Kennelsfort Road Lower Palmerstown SHD

Planning Stage Acoustic Report

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Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
R_W	Weighted Sound Reduction Index—A laboratory measured value of the acoustic separation provided by a single building element (such as a partition). The higher the R_W the better the noise isolation provided by a building element.
Reverberation Time (RT)	Of a room, for a sound of a given frequency or frequency band, the time that would be required for the reverberantly decaying sound pressure level in the room to decrease by 60 decibels.
$D_{n,e,w}$	Element normalised level difference, weighted - A laboratory measured value of the acoustic separation provided by a small building element.
L_{den}	(day-evening-night noise level) is the A-weighted, Leq (equivalent noise level) over a whole day, but with a penalty of +10 dB(A) for night-time noise (22:00-07:00) and +5 dB(A) for evening noise (19:00-23:00).
L_{day}	(day noise level), is the A-weighted, Leq (equivalent noise level) over the 16-hour day period of 07:00-23:00 hours, also known as the day noise indicator
L_{night}	(night noise level), is the A-weighted, Leq (equivalent noise level) over the 8-hour night period of 23:00-07:00 hours, also known as the night noise indicator.

Executive Summary

Amplitude Acoustics have been engaged to conduct an acoustic assessment for the planning application for a new residential development consisting of 250 residential units proposed at Kennelsfort Road Lower, Palmerstown, Dublin 20.

As the land is located adjacent to the Chapelizod Bypass, an acoustic report is required assessing the noise intrusion from road noise on the proposed development. This report details the acoustic assessment of the site based on traffic noise levels measured at the site and predicted noise levels based on future traffic growth.

Assessment Criteria

The criteria for the project have been developed with regard to the requirements of *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* and *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development May 2017*.

It should be noted that the recommended internal levels of BS8233 and ProPg 2017 are similar to those in the *WHO Guidelines for Community Noise 1999* and *WHO Night Noise Guidelines for Europe 2009*. Furthermore, these internal noise levels are also aligned with the objectives of *EU Noise Policy* implemented through the *EU Noise Directive* and associated *Dublin Agglomeration Environmental Noise Action Plan*.

The design advice provided for the building façade is suitable for achieving the recommended internal levels with the windows closed and appropriate acoustic ventilation systems installed. Open windows typically provide a reduction of approximately only 10dB - 15dB and should not be relied on for the ventilating strategy for the building, except for rapid or purge ventilation. It is generally accepted that a higher level of noise from outside the building is accepted by residents when they have a degree of control over the noise intrusion i.e. they can close the windows.

Roof Terrace

The development will require a noise wall at the rooftop terrace on block A. A 3m high glazed noise wall around the perimeter of the rooftop amenity space has been included. This noise barrier has been modelled and the rooftop amenity noise levels are predicted to be below the recommended external amenity noise level of 55dB(A) L_{day}

Children's Playgrounds

The playgrounds have been purposely located behind Block E and Block C to benefit from acoustic shading from the buildings. The noise levels in general achieve the recommended external amenity noise level of 55dB(A) L_{day} with some of the playground boundary areas just above 'the Desirable Low Sound levels' in the 55-60 dB(A) L_{day} contour.

Conclusion

The Interior noise levels for the whole development are predicted to comply with interior sound levels from BS 8233 and ProPg 2017 provided that the construction requirements detailed in Section 6 are implemented.

Table of Contents

1 Introduction

Amplitude Acoustics have been engaged to conduct a planning stage acoustic assessment for the planning application for a proposed new residential development consisting of 250 build to rent apartments proposed at Kennelsfort Road Lower, Palmerstown, Dublin 20.

