WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Forest Road

Acoustic Design Statement
10 June 2025

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www.wdacoustics.com

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Executive Summary

Wave Dynamics were engaged by Golden Port Homes Limited as the acoustic consultants for the planning stage application of Forest Road, Swords, Co. Dublin. Planning permission is sought by Golden Port Homes Limited on lands located to the north of Dublin Airport on Forest Road, Swords, Co. Dublin.

Golden Port Homes Limited, intend to apply for planning permission for a Large-Scale Residential Development (LRD) on lands at Forest Road, Swords, Co. Dublin.

The proposed development will consist of a total of 109 no. residential units (42 no. duplex units; 41 no. apartments; 26 no. houses) as follows:

42 no. duplex units within 3-storey buildings comprising 21 No. 1 bed units at ground level and 21 No. 3 bed units over first and second floor levels with balconies/terraces, private and communal open space;
41 no. apartments within 2 blocks. Block A will be a 4 storey building with 14 no. apartments (4 no. 1 bed units and 10 no. 2 bed units) with balconies/terraces to the north, south and west elevations, and bin, bicycle parking and plant at ground floor level and pv panels at roof level; Block B will be a 5 storey building with 27 no. apartments (13 no. 1 bed and 14 no. 2 bed units) with balconies/terraces to the east and west elevations and bin, bicycle parking and plant at ground floor level and pv panels at roof level;
26 no. houses (comprising 5 no. 2 bed, 2 storey terrace houses; 6 no. 3 bed, 2 storey terrace houses; 4 No. 3 bed, 2 storey semi-detached houses; and 11 no. 4 bed, 3 storey houses);
96 no. Surface level car parking spaces and 4 no. surface level motorcycle parking spaces as well as bike parking stores and spaces; and bin stores;
1 no. ESB substation;

Landscaping, including the provision of new public open spaces with play areas and a MUGA; footpaths and cycle paths, new vehicular access/egress from Forest Road; public lighting; boundary treatment and all associated site, drainage and development works necessary to facilitate the proposed development.

Noise Impact Assessment

A Stage 1 and Stage 2 ProPG assessment has been undertaken. As part of the stage one assessment to categorise the site a baseline noise survey was undertaken to measure the existing noise levels. Following a review of the noise levels on the site including the L_{AFmax} and L_{Aeq} the site has been characterised as medium to low risk to for the daytime period and medium to high risk for the nighttime period therefore mitigation measures are not required to control the onset noise levels.

Internal Noise Levels

Following the baseline survey, a noise impact assessment was undertaken, this included break-in noise calculations to predict the internal noise levels from road traffic noise and aircraft noise. Consideration has also been given to the future growth of the roads. The break in assessment considers the noise break in from aircraft noise for the current Dublin Airport operations.

Following the assessment, the building envelope performance requirements were determined. The performance specification for the building envelope has been provided in this report which includes the external walls, glazing, roof and ventilation requirements.

External Amenity Noise Levels

The assessment has also considered the external amenity noise levels in accordance with ProPG 2017. All private gardens and the majority of communal open spaces are predicted to achieve suitable noise levels to meet the desirable levels without additional mitigation. Balconies/terraces along the northeastern façades of Blocks A and B are predicted to exceed the desirable levels however suitable amenity has been provided elsewhere

across the development. This in line with ProPG Element 3(v). As part of the design review alternative balcony locations were considered however considering other elements including massing, daylighting etc were found not to be sufficient.

Section 32B

The Section 32B Opinion addresses the acoustic design of the proposed development located within Dublin Airport's Noise Zone B. A baseline noise survey and a calibrated predictive model were used to assess the impacts of ground-based aircraft operations and road traffic noise. As a result, site-specific glazing specifications were developed, ensuring compliance with internal noise level criteria.

External amenity spaces were also assessed, with noise walls and landscaped mounding mitigating aircraft ground operations and road traffic noise effectively, ensuring most areas fall within the 50–55 dB $L_{Aeq,16hour}$ desirable range.

Aircraft noise modelling incorporated measured SELs, flight data based on the current usage. A linear noise source was modelled at 2.2m height, aligning with aircraft engine centres above ground level, and the model was calibrated to reflect the calculated average daytime L_{Aeq} values. Estimated noise contour maps have been included in this report to visualise the noise impact across the development.

Based on the recommendations in this report it is predicted that the internal and external noise levels will achieve the targeted internal noise levels in line with BS 82233:2014 and ProPG 2017 guidance.

Table of Contents

1 Introduction

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26 no. houses (comprising 5 no. 2 bed, 2 storey terrace houses; 6 no. 3 bed, 2 storey terrace houses; 4 No. 3 bed, 2 storey semi-detached houses; and 11 no. 4 bed, 3 storey houses);
96 no. Surface level car parking spaces and 4 no. surface level motorcycle parking spaces as well as bike parking stores and spaces; and bin stores;
1 no. ESB substation;

Landscaping, including the provision of new public open spaces with play areas and a MUGA; footpaths and cycle paths, new vehicular access/egress from Forest Road; public lighting; boundary treatment and all associated site, drainage and development works necessary to facilitate the proposed development.

A baseline noise survey was undertaken to measure the existing noise levels. This report outlines the project criteria, baseline survey results, assessment, and recommendations for.

- Building envelope sound insulation,
- Ventilation requirements and
- External amenity.

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

1.1 Statement of Competence

This report was completed by Wave Dynamics, an acoustic consultancy that specialises in noise and vibration. Our consultants have completed numerous similar projects in the Ireland the UK and Europe.

This assessment and report were completed by Cathal Reck, Acoustic Consultant, Cathal has experience of numerous planning stage assessments. Cathal's qualifications include; BSc (Hons) in Music Technology & Production and IOA Certificate of Competence in Environmental Noise Measurement, and a certificate in Building Acoustics and Noise Control. Cathal is a member of the Institute of Acoustics (TechIOA) and a SITRI certified sound insulation tester.

This report was peer reviewed by James Cousins, Managing Director | Principal Consultant with Wave Dynamics who has extensive experience in assessing noise impacts on commercial and residential developments. James is an experienced consultant. His qualifications include; BSc (Hons) in Construction Management and Engineering, Pg Cert in Construction Law and Diploma in Acoustics and Noise Control (Institute of Acoustics) and an IOA Competence Cert in Building Acoustic Measurements. James is a member of both Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA) and is the current SITRI Chairman.

2 Site Description

The site is located on Forest Road, Swords, Dublin. The site is located north of Dublin Airport and is within the Dublin Airport Noise Zone B. There are residential dwellings to the north and south, agricultural land to the west and southwest, and Forest Road and Forest Little golf club to the east. Attended and unattended noise measurements were carried out across the site to establish the existing noise climate in the area.

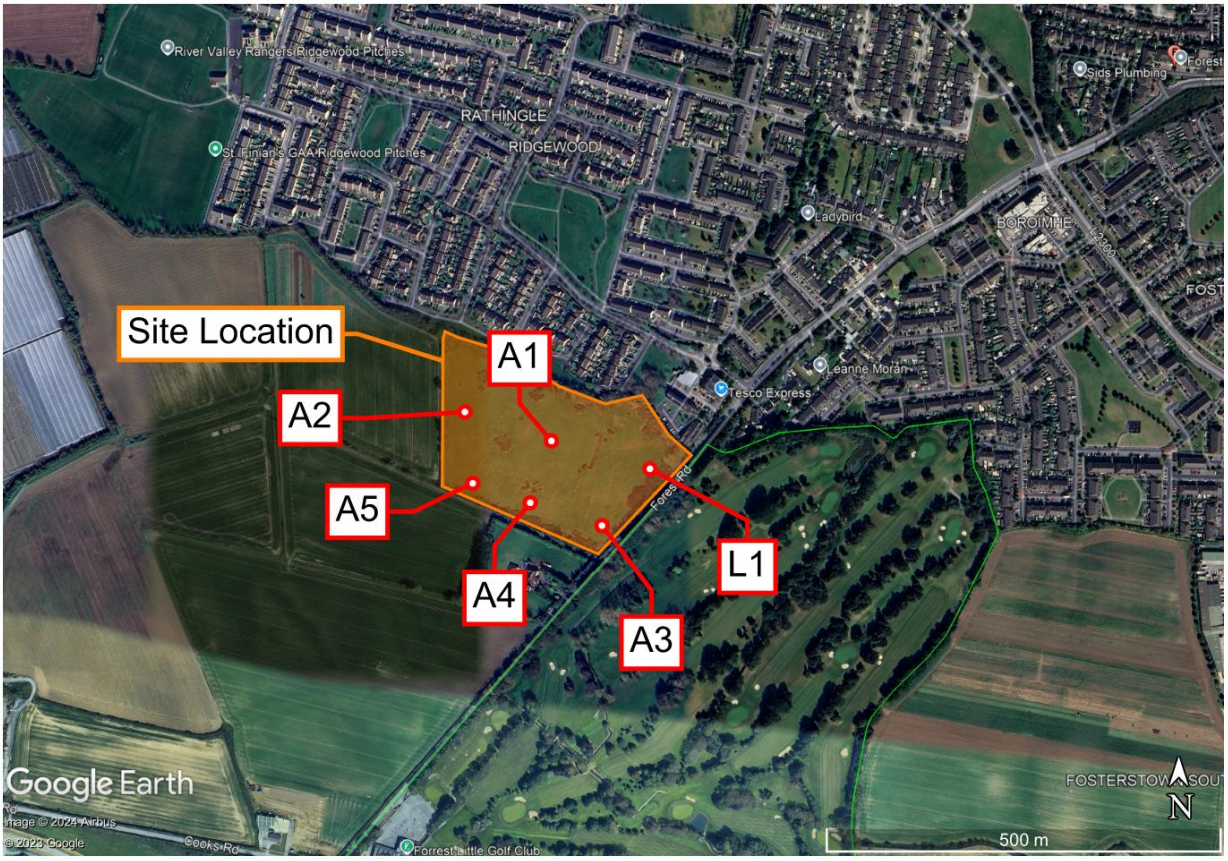


Figure 1: Site Location, measurement locations L1, A1-A5 and the surrounding area.

3 Project Criteria

The acoustic criterion for the project is set out in this section, the purpose of the criteria is to ensure reasonable:

- Internal noise levels and
- External amenity noise levels.

To provide adequate conditions Wave Dynamics have developed the project criteria for:

- Façade sound insulation performance,
- Ventilation requirements and,
- External amenity requirements.

Assessment Standards

The criteria for the project have been developed based on the following industry standards:

- ✓ BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.
- ✓ Dublin Agglomeration Environmental Noise Action Plan 2024 – 2028.
- ✓ Fingal County Council Development Plan 2023 – 2029.
- ✓ Dublin Airport Noise Action Plan 2024 – 2028.
- ✓ ProPG Professional Practice Guidance on Planning & Noise.
- ✓ ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
- ✓ Previous experience on similar projects.

3.1 Noise Assessment Criteria

The internal ambient noise levels requirements have been developed from the following standards:

Dublin Agglomeration Noise Action Plan

The Dublin Agglomeration Noise Action Plan 2024 – 2028 states the following with respect to the prevention of excessive noise levels for proposed new developments:

> *"Applications for new residential developments in the Agglomeration will be assessed in accordance with the policies and goals outlined in the relevant City and County Development Plans. Where applicable, these include adoption of the principles of Professional Planning Guidance (ProPG) on Planning & Noise: New Residential Development, as described in Section 7.5.1.*
>
> *Where the assessment outcome determines the likelihood of an adverse noise impact, planning applications should be supplemented by an Acoustic Design Statement carried out by appropriately qualified acousticians and competent persons."*

Fingal Development Plan Policy on Aircraft Noise

Variation No. 1 of the Final Development Plan Policy on Aircraft Noise outlines revised Noise Zones and policy objectives in relation to aircraft noise from Dublin Airport.

This includes four noise zones (Zone A to D) representing the potential exposure of the site to aircraft noise. It is Fingal County Council policy to actively resist residential development within Zone A, and resist in Zone B and C pending independent acoustic advice and mitigation measures. Specific residential developments or developments for

residential purposes located in Zone D may be required to demonstrate that aircraft noise intrusion has been considered in the design. Table 1 below outlines the objectives for new developments in each noise zone.

Table 1: Fingal Airport Noise Zones

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
D	≥ 50 and < 54 dB $L_{Aeq,16hr}$ and ≥ 40 and < 48 dB L_{night}	**To identify noise sensitive developments which could potentially be affected by aircraft noise and to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment.** *All noise sensitive development within this zone is likely to be acceptable from a noise perspective. An associated application would not normally be refused on noise grounds, however where the development is residential-led and comprises non- residential noise sensitive uses, or comprises 50 residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design has been followed.* *Applicants are **advised** to seek expert advice.*
C	≥ 54 and < 63 dB $L_{Aeq, 16hr}$ and ≥ 48 and < 55 dB L_{night}	**To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development** *Noise sensitive development in this zone is less suitable from a noise perspective than in Zone D. A noise assessment **must** be undertaken in order to demonstrate good acoustic design has been followed.* *The noise assessment must demonstrate that relevant internal noise guidelines will be met. This **may** require noise insulation measures.* *An external amenity area noise assessment **must** be undertaken where external amenity space is intrinsic to the development's design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels.* *Applicants are **strongly advised** to seek expert advice.*

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
B	≥ 54 and < 63 dB $L_{Aeq, 16hr}$ and ≥ 55 dB L_{night}	**To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure noise insulation is incorporated within the development.** *Noise sensitive development in this zone is less suitable from a noise perspective than in Zone C. A noise assessment **must** be undertaken in order to demonstrate good acoustic design has been followed.* *Appropriate well-designed noise insulation measures **must** be incorporated into the development in order to meet relevant internal noise guidelines.* *An external amenity area noise assessment **must** be undertaken where external amenity space is intrinsic to the developments design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels.* *Applicants **must** seek expert advice.*
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.*

Notes:

- 'Good Acoustic Design' means following the principles of assessment and design as described in ProPG: Planning & Noise – New Residential Development, May 2017;
- Internal and External Amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Noise Action Plan (NAP) for Dublin Airport 2024 - 2028

The Noise Action Plan for Dublin Airport (2024 – 2028) outlines the following objective in relation to the noise abatement objectives for aircraft noise:

"Limit and reduce the long-term adverse effects of aircraft noise on health and quality of life, particularly at night, as part of the sustainable development of Dublin Airport."

The plan primarily focuses on the outward noise impact and encroachment of the airport activities on the existing uses of nearby lands. The consideration of the noise impacts from aircraft noise on residential amenity is considered in more detail in the Dublin Agglomeration Noise Action Plan.

ProPG: Professional Practice Guidance on Planning & Noise

ProPg 2017 is used to assess airborne noise from transport sources including road, rail and aircraft noise. The aim of the document is to provide a good design process which considers the internal acoustic environment at an early stage in the design process. The guidance was prepared by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health and is based on the findings by the World Health Organisation in relation to noise impact on humans. Its adoption is considered best practice for assessing the potential noise impact on the future occupants for residential developments.

The guidance is primarily designed for residential developments however it can be applied to other development types including developments where people require appropriate noise levels for rest and sleep. This includes residential care homes, hospitals etc. The guidance advocates a holistic design process which considers the site, its location and likely suitability for the development at an early stage.

The two primary stages of the ProPG design approach are summarised as follows:

Stage 1 – The first stage is to undertake an initial high-level noise risk assessment of the proposed site considering the noise levels (measured and or predicted) to identify any noise risks. This would include consideration of the current noise environment, future use and future noise levels; and,

Stage 2 –The second stage is a full detailed assessment of the proposed development covering the "*Four Key Elements*":

1. *"Good Acoustic Design Process,*
2. *Internal Noise Level Guidelines,*
3. *External Amenity Area Noise Assessment; and*
4. *Assessment of Other Relevant Issues."*

As part of the process an Acoustic Design Statement is produced and submitted to the planning authority. This document sets out the design process used to come to the conclusions and recommendations in the report.

Following the ProPg the following conclusions are recommended by ProPG in relation to the findings of the Acoustic Design Statement based one the recommendations of the Acoustic Consultant:

a. *"Planning consent may be granted without any need for noise conditions;"*
b. *"Planning consent may be granted subject to the inclusion of suitable noise conditions; "*
c. *"Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or, "*
d. *"Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent")."*

Section 3 of the ProPG outlines the recommended approach decision makers should following in coming to their conclusions based on the recommendations of the Acoustic Design Statement. Figure 1 on the next page illustrates the ProPG approach.

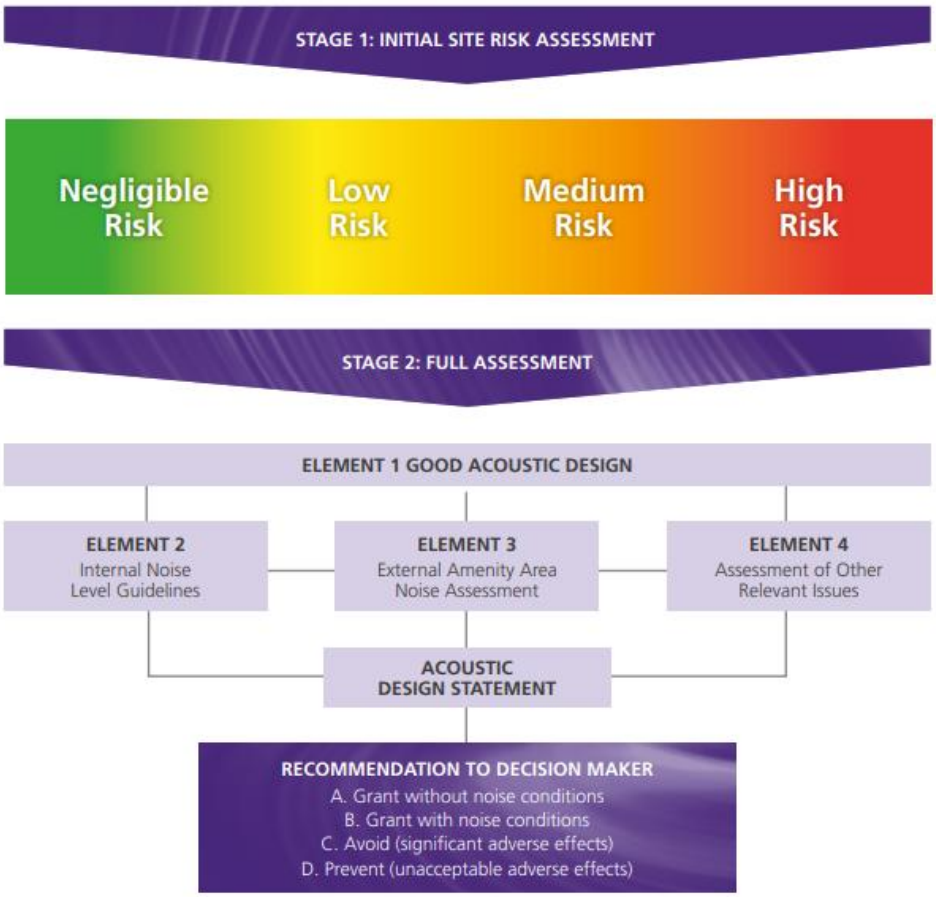


Figure 2: Summary of overall ProPG approach

Internal Noise Levels

Table 2 below outlines the recommended internal noise levels from BS 8233:2014 within living accommodation for residential buildings for dining, resting and sleeping. These limits are in line with the ProPG and the World Health Organisation Guidelines.

Table 2: BS 8233:2014 internal noise criteria –Residential Buildings.

Activity	Location	07:00 to 23:00 Hrs	23:00 to 07:00 Hrs
Resting	Living Room	35 dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining Room/Area	35 dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ hour}$	30 dB $L_{Aeq,\ 8\ hour}$ 45dB L_{AFmax} (See Note 1)

1: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB L_{AFmax} more than 10 times a night.

External Amenity Space Noise Levels

With regard to noise levels in external amenity spaces ProPG 2017 refers to the BS8233:2014 guidance which states that:

> "*the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$".*

It also states that:

"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."

After mitigation/with mitigation if the adverse noise impacts are still above the recommended noise levels they can be offset by providing an alternative amenity space to partially offset the noise impact by providing access to:

- *"a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."*

BS 8233:2014 elaborates on this further, it acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within the guideline values. In respect of gardens and patios, BS 8233:2014 states:

> *"however it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."*

Both BS8233:2014 and ProPG 2017 do not advise that development should be restricted in areas with undesirable noise levels. The standards recommend that mitigation measures are put in place where practicable to achieve the recommended noise levels for the external amenity spaces. It notes that this may not be practical in all situations and local or governmental policy should take precedence in these situations.

4 ProPG Stage 1 – Assessment

The stage one risk assessment is used to assess the site for potential risks that may occur in terms of noise impact. The ProPG sets out four categories of risk:1) negligible, 2) low, 3) medium or 4) high risk. Figure 2 below illustrates the ProPG risk assessment and the values associated with each risk category.

The risk assessment also considers the risk based on the number of L_{AFmax} events per night as follows;

- A site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and;
- A site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times per night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

To assess the noise impact with the ProPG risk categories a baseline noise survey was undertaken on the site to quantify the existing noise environment.

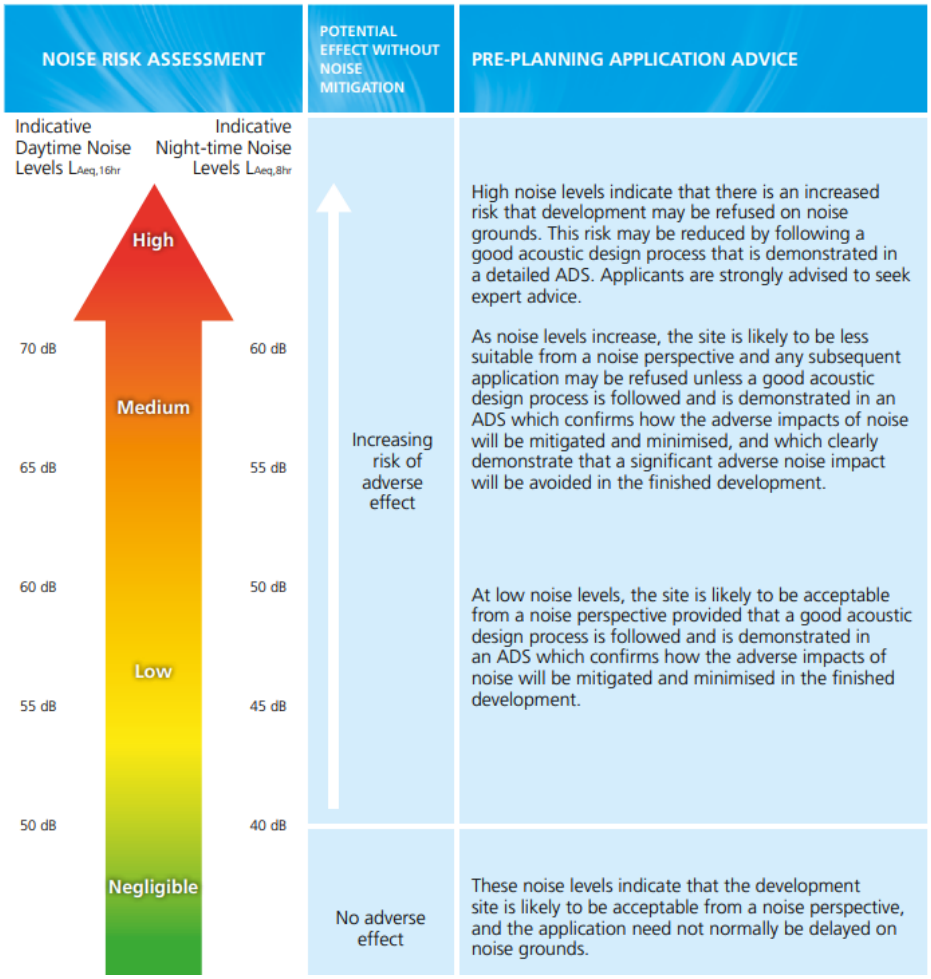


Figure 3: ProPG Risk Analysis

4.1 Baseline Noise Survey

A baseline noise survey was conducted at Forest Road, Swords, Co. Dublin, to assess the impact of road and aircraft noise as the development is in Airport Noise Zone B. The purpose of the survey was to quantify the existing noise environment to predict its impact on the future occupants of the development.

This section outlines the results from the survey, the measurement procedure and the equipment used. The attended noise measurements were undertaken on the 25th and 29th of October 2024. The noise logger was deployed on the 18th of October 2024 at 16:00hrs and collected on the 27th of October 2024 at 10:30hrs.

4.1.1 Site Description and Measurement Locations

The site is located on Forest Road, Swords, Dublin. The site is located north of Dublin Airport and is within the Dublin Airport Noise Zone B. There are residential dwellings to the north and south, agricultural land to the west and southwest, and Forest Road and Forest Little golf club to the east. Attended and unattended noise measurements were carried out across the site to establish the existing noise climate in the area.

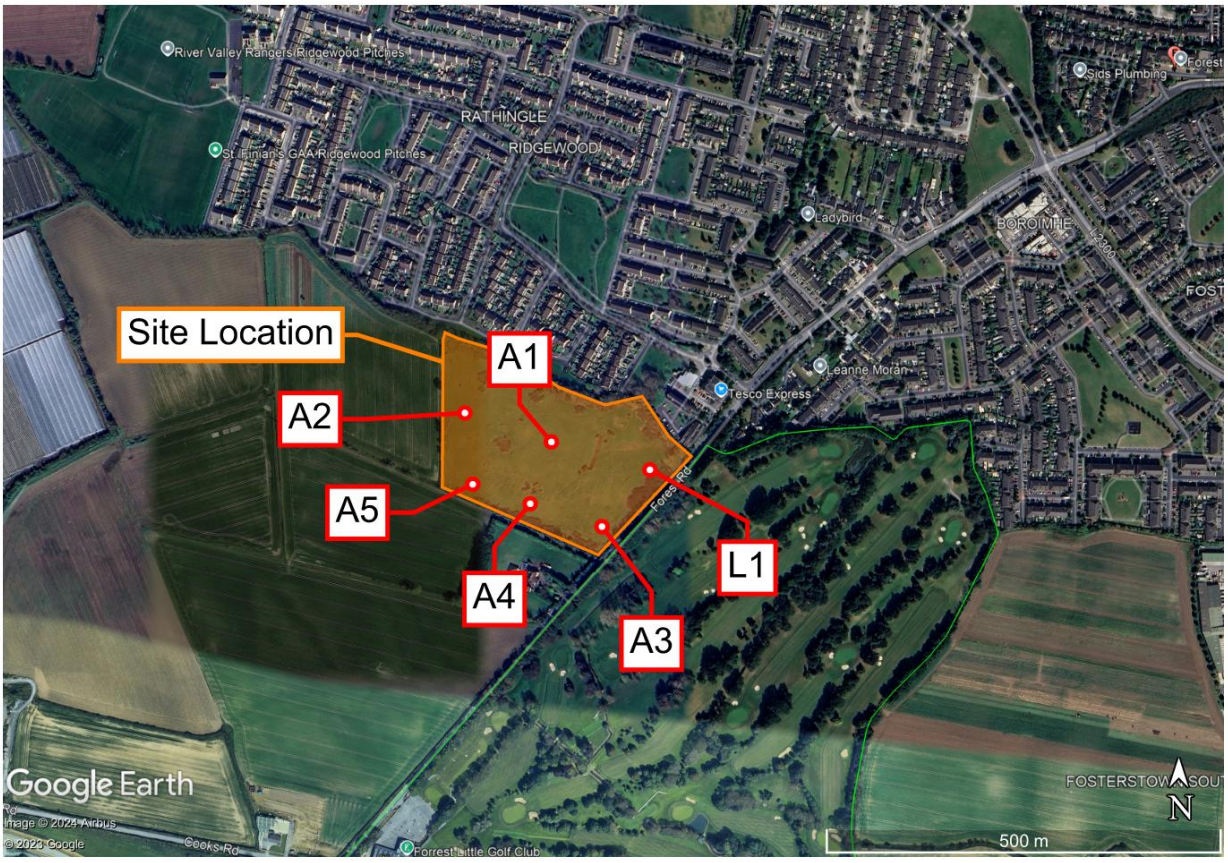


Figure 4: Site location and measurement locations L1 and A1-A5

4.1.2 Survey Methodology and Personnel

The logger was deployed by Daniel Cousins (Field Engineer) on the 18th of October 2024 at 16:00hrs. The logger was collected by Sean Rocks (Senior Acoustic Consultant) on the 27th of October at 10:30hrs. The attended measurements were completed by Joe Potter (Technical Engineer) on the 29th of October 2024.

Attended Noise Measurements

Noise measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were taken for a duration of 15 minutes in the locations L1, A1, A2, A3, A4 and A5 as noted in Figure 4. Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately

1.5m above the ground level. The weather conditions were calm (wind less than 5m/s) with no rain, a wind shield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.

Unattended Noise Measurements

An unattended noise logger was deployed in location L1 as per Figure 5. The logger was placed in a free field position and deployed at a height of 1.5m above the ground. Measurements were filtered for periods of unsuitable weather conditions where appropriate. The noise logger was calibrated before and after the survey and no significant drift was noted.

Figure 5: Noise Logger Setup

4.1.3 Survey Period

The logger was deployed by Daniel Cousins (Field Engineer) on the 18th of October 2024 at 16:00hrs. The logger was collected by Sean Rocks (Senior Acoustic Consultant/Director) on the 27th of October at 10:30hrs. The attended measurements were completed by Joe Potter (Technical Engineer) on the 29th of October 2024.

4.1.4 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended measurements. Table 3 below summarises the measurement equipment used.

Table 3: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM2	NOR140	1406532	SLM230218	27/09/2025
Sound Level Meter	SLM7	Nor 140	1405924	U48184/ U47386	25/07/2026
Weather Enclosure (Mic in enclosure)	WE1	Nor1211	14155	48186	25/06/2026
Sound Level Meter	SLM5	Nor 145	14529031	U46800/U46801 /U46802	15/02/2026
Calibrator	CAL4	Larson Davis CAL200	21085	AC240249	29/06/2025

4.1.5 Subjective Noise Environment

During the attended noise survey and logger deployment the following noise sources were identified:

- At location L1 and A3 the dominant source of noise was road traffic noise from Forest Road was the dominant noise source to the Leq measured noise levels. Noise from aircraft engines were clearly audible at this location during lulls of traffic. Other sources of noise include horses inside the site boundary and birdsong.
- At all other measurement locations, noise from aircraft taking off on the North Runway of Dublin Airport was dominant. Other sources of noise include horses inside the site boundary and birdsong.

4.2 Noise Measurement Results

This section outlines the results of both the unattended and attended noise measurements.

Attended Measurement Results

Table 4 outlines the results of the attended measurement survey.

Table 4: Attended Noise Measurement Results

Measurement				Measured Noise Levels		
Location	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
L1	24/01/2024	15:55	15	61	79	55
A3	24/01/2024	16:14	15	65	76	57
A1	29/10/2024	10:20	15	53	71	45
A1	29/10/2024	10:37	15	52	72	44
A2	29/10/2024	11:05	15	54	78	41
A2	29/10/2024	11:21	15	55	78	42
A3	29/10/2024	11:43	15	58	77	46
A3	29/10/2024	12:00	15	58	71	47
A4	29/10/2024	12:18	15	48	68	41
A4	29/10/2024	12:35	15	49	64	42
A5	29/10/2024	12:53	15	51	73	42
A5	29/10/2024	13:09	15	52	71	42

Aircraft Sound Exposure Measurement Results

Table 5 outlines the results of the attended measurements for aircraft flyover noise levels at location A1. The flyover sound exposure levels have been calculated from the measured L_{Aeq} levels.

The sound exposure level (SEL) from aircraft flyovers has been calculated using the following equation to allow direct comparison of the measured levels with the DAA predicted SEL contour maps:

$$L_{AX} = LAeq - 10*\log_{10}(N) + 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)

Table 5: Aircraft Flyover Noise Levels

Measurement				Aircraft Type	Measured Noise Levels		Sound Exposure Level
Location	Date	Time (hrs)	Duration (s)		L_{Aeq} dB	L_{AFmax} dB	L_{AX} dB
A1	24/01/2024	15:58	47	N/A	61	69	78
A1	24/01/2024	16.01	35	N/A	61	68	76
A1	24/01/2024	16:05	45	N/A	64	72	80
A1	24/01/2024	16:24	42	N/A	68	75	84
A1	24/01/2024	16:34	35	N/A	61	66	77
A1	29/10/2024	14:28	41	Airbus A330-202	64	73	80
A1	29/10/2024	14:37	17	ATR 72-600	56	64	68
A1	29/10/2024	14:39	46	Boeing 737-8AS	63	72	80
A1	29/10/2024	14:41	32	AirbusA320-232	60	68	75
A1	29/10/2024	14:42	27	AirbusA320-232	61	69	75
A1	29/10/2024	14:44	16	Airbus A320-214	53	58	65
A1	29/10/2024	14:46	21	Airbus A320-214	61	67	74
A1	29/10/2024	14:48	28	Boeing 738	61	68	76
A1	29/10/2024	14:49	44	Boeing 777-31	63	77	79
A1	29/10/2024	14:59	80	AirbusA330-302	63	77	76
A1	29/10/2024	15:06	39	Boeing 737-8As	62	69	78
A1	29/10/2024	15:07	22	Airbus A321	59	67	72
A1	29/10/2024	15:09	36	Boeing 737-8As	61	70	77
A1	29/10/2024	15:12	31	Boeing 787 Dreamliner	57	67	72
A1	29/10/2024	15:15	7	ATR 72-600	49	54	58
A1	29/10/2024	15:19	32	Airbus A320-214	58	66	73

Unattended Monitoring Results

Table 6 outlines the results of noise measurements at the unattended monitoring location L1. A full breakdown of all of the unattended measurement results are provided in Appendix A of this report.

Table 6: unattended Measurement Results

Start Date	$L_{Aeq,16hour}$ 07:00 - 23:00 dB	L_{night} ($L_{Aeq,8hour}$ 23:00 - 07:00) dB	L_{den} (00:00 - 00:00) dB	10th highest night-time L_{AFmax}	L_{AF90} (23:00 - 07:00) dB
18/10/2024	61(1)	52	64(1)	67	43
19/10/2024	60	53	61	69	45
20/10/2024	62	52	64	66	45
21/10/2024	59	53	61	70	43
22/10/2024	59	55	62	72	43
23/10/2024	61	54	63	70	41
24/10/2024	58	52	62	66	43
25/10/2024	58	54	61	71	43

26/10/2024	61	50	62	67	38
27/10/2024	61(1)	N/A	60(1)	N/A	N/A

(1) Shortened measurement duration.

(2) Where night-time period is referred to the date is the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

(3) Arithmetic average of L_{AF90}.

4.2.1 L_{AFmax} Noise Levels

Based on the project criteria outlined in Section 3, the internal $L_{AFmax\ 15min}$ inside the dwelling bedrooms cannot exceed 45dBA more than 10 times per night. With regard to the maximum noise levels ProPg states:

"A site should not be regarded as negligible risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 60 dB more than 10 times a night. A site should be regarded as high risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 80 dB more than 20 times a night."

Figure 6 below highlights the average number of L_{AFmax} events recorded on the noise logger per night based on a 15min measurement interval. It should be noted that the noise logger was located close to the road than the proposed building will be therefore the L_{AFmax} noise levels incident at the façade are not predicted to be as high as the below. Based on the ProPG risk assessment of the L_{AFmax} noise levels, the site is not considered high risk as there are currently not typically more than 20 occurrences exceeding 80dB L_{AFmax}.

The façade specification outlined in Table 8 below has been determined in accordance with achieving the internal noise levels for both L_{Aeq} and the L_{AFmax} incident noise levels below.

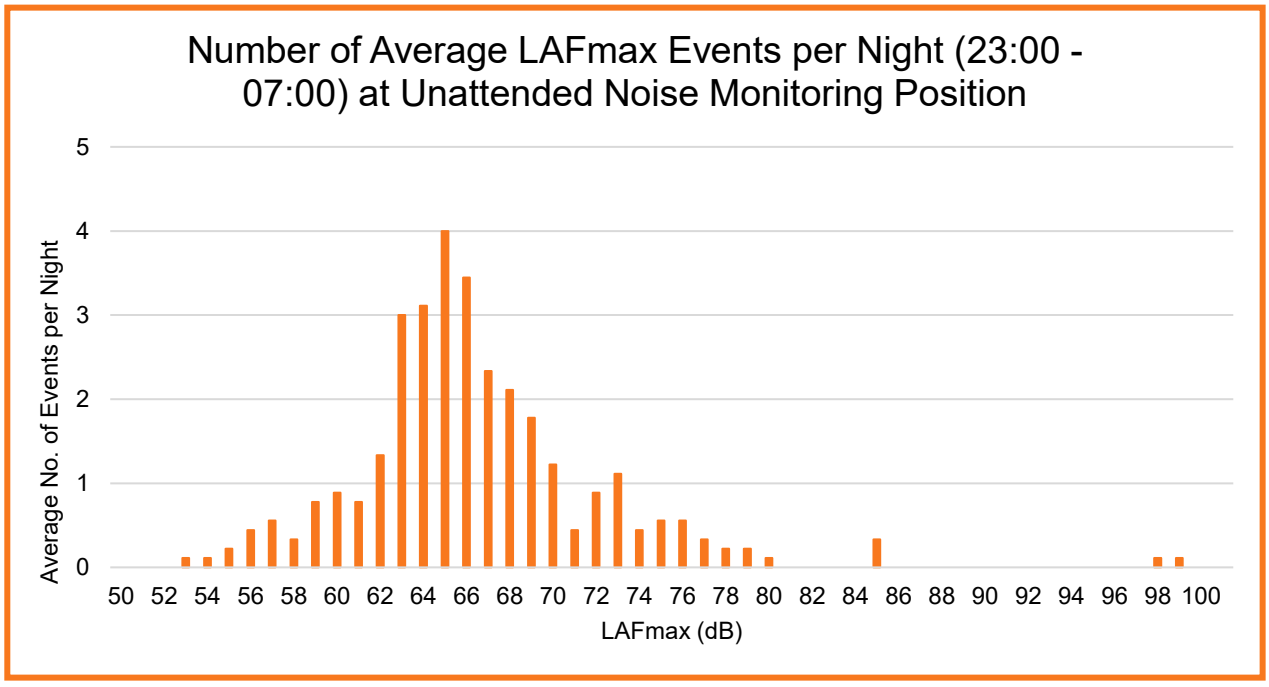


Figure 6: Average recorded L_{AFmax} events per night based on 15min measurement intervals.

Discussion of Measurement Results

The measurements were taken on weekdays and over a weekend to provide an understanding of the existing noise climate. From the noise levels recorded it can be seen that the levels were steady for the duration of the full survey.

The ambient noise consisted of traffic noise from Forest Road and aircraft noise from Dublin Airport.

Based on the ProPG risk assessment of the L_{AFmax} noise levels, the site is not considered high risk as there are not typically more than 20 occurrences exceeding 80dB L_{AFmax}.

Differentiation Between Aircraft Noise and Road Traffic Noise

As the use of the north runway is not permitted outside the hours of 07:00hrs-23:00hrs, the measured maximum noise levels are likely contributable to road traffic events rather than aircraft operations on the northern runway during the nighttime period of 23:00hrs-07:00hrs. The north runway is the closest runway to the proposed development and usage of the runway would likely lead to elevated maximum noise levels, higher than those measured during the unattended noise survey period. Therefore, maximum noise events measured during the unattended monitoring period can be attributed to road traffic events rather than aircraft movements on the north runway.

4.3 Weather Conditions for Monitoring Period

Good weather conditions were noted in general during the deployment and collection during the attended survey, with winds of less than 5 m/s and no rain.

Where weather conditions during the unattended survey impacted on the results they were filtered where required.

4.4 Future Noise Levels

Road Noise

At the time of the assessment, we are not aware of any additional upgrades to local roads which may cause an increase on the noise impact on the future development.

Based on data from the TII (2017) the average rate of growth on Irish roads is a 3.9%, assuming linear growth of 3.9% over the next 10 years an increase in noise levels from road traffic of 1-2 dB would be expected. WDA have allowed for this growth in our assessment.

Aircraft Noise

The development currently resides just inside the Dublin Airport Noise Zone B:

- Zone B – ≥ 54 and < 63 dB $L_{Aeq,\ 16hr}$ and ≥ 55 dB L_{night}

Figure 7 and Figure 8 below outline the proposed noise contours for the day and night periods for 2025. It can be seen from the contours that the site location will be within the 63dB-65dB $L_{Aeq,16hour}$ noise contour for the daytime period and the 55dB-59dB $L_{Aeq,8hour}$ noise contour for the nighttime period. Consideration has been given to these contours throughout the assessment.

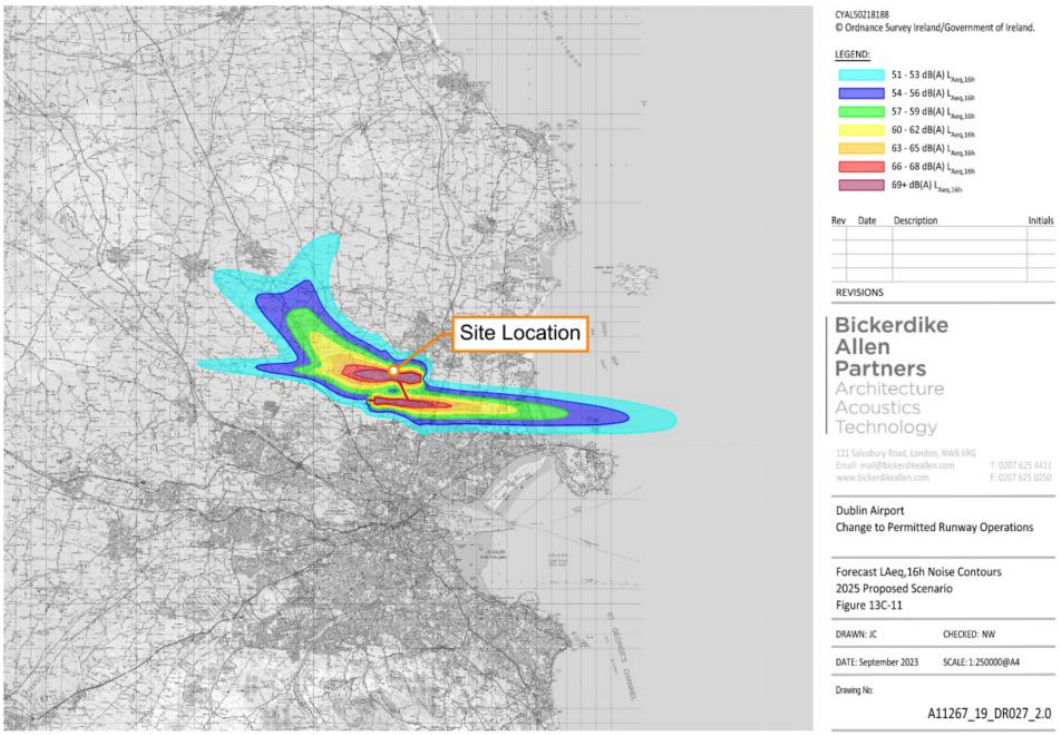


Figure 7: L_{day} contours proposed for Dublin Airport noise emissions 2025.

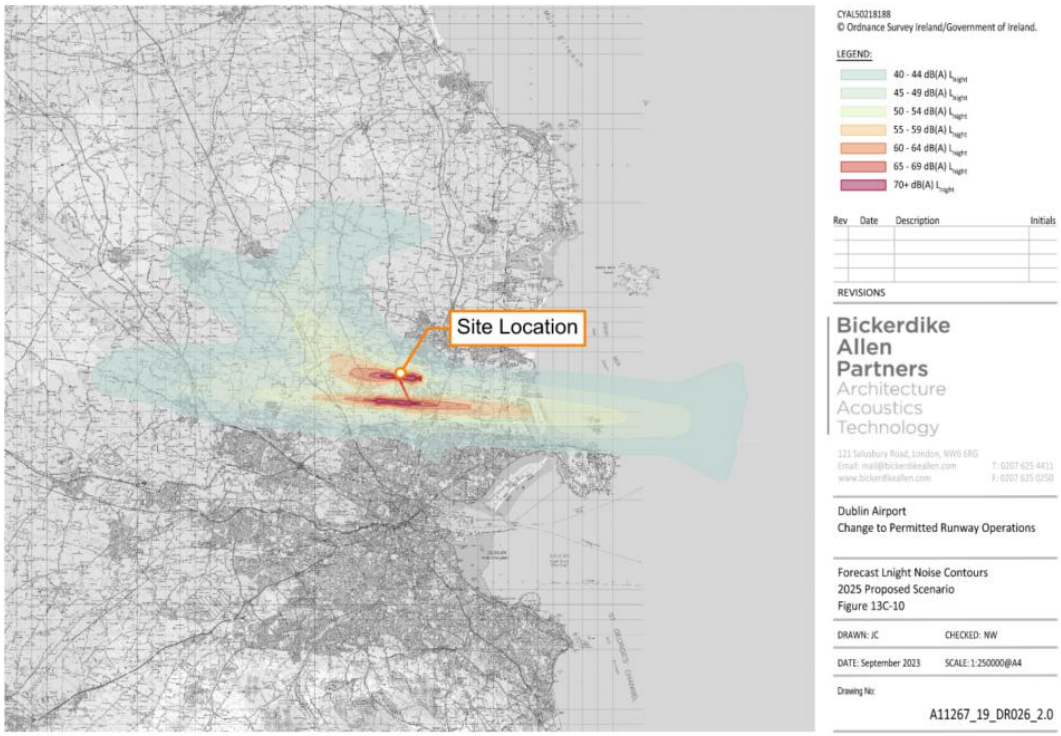


Figure 8: L_{night} contours proposed for Dublin Airport noise emissions 2025.

There is currently a planning application lodged by DAA in respect to extending the opening hours and capacity of the Northern Runway to allow for nighttime departures. At this stage there is no design made and therefore the assessment is based on the currently permitted scenario.

4.5 ProPG Stage 1 – Initial Risk Assessment

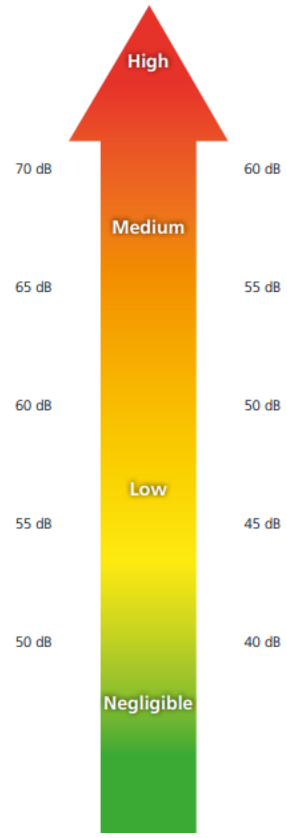
The measured noise levels on the site and future noise levels have been predicted for, road and aircraft noise.

Table 7 below identifies the Noise Risk Categorisation of the site based on the predicted free field façade noise levels. The site has been categorised as medium to low risk during the daytime period and medium to high risk during the nighttime period. Considering this risk categorisation of the development mitigation measures will be required to mitigate the noise risk in following with ProPG guidance and good acoustic design process.

It should be noted that the ProPG 2017states the following with regard to how the initial site noise risk is to be used:

"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."

Table 7: ProPG Stage 1 Risk Assessment of Existing/Future Noise Levels

Noise Risk Assessment		**Risk Assessment Rating**	
Indicative Daytime Noise Levels $L_{Aeq,16hour}$	**Indicative Night-time Noise Levels $L_{Aeq,8hour}$**	**Daytime Noise Levels**	**Night-time Noise Levels**
		**High Risk**	**High Risk**
		N/A	The northeastern boundary occupies the high risk contour for nighttime noise. Good acoustic design should be demonstrated.
		Medium Risk	**Medium Risk**
		The site lies between the medium to low risk contour for daytime noise. Good acoustic design should be demonstrated.	The site occupies the medium risk contour for night-time noise. Good acoustic design should be demonstrated.
		Low Risk	**Low Risk**
		N/A	N/A
		Negligible Risk	**Negligible Risk**
		N/A	N/A

5 ProPG Stage 2- Full Assessment

This section outlines the full acoustic design assessment in line with ProPG guidance.

5.1 Element 1: Good Acoustic Design Process

ProPg States the following in relation to Good Acoustic Design Process:

"A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building(s)) and externally (in spaces to be used for amenity purposes)."

"Good acoustic design should avoid "unreasonable" acoustic conditions and prevent "unacceptable" acoustic conditions (these terms are defined in Element 2). Good acoustic design does not mean overdesign or gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site"

The following considerations are recommended by ProPG:

- *"Check the feasibility of relocating, or reducing noise levels from relevant sources.*
- *Consider options for planning the site or building layout.*
- *Consider the orientation of proposed building(s).*
- *Select construction types and methods for meeting building performance requirements.*
- *Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.*
- *Assess the viability of alternative solutions.*
- *Assess external amenity area noise."*

5.1.1 Discussion of Good Acoustic Design

Mitigation of Sources

The development is located close to road and aircraft noise sources which are not on or part of the development therefore it is not possible to reduce or relocate the relevant noise sources.

Site Layout and Orientation

The southeastern boundary will be the most exposed to the road traffic noise. The whole site is generally at risk of noise from aircraft.

Construction Methods

Section 5.2.2 considers the construction methods required to meet the building performance control measures. The construction measures are in general robust, providing standard external wall and façade details to meet thermal, fire and weathertightness requirements will in general provide adequate performance to achieve good levels of sound insulation.

Impact of Noise Control Measures

The effects for noise control measures on other building elements including ventilation are considered in Section 5.2.2. It is generally impractical to provide ventilation via openable windows in urban/built up areas. An open window will provide 10-15dB of attenuation which in build-up urban areas is not practical. In general, the good acoustic design process in these areas is to provide ventilation via attenuated natural vents or mechanical ventilation. This allows the occupants to have adequate ventilation with adequate noise levels.

External Amenity

ProPG states the following with regard to external amenity spaces:

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."

The external amenity source noise levels are considered in section 5.3.

5.2 Element 2 – Assessment of Internal Noise Levels

This section outlines the assessment of the building envelope including the façade noise modelling, and specification of the glazing requirements.

A noise intrusion assessment for the proposed development has been completed in accordance with the methodology outlined International Standard *ISO EN 12354-3:2017 Building acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 3: Airborne sound insulation against outdoor sound*. The standard provides a method for calculating the indoor noise levels due to for instance Road Traffic Noise.

The calculation method accounts for multiple factors including:

- The external noise level at the affected building façade.
- The frequency characteristics of the specific noise source (i.e. Road traffic noise).
- The sound insulation performance of each façade element (i.e. Windows, Walls, Roof…).
- The area of each façade element.
- Direct and flanking transmission paths.

5.2.1 Noise Prediction Modelling

Following the survey, a computational noise model of the development using SoundPLAN 9.0 modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc)
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source,
- Atmospheric attenuation and meteorological effects,

The noise model has been calibrated against the attended and unattended noise measurements. SoundPLAN 9.0 software predicts road traffic noise levels in accordance with *Calculation of Road Traffic Noise* (UK Department for Transport, 1998). This is the recognised appropriate standard for road traffic noise prediction as per TII (Transport Infrastructure Ireland).
The following information was input into the model:

- Development layout provided by architects drawings.
- Google Maps terrain and elevation data of surrounding area.
- As measured and calibrated noise levels from aircraft operations at Dublin Airport.
- Traffic speed of 60km/hr on Forest Road as per local signage and onsite observation.
- Percentage of HGV assumed at 4% based on assessment of similar local roads.
- Annual traffic growth rate of 3.9%.
    - This has been assessed based on pre-covid traffic growth data.

5.2.2 Predicted Road & Airport Noise Levels

Incident road traffic and airport noise levels have been predicted across all facades of the development for both the day and nighttime period.

Daytime Noise Levels

Figure 9, Figure 10 and Figure 11 below outline the predicted road traffic and aircraft noise levels across the proposed site for the daytime period at 1.5m, 4m and 6.5m height respectively for the current airport operating situation.

Figure 9: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 1.5m height for the future development.

Figure 10: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 4m height for the future development.

Figure 11: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 6.5m height for the future development.

Nighttime Noise Levels

Figure 12, Figure 13 and Figure 14 below outline the predicted road traffic and aircraft noise levels across the proposed site for the nighttime period at 1.5m, 4m and 6.5m height respectively for the current airport operating situation.

Figure 12: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 1.5m height for the future development.

Figure 13: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 4m height for the future development.

Figure 14: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 6.5m height for the future development.

5.2.3 Building Envelope Specification

This section outlines the building envelope requirements based on the measurements outlined in Section 3. Facade, wall, glazing, roof and ventilation specifications have been determined to achieve the internal noise level criteria for the development. The specification has been determined in accordance with EN ISO 12354-3: 2017 based on the predicted façade day and night noise levels, the room and facade dimensions from the drawings provided.

The building envelope specification should be confirmed by the acoustic consultant at design stage once the internal layouts and design development has been completed. Any changes to the assumed ventilation strategy and glazing requirement should be considered as part of the review and it should be based on the internal noise levels cited in this report.

Glazed Elements and Ventilation

The glazed elements and ventilation openings are typically the acoustically weakest elements of any façade. The required sound insulation performance of façade glazed elements and ventilation openings is outlined in Table 8 below.

It is required that the glazing, frame and seals as a whole achieve the performance when the window is in the closed position. The performance requirements outlined in Table 8 below are considered to provide adequate sound insulation to achieve the relevant day and night internal design goals respectively. A markup outlining the performance requirements for each façade are included in Appendix B.

Table 8: Sound Insulation performance requirements for glazed elements and ventilation.

Façade	Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)							Façade Ventilation Requirement[2]
	Octave Band Frequency Requirements[1] R dB						Glazing Acoustic Performance dB R_W	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
RED	23	27	34	45	48	52	37dB R_W	40dB $D_{n,e,w}$ [1]
BLUE	23	26	29	35	41	29	34dB R_W	37dB $D_{n,e,w}$ [1]

(1) Natural ventilation assumed throughout, the performance cited for the ventilator is in the open position. Should this change to mechanical ventilation the above specification may be reduced. An acoustic consultant should be engaged to assess the level of reduction appropriate to maintain the internal noise level criteria.

(2) The calculation assumes a maximum of 1 ventilation opening per bedroom at the above specification.

It is important to note that the requirements outlined above are minimum requirements for the glazed element as a whole. The octave band values are indicative and specific to the assessed glazing type, equal or approved to meet the minimum project requirements is acceptable.

We understand the ventilation strategy for the development has not been confirmed at this stage of the design. It has been assumed that ventilation will be provided via natural ventilation system. Should the ventilation strategy change to mechanical ventilation strategy Wave Dynamics should be notified. Typically, the use of a natural ventilation strategy will lead to an enhanced glazing specification compared to a sealed mechanical ventilation system. This assessment is based on the windows in closed position.

It is recommended that the facade supplier provide laboratory tests confirming the airborne sound insulation performance in the absence of suitable laboratory data a composite sound reduction index calculation undertaken by a suitably qualified acoustic consultant can be used to demonstrate compliance.

Consideration has been given to the Dublin Airport proposed noise contours for 2025 in this assessment based on the measured noise levels at the site and the noise contour maps presented in the most recently submitted EIAR supplement by DAA provided to ABP.

External Wall Construction

The façade wall construction has been assumed to achieve a minimum sound insulation performance of 60dB R_W. Typical façade construction such as concrete, blockwork, timber frame and brick offer high levels of sound insulation and will meet this requirement.

Roof Construction

The roof construction has been assumed to achieve a minimum sound insulation performance of 55dB R_W. Any skylights and glazing in the roof system to corridor or communal areas should be of standard double-glazed construction to meet the same performance a minimum of 29 dB R_w. If there are any skylights to habitable bedrooms Wave Dynamics should be informed to provide specific guidance in each case.

5.3 Element 3- External Amenity Spaces

External amenity is provided in the form of private gardens and communal open spaces. Based on the measured noise levels at the site it is predicted that the external noise levels in all amenity spaces will achieve the ProPG recommendations for desirable external amenity noise levels of 50-55dBA $L_{Aeq,16hour}$, with the exception of a small portion of the greenbelt open space located to the east and bounding Forest Road. To the north of the development is a small external amenity space, a 2m noise wall is proposed around the boundary of this external space to ensure that the majority of the space will achieve the external amenity desirable noise levels.

Balconies on the eastern elevations of Blocks A and B are predicted to have noise levels above the desirable levels however, suitable amenity is provided elsewhere on the development which satisfies ProPG guidance. It was discussed at with design team to provide wintergardens however due to concerns with daylight in the apartments, visual impact, and the fact that there is other alternative amenity space on the development it was decided to provide appropriate amenity spaces via a combination of greenbelt/communal open spaces and private amenity were appropriate. This is in keeping with good acoustic design as per ProPG.

This is in line with ProPG Element 3(v) which states:

“Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:” ….

“a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or

a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)”.

Based on the measured noise levels at the site it is predicted that the external noise levels in all rear gardens, the majority of balconies and the majority of external amenity space achieve the ProPG recommendations for desirable external amenity noise levels of 50-55dBA $L_{Aeq,16hour}$. Figure 15 below highlight the proposed external amenity spaces.

Figure 15: Compliant communal amenity space (Marked in Orange).

A noise wall has been proposed along the northeastern boundary of the site to reduce the onset noise levels from road traffic noise on the external amenity space located to the south of apartment block B. Figure 16 below outlines the location of the 2 meter high noise barrier.

It is vital that the acoustic barrier is solid to its full extent and that there are no gaps/holes in the barrier. Suitable materials for a noise barrier are listed below, other materials and products should be approved by an acoustic consultant prior to installation:

- 10mm float glass
- 100mm concrete block
- Sonant acoustic noise barrier

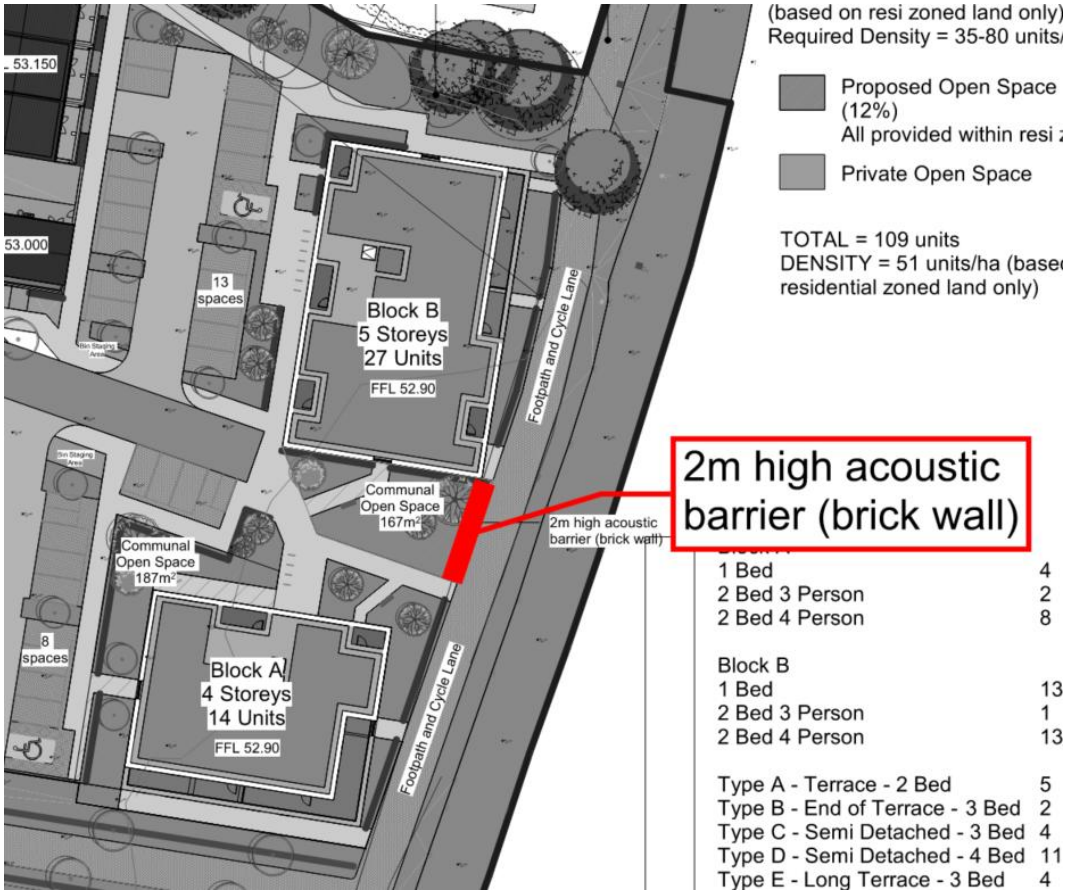


Figure 16: Location and height of noise wall at the northeastern boundary.

5.4 Section 32B Opinion

Adequate Sound Insulation

The proposed development is located within Airport Noise Zone B, which necessitates a robust approach to noise mitigation to ensure compliance with relevant internal noise level criteria. In accordance with the requirements outlined in Section 32, a detailed baseline noise survey was undertaken to quantify the existing noise environment. The data collected from this survey was used to calibrate a predictive noise model representing the acoustic impact of aircraft operations and road traffic noise on the proposed development.

Based on the measured noise levels from the specific sound insulation performance requirements have been developed and applied to the glazed elements of the building façades, recognising that glazing typically represents the weakest element of a façade in terms of noise transmission. Glazing specifications have therefore been tailored across the development to ensure adequate attenuation of external noise.

It has been assumed that the external wall construction will achieve a minimum sound insulation performance of 56 dB R_W, providing a robust envelope to complement the acoustically rated glazing. This integrated approach ensures that the building fabric contributes effectively to the mitigation of aircraft and road traffic noise.

Considering the anticipated number and timing of nighttime flights, the specified glazing configurations are assessed to be sufficient in reducing internal noise levels to meet the internal acoustic criteria detailed above in Section 5.2.3.

Amenity Space Assessment

In accordance with the recommendations contained in the Section 32B Opinion, an assessment of noise levels within the proposed external amenity spaces has been undertaken to evaluate compliance with the relevant environmental noise criteria for external amenity noise levels. The assessment was informed by the predictive noise modelling conducted as part of the overall acoustic strategy for the development.

The results of the model indicate that the inclusion of targeted noise mitigation measures, specifically the installation of acoustic barriers and landscaped mounding along the perimeter of the green belt site, provides effective attenuation of both road traffic noise and noise associated with runway operations at Dublin Airport. These measures have been strategically positioned to shield the primary greenbelt and external communal amenity areas from direct exposure to aircraft (ground operations) and road traffic noise sources.

The effectiveness of these mitigation measures is clearly demonstrated in the predicted noise contour maps outlined in Section 5.2.2 above, which illustrate that most the external amenity spaces fall within the required daytime noise level range of 50-55 dB $L_{Aeq,16hour}$. This is in line with established guidelines for external amenity space noise and confirms compliance with the relevant criteria.

The implementation of these mitigation measures is considered essential in ensuring that the quality of the outdoor environment is preserved for future residents, and that the development achieves a high standard of acoustic comfort in line with ProPG objectives.

Clarification of Modelling Assumptions - Aircraft

In support of the Section 32B Opinion, a calibrated noise model has been developed to assess the potential impact of ground-based aviation operations at Dublin Airports North Runway related noise on the proposed residential development. The modelling approach is based on a robust methodology that utilises measured sound exposure levels obtained during the baseline noise survey conducted on the development lands.

These measurements were undertaken at representative locations across the site and capture real-world aircraft noise events from aircraft ground operations. The measured sound exposure levels (SELs) from aircraft noise ranged between 49dB L_{Aeq} to 68dB L_{Aeq}. Based on DAA reported figures which reported 22,212 flights in May 2024, averaging 717 arrivals and departures per day. Calculations of average $L_{Aeq16hour}$ on the development lands have assumed 359 flights departing from the north runway as a worst-case estimation. The $L_{Aeq,16hour}$ daytime period was used as there is no permitted flights taking off on the north runway outside the hours of 07:00hrs-23:00hrs. The calculation used is as follows:

$$L_{AX} = LAeq - 10*\log_{10}(N) + 10*\log_{10}(T)$$

Where:

L_{Ax} measured SEL
N number of vehicle movements
T time (seconds)

The model was then calibrated using a linear noise source at 2.2m height (approximate heights to centre of turbines) along the north runway using a converted sound power spectrum of measured aircraft noise from the baseline survey. The model was then calibrated with the results of the calculated $L_{Aeq,16hour}$ average figures and showed direct correlation to Zone B ≥ 54 and < 63 dB $L_{Aeq,\ 16hr.}$

A linear noise source was selected and placed at 2.2m above the runway, due to the closest point of the runway to the proposed development being the eastern side of the runway, typically aircraft begin increasing the throttle input leading to an increase in power and noise output of the engine turbines. The aircraft remain on the runway and accelerate to speeds sufficient for take-off towards the western point of the northern runway.

The measured noise levels at each survey location were subsequently calibrated within the noise model to align with the calculated period specific averages. This calibration process ensures that the model accurately represents the

typical noise environment experienced on the site, accounting for both the frequency and intensity of aircraft movements.

Although it is not strictly required to model these noise levels (as the measured data is available) , WDA have provided an estimation of the contours across the site based on the measured noise data.

The L_{Afmax} was not considered for the external amenity spaces during this period as there are no industry standards for assessing maximum noise events in external amenity spaces. The assessment is based on current Dublin Airport operations at the time of writing.

Predicted Daytime Airport Ground Operations – Grid Noise Maps

This section outlines the estimated airport noise emissions from ground-based aircraft movements along the north runway.

Figure 17: Predicted LAeq,16hour (07:00Hrs – 23:00Hrs) at 1.5m height for the future development (for aircraft noise only).

Figure 18: Predicted LAeq,16hour (07:00Hrs – 23:00Hrs) at 4m height for the future development (for aircraft noise only).

Figure 19: Predicted LAeq,16hour (07:00Hrs – 23:00Hrs) at 6.5m height for the future development (for aircraft noise only).

Predicted Nighttime Airport Ground Operations – Grid Noise Maps

As there are currently no permitted departures on the north runway outside the hours of 07:00hrs-23:00hrs, no grid noise maps have been generated.

Predicted Road Traffic Noise – Grid Noise Maps

This section outlines grid noise maps with the inclusion of road traffic noise only, omitting emissions from Dublin Airport's north runway.

Daytime Noise Levels

Figure 20, Figure 21 and Figure 22 below outline the predicted road traffic and aircraft noise levels across the proposed site for the daytime period at 1.5m, 4m and 6.5m height respectively for the current airport operating situation.

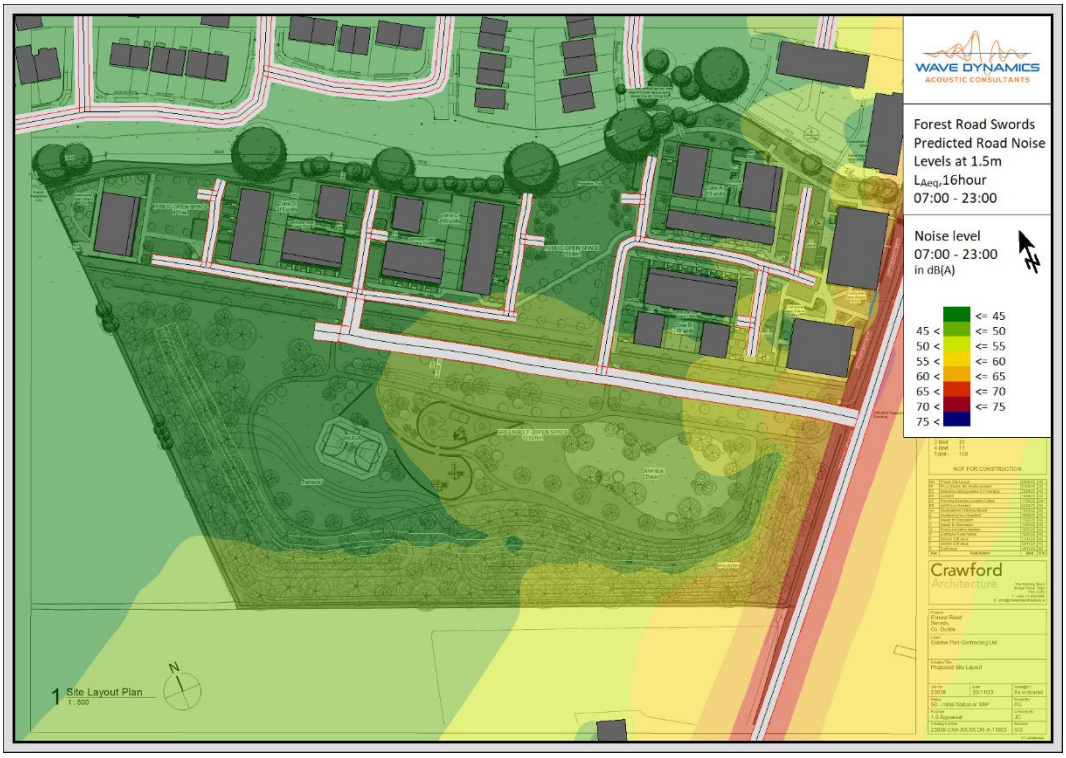


Figure 20: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 1.5m height for the future development.

Figure 21: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 4m height for the future development.

Figure 22: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 6.5m height for the future development.

Nighttime Noise Levels

Figure 23, Figure 24 and Figure 25 below outline the predicted road traffic and aircraft noise levels across the proposed site for the nighttime period at 1.5m, 4m and 6.5m height respectively for the current airport operating situation.

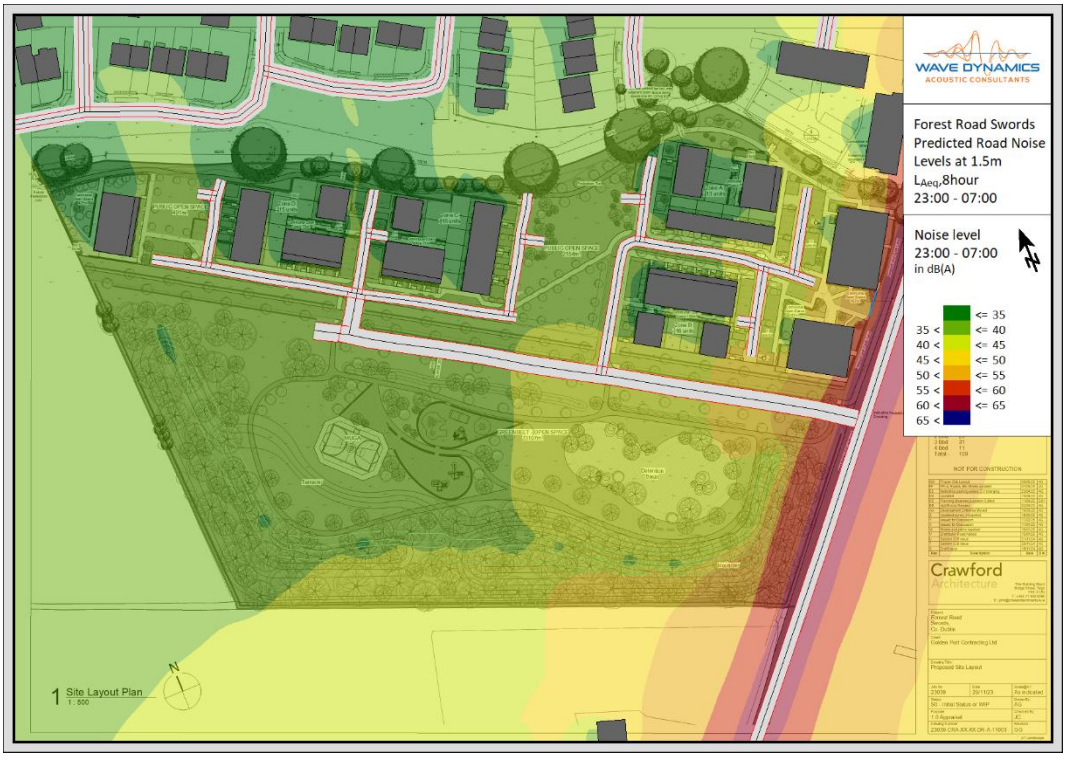


Figure 23: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 1.5m height for the future development.

Figure 24: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 4m height for the future development.

Figure 25: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 6.5m height for the future development.

Noise Barriers

As outlined in Figure 16 above, the location and height of the proposed noise barrier along the northeastern boundary of the site are positioned to control the exposure of road traffic noise on the external amenity space located to the south of block B. As outlined in Figure 9 above, the noise wall clearly aids in the reduction of road traffic noise from Forest Road and the majority of the external amenity space located at the apartment block is in compliance with external amenity noise level criteria of 50-55dB $L_{Aeq,16hour}$.

Reiterating details outlined in Section 5.3 above, the noise barriers are proposed to be 2 meters in height and be of brick construction, alternative constructions can be found below:

- Timber fencing to have surface density >20kg/m^2.
- 100mm concrete block.
- Sonant acoustic noise barrier.
- Brick

5.5 Element 4- Assessment of Other Relevant Issues

This section of the acoustic design report considered the other relevant issues. Element 4 considers other issues which may remain relevant to the assessment, these issues are as follows:

- 4(i) compliance with relevant national and local policy.
- 4(ii) magnitude and extent of compliance with ProPG .
- 4(iii) likely occupants of the development.
- 4(iv) acoustic design v unintended adverse consequences and;
- 4(v) acoustic design v wider planning objectives.

5.5.1 Compliance with Relevant National and Local Policy

There are no specific noise guidance or policy documents for residential developments. The Dublin Agglomeration Noise Action Plan refers to the ProPG as the relevant document for assessment of the noise impact on new residential developments as followed in this acoustic design statement.

5.5.2 Magnitude and Extent of Compliance with ProPG

This report demonstrates that all dwellings will meet the specified internal noise level requirements provided the guidance in this report is followed. External amenity spaces have been provided in line with the guidance set out in ProPG. Based on this the development is in general compliance with the ProPG requirements.

5.5.3 Likely Occupants of The Development

Additional needs of the future occupants are not known at this stage however the needs of all potential occupants have been considered with the assessment of adequate internal noise levels and provision of adequate external amenity spaces to meet the needs of potential occupants.

5.5.4 Acoustic Design v Unintended Adverse Consequences

The design has considered the impact of adverse consequences, mitigation has been provided by specification of the sound insulation and ventilation requirements.

5.5.5 Acoustic Design v Wider Planning Objective

Where possible the wider planning objectives have been considered including the need for residential housing with good transport links. It is assumed that the winder planning objectives have been adhered to by following the ProPG guidance.

5.6 Stage 2 Assessment Conclusion

The stage 2 assessment considers all four (4) elements, the principals of good acoustic design have been followed.

The element 2 assessment has considered the measures required to provide an adequate acoustic environment with appropriate noise levels for internal spaces. The sound insulation and ventilation requirements have been specified based on the predicted façade noise levels.

The element 3 assessment of external amenity spaces has considered the noise impact on the development and the external amenity spaces. Appropriate provision of external amenity space has been provided in line with the ProPG guidance.

Other relevant issues have been considered including, local policy, unintended consequences and the wider planning objectives.

6 Conclusion

Wave Dynamics were engaged by Golden Port Homes Limited as the acoustic consultants for the planning stage application of Forest Road, Swords, Co. Dublin. Planning permission is sought by Golden Port Homes Limited on lands located to the north of Dublin Airport on Forest Road, Swords, Co. Dublin.

Golden Port Homes Limited, intend to apply for planning permission for a Large-Scale Residential Development (LRD) on lands at Forest Road, Swords, Co. Dublin.

The proposed development will consist of a total of 109 no. residential units (42 no. duplex units; 41 no. apartments; 26 no. houses) as follows:

42 no. duplex units within 3-storey buildings comprising 21 No. 1 bed units at ground level and 21 No. 3 bed units over first and second floor levels with balconies/terraces, private and communal open space;
41 no. apartments within 2 blocks. Block A will be a 4 storey building with 14 no. apartments (4 no. 1 bed units and 10 no. 2 bed units) with balconies/terraces to the north, south and west elevations, and bin, bicycle parking and plant at ground floor level and pv panels at roof level; Block B will be a 5 storey building with 27 no. apartments (13 no. 1 bed and 14 no. 2 bed units) with balconies/terraces to the east and west elevations and bin, bicycle parking and plant at ground floor level and pv panels at roof level;
26 no. houses (comprising 5 no. 2 bed, 2 storey terrace houses; 6 no. 3 bed, 2 storey terrace houses; 4 No. 3 bed, 2 storey semi-detached houses; and 11 no. 4 bed, 3 storey houses);
96 no. Surface level car parking spaces and 4 no. surface level motorcycle parking spaces as well as bike parking stores and spaces; and bin stores;
1 no. ESB substation;

Landscaping, including the provision of new public open spaces with play areas and a MUGA; footpaths and cycle paths, new vehicular access/egress from Forest Road; public lighting; boundary treatment and all associated site, drainage and development works necessary to facilitate the proposed development.

Noise Impact Assessment

A Stage 1 and Stage 2 ProPG assessment has been undertaken. As part of the stage one assessment to categorise the site a baseline noise survey was undertaken to measure the existing noise levels. Following a review of the noise levels on the site including the L_{AFmax} and L_{Aeq} the site has been characterised as medium to low risk to for the daytime period and medium to high risk for the nighttime period therefore mitigation measures are not required to control the onset noise levels.

Internal Noise Levels

Following the baseline survey, a noise impact assessment was undertaken, this included break-in noise calculations to predict the internal noise levels from road traffic noise and aircraft noise. Consideration has also been given to the future growth of the roads. The break in assessment considers the noise break in from aircraft noise for the current Dublin Airport operations.

Following the assessment, the building envelope performance requirements were determined. The performance specification for the building envelope has been provided in this report which includes the external walls, glazing, roof and ventilation requirements.

External Amenity Noise Levels

The assessment has also considered the external amenity noise levels in accordance with ProPG 2017. All private gardens and the majority of communal open spaces are predicted to achieve suitable noise levels to meet the desirable levels without additional mitigation. Balconies/terraces along the northeastern façades of Blocks A and B are predicted to exceed the desirable levels however suitable amenity has been provided elsewhere across the development. This in line with ProPG Element 3(v). As part of the design review alternative balcony

locations were considered however considering other elements including massing, daylighting etc were found not to be sufficient.

Section 32B

The Section 32B Opinion addresses the acoustic design of the proposed development located within Dublin Airport's Noise Zone B. A baseline noise survey and a calibrated predictive model were used to assess the impacts of ground-based aircraft operations and road traffic noise. As a result, site-specific glazing specifications were developed, ensuring compliance with internal noise level criteria.

External amenity spaces were also assessed, with noise walls and landscaped mounding mitigating aircraft ground operations and road traffic noise effectively, ensuring most areas fall within the 50–55 dB $L_{Aeq,16hour}$ desirable range.

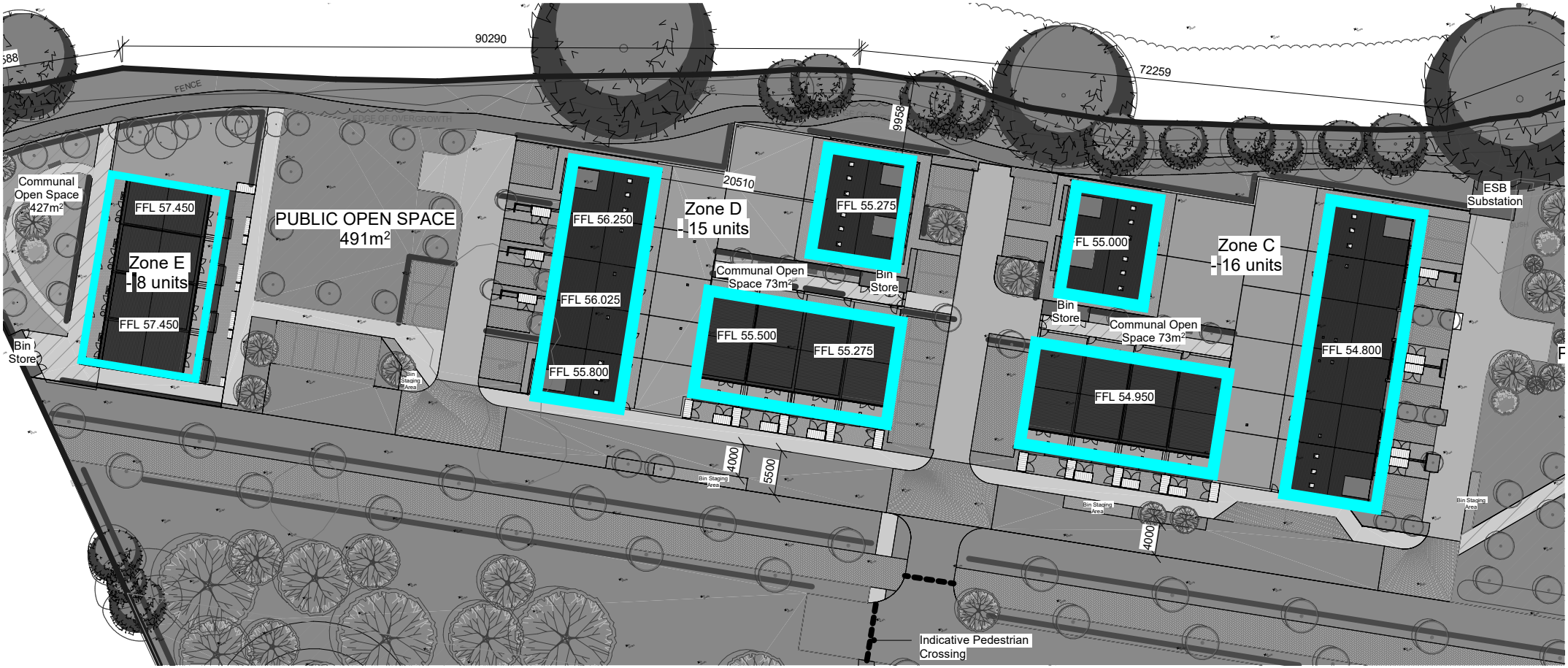
Aircraft noise modelling incorporated measured SELs, flight data based on the current usage. A linear noise source was modelled at 2.2m height, aligning with aircraft engine centres above ground level, and the model was calibrated to reflect the calculated average daytime L_{Aeq} values. Estimated noise contour maps have been included in this report to visualise the noise impact across the development.

Based on the recommendations in this report it is predicted that the internal and external noise levels will achieve the targeted internal noise levels in line with BS 82233:2014 and ProPG 2017 guidance.

Appendix A- Glossary of Terms

Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
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 ($L_{AF90,T}$).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak
L_{den}	day-evening-night noise level, the A-weighted, Leq (equivalent noise level) over a whole day, but with a penalty of 10 dB(A) for night-time noise (23:00-07:00) and 5 dB(A) for evening noise (19:00-23:00), also known as the day evening night noise indicator

Appendix B – Façade Sound Insulation Drawings



Glazed Elements Specification

- 34 dB R_w
- 37 dB R_w

WAVE DYNAMICS
ACOUSTIC CONSULTANTS
DUBLIN WEXFORD CORK LONDON

Project:	Forest Road, Swords, Dublin.
Title:	Glazing Markup - Part 1
Prepared By:	Cathal Reck
Reviewed By:	Sean Rocks
Date:	21/11/2024

Glazed Elements Specification

- 34 dB R_w
- 37 dB R_w

WAVE DYNAMICS
ACOUSTIC CONSULTANTS
DUBLIN WEXFORD CORK LONDON

Project: Forest Road, Swords, Dublin.

Title: Glazing Markup - Part 2

Prepared By: Cathal Reck

Reviewed By: Sean Rocks

Date: 16/05/2025