significant

Table 16 Review of Predicted Changes in Existing Noise Levels – Evening

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is '*Imperceptible*' or '*Not Significant*' at all locations for Scenario A – Typical Operation evening periods.

Loc.	Scenario B – Typical Operation Night-Time				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
R01	34	52	52	0	Imperceptible
R02	41	52	52	0	Imperceptible
R03	43	52	53	+1	Not Significant
R04	42	52	52	0	Imperceptible
R05	40	52	52	0	Imperceptible
R06	39	52	52	0	Imperceptible
R07	38	52	52	0	Imperceptible
R08	40	49	50	+1	Not Significant
R09	42	49	50	+1	Not Significant

Table 17 Review of Predicted Changes in Existing Noise Levels – Night

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is '*Imperceptible*' or '*Not Significant*' at all locations for Scenario B – Typical Operation night time periods.

In essence the existing soundscapes that are encountered at the nearest noise sensitive locations are predicted to remain unchanged in terms of ambient noise levels with the development of the data storage facility introducing a low level of plant noise which will not significantly increase the background noise environment. Therefore, no significant cumulative impact is predicted on foot of the proposed development, in combination with other noise sources in the vicinity.

9.0 STATEMENT ON ACOUSTIC CONTROL MEASURES

"2e) *A statement outlining any recommended acoustic control measures that should be incorporated into the development to ensure the use will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties.*"

Noise from external plant will be minimised by the following measures:

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

With due consideration as part of the detailed design process, this approach will result in the site operating within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment and conditioned in Condition 11 of SD20A/0309.

APPENDIX A GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μ Pa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with the A-frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AT}(DW)	equivalent continuous downwind sound pressure level.
L_T(DW)	equivalent continuous downwind octave-band sound pressure level.
L_{day}	L _{day} is the average noise level during the daytime period of 07:00hrs to 19:00hrs
L_{night}	L _{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.
low frequency noise	LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.
noise	Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.
noise sensitive location	NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000 Hz octave band contains acoustical energy between 707 Hz and 1,414 Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.
rating level	See L _{A,r,T} .
sound power level	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m ² where: $L_w = 10 \text{Log} \frac{P}{P_0} \text{ dB}$
	Where: p is the rms value of sound power in pascals; and P ₀ is 1 pW.
sound pressure level	The sound pressure level at a point is defined as: $L_p = 20 \text{Log} \frac{P}{P_0} \text{ dB}$
specific noise level	A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure

level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq, T}$).

tonal

Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

 $\frac{1}{3}$ octave analysis

Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one-third of an octave each.

APPENDIX B NOISE MODELLING DETAILS & ASSUMPTIONS

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. Predictor calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (L_{WA});
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of $\pm 45^\circ$ to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms^{-1} and 5ms^{-1} , measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights. The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{r}(DW) = L_{w} + D_{c} - A \qquad \text{Eqn. A}$$

Where:

- $L_{r}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to $2 \times 10^{-5}\text{Pa}$;
- L_{w} is the octave band sound power of the point source;
- D_{c} is the directivity correction for the point source;
- A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table B.1 below:

Table B.1 Estimated Accuracy for Broadband Noise of $L_{AT}(DW)$

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0 < h < 5m	±3dB	±3dB
5m < h < 30m	±1dB	±3dB

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.
N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

<i>Site Layout</i>	The general site layout has been obtained from the drawings forwarded by the project architects.
<i>Local Area</i>	The location of noise sensitive locations has been obtained from a combination of site drawings provided by the project architects and others obtained from Ordnance Survey Ireland (OSI).
<i>Heights</i>	The heights of buildings on site have been obtained from site drawings forwarded by the project architects. Off-site buildings have been assumed to be 8m high for houses and 16m for apartments with the exception of industrial buildings where a default height of 15m has been assumed.
<i>Contours</i>	Site ground contours/heights have been obtained from site drawings forwarded by the project architects where available.

The final critical aspect of the noise model development is the inclusion of the various plant noise sources. Details are presented in the following section.

Source Sound Power Data

See Section 6.0 of the main body of this report.

It is assumed that the plantroom parapet will be at least 0.5m higher than the highest dimension of the roof mounted plant.

Modelling Calculation Parameters³

Prediction calculations for plant noise have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*.

Ground attenuation factors of 0.5 have been assumed. No metrological corrections were assumed for the calculations. The atmospheric attenuation outlined in Table B.2 has been assumed for all calculations.

Table B.2 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	80	0.13	0.38	1.02	1.97	3.57	8.76	28.72	103.71

³ See Appendix C for further discussion of calculation parameters.

APPENDIX C NOISE MODEL PARAMETERS

Prediction calculations for noise emissions have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996*. The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measured in a down wind direction, corresponding to the worst-case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 0.5 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 16m in all instances. For construction noise predictions have been made at a level of 1.6m as these activities will not occur at night.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log (\text{distance from source in meters}) + 11$$

Atmospheric Absorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10°C and a relative humidity of 70% have been used, which give relatively low levels of atmosphere attenuation and corresponding worst case noise predictions.

Table C.1 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	80	0.13	0.38	1.02	1.97	3.57	8.76	28.72	103.71

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