The development will consist of the demolition of all existing structures on site and the construction of a residential development of 250 no. 'build to rent' apartments (134 no. 1 beds, 116 no. 2 beds) in 5 no. blocks; with a café and ancillary residential amenity facilities, to be provided as follows:

- Block A containing a total of 27 no. apartments comprising of 13 no. 1 beds and 14 no. 2 beds, in a building ranging from 3-6 storeys over basement in height, with 1 no. communal roof garden (at third floor level), and most apartments provided with private balconies/terraces. Block A also provides a café, a reception/concierge with manager's office and bookable space at ground floor level; meeting rooms and workspace/lounge at first floor level; a gym at second floor level; and a cinema and a games room at basement level;

- Block B containing a total of 46 no. apartments comprising of 18 no. 1 beds and 28 no. 2 beds, in a building 6 storeys over basement in height, and all apartments provided with private balconies/terraces;
    -
- Block C containing a total of 47 no. apartments comprising of 30 no. 1 beds and 17 no. 2 beds, in a building 6 storeys over basement in height, and all apartments provided with private balconies/terraces;

- Block D containing a total of 67 no. apartments comprising of 33 no. 1 beds and 34 no. 2 beds, in a building 7 storeys over basement in height, and most apartments provided with private balconies/terraces;

- Block E containing a total of 63 no. apartments comprising of 40 no. 1 beds and 23 no. 2 beds, in a building 8 storeys over basement in height, and all apartments provided with private balconies/terraces.

The development also includes the construction of a basement providing 120 no. car parking spaces, 10 no. motorcycle spaces, 250 no. bicycle spaces, and a plant room and bin stores. The proposal also incorporates 5 no. car parking spaces and 26 no. bicycle spaces at surface level; upgrades and modifications to vehicular and pedestrian/cyclist access on Kennelsfort Road Lower; utilisation of existing vehicular and pedestrian/cyclist access via Palmerstown Business Park (onto Old Lucan Road); 1 no. ESB sub-station; landscaping including play equipment and upgrades to public realm; public lighting; boundary treatments; and all associated engineering and site works necessary to facilitate the development.

As the land is adjacent the R148 Chapelizod bypass, an acoustic report is required assessing the noise intrusion from road noise on the proposed development. This report details the acoustic assessment of the site including internal and external amenity noise levels based on traffic noise levels measured at the site and predicted noise levels based on future traffic growth.

Implementing the acoustic design guidance in this report is predicted to achieve acceptable internal noise levels for the proposed use of the site.

2 Site Description

The proposed development is located on an existing commercial site at Kennelsfort Road Lower, Palmerstown, Dublin 20. The development will consist of the demolition of all existing structures on site and the construction of a residential development of 250 no. 'build to rent' apartments (134 no. 1 beds, 116 no. 2 beds) in 5 no. blocks; with a café and ancillary residential amenity facilities. The development also includes the construction of a basement providing 120 no. car parking spaces, 10 no. motorcycle spaces, 250 no. bicycle spaces, and a plant room and bin stores. The site is bounded by:

- The R148 dual carriageway (Chapelizod Bypass) to the South.
- Industrial and commercial premises to the West and North West.
- Residential dwellings to the North and North East.
- Kennelsfort Road Lower to the East.

The R148 is composed of two carriageways consisting of two Eastbound and two West bound lanes with a section speed limit of 60km/hr. Figure 1 below shows an aerial view of the proposed development site in relation to the surrounding area and the Chapelizod Bypass. The location of the background noise logger is also shown.

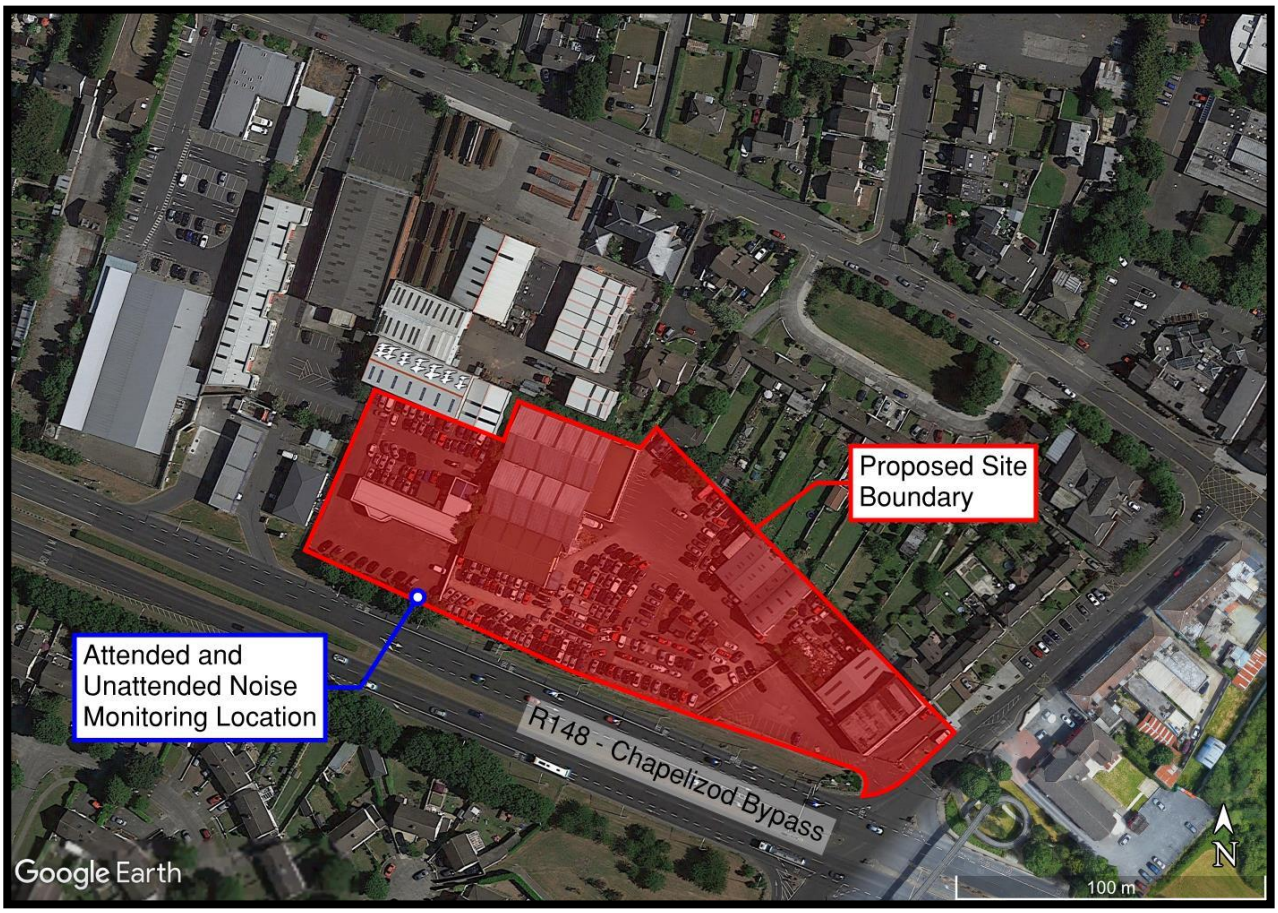

Figure 1: Aerial view showing the proposed development site in relation to the surrounding area and Chapelizod Bypass. The location of the background noise logger is also shown. Image © Google Earth

3 Acoustic Criteria

The criteria for the project have been developed with regard to the requirements of ProPG 2017, BS 8233:2014, WHO Guidelines, and the Dublin Agglomeration Noise Action Plan.

3.1 Internal Noise Levels

The relevant internal noise criteria for the development have been based on the requirements of BS 8233:2014 Guidance on sound insulation and noise reduction for buildings and *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development May 2017*. Table 1 below provides relevant internal L_{Aeq} target levels for overall noise in the design of a building:

Table 1: BS 8233:2014 internal noise criteria – Commercial and 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 $L_{Aeq, 8\ hour}$
Working	Office	40 dB $L_{Aeq, 16\ hour}$	-

Note 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 $L_{Amax,F}$ more than 10 times a night.

For the purposes of this assessment we have determined glazing requirements on the basis of achieving internal noise criteria as shown in Table 1 the living, sleeping and working areas of the proposed development.

3.2 External Amenity Areas

Guidance on noise levels for external amenity areas is provided by BS 8233:2014 and ProPG 2017. 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 LAeq,16hr".* The standard continues… *"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."*

It should be noted that both BS8233:2014 and ProPG 2017 do not advise that development should be restricted in areas with undesirable noise levels, however it does recommend that appropriate mitigation measures are put in place and planning should not be restricted on this basis. Where required, design guidance has been provided to ensure lowest practicable external noise levels are achieved in line with ProPG 2017.

4 Noise Measurements

4.1 Details

Amplitude have previously conducted unattended noise monitoring on the site boundary between 16:00 on 12th February and 16:00 on 14th February 2018. Additional attended measurements were conducted at the same monitoring location on 3rd March 2020 to validate the accuracy of the previously undertaken measurements. Traffic noise was observed to be the dominant noise source in the area for the duration of the attended measurements.

4.2 Instrumentation

A Class 1 sound level meter/noise logger in accordance with IEC 61672-1:2013 was used for all measurements. Table 2 below summarises the measurement equipment used.

Table 2: Measurement Equipment

Description	Manufacturer	Model
Noise Logger	Sinus Messtechnik	Tango Plus
Acoustic Calibrator	Larson Davis	CAL200
Sound Level Meter	Norsonic	NOR140
Acoustic Calibrator	Norsonic	NOR1251

All equipment has calibration certificates traceable back to the relevant Standard. A calibration check of the sound level meter was conducted prior to and following the assessment using an external acoustic calibrator, with no significant drift in calibration measured.

4.3 Procedure

Noise measurements were undertaken in accordance with the following:

- The noise monitor was positioned at the south boundary of the proposed development site, adjacent to the Chapelizod Bypass. The noise monitor was positioned approximately 1.5 metres above the ground and at approximately 25 metres away from the centre of the dual carriageway.
- Figure 2 on the next page shows the noise monitoring location in relation to the Chapelizod Bypass.
- Attended measurements were conducted to validate the accuracy of the noise logger measurements at the same location.
- A wind shield was used during all measurements, and the measurements were undertaken during a calm, still period (for which the wind velocity did not exceed 5 m/s).
- Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration or electrical interference.

Figure 2: Noise logger location relevant to site boundary showing Chapelizod Bypass in background.

4.4 Results

4.4.1 Unattended Noise Monitoring Results

A summary of the relevant day and night measured levels is presented in Table 3 below. It should be noted that the noise levels displayed represent the noise at the monitoring location which is only 25 metres from the centre of the dual carriageway. The noise level at the most exposed façade of the proposed development will be lower than those presented due to the attenuation with distance from the road.

Table 3: Average traffic noise measurements for 12th - 14h February 2018 at noise monitor location.

Time period	Assessment period	Noise Levels
Day	07:00 to 23:00 Hrs	70 dB(A) $L_{Aeq,\ 16\ hour}$
Night	23:00 to 07:00 Hrs	65 dB(A) $L_{Aeq,\ 8\ hour}$

4.4.2 Attended Noise Survey Results

A summary of the attended measurements taken on 2nd March 2020 to validate the previous logger measurements can be seen in Table 4. The measurements were taken at the same location as the unattended noise monitor, 25m metres from the centre of the road. Traffic noise from the R148 was observed to be the dominant noise source in the area for the duration of the site visit.

Table 4: Summary of attended noise measurements on 2nd March 2020

Time	Duration	Noise Levels	
		L_{Aeq} dB	L_{A90} dB
09:03	15 min	68	61
09:26	15 min	65	59
09:56	15 min	69	65
10:14	15 min	72	67

These measurements show that previous unattended noise monitoring undertaken on the site by Amplitude Acoustics remain relevant to the existing noise environment of the area.

5 Noise Modelling

Noise emissions from the Chapelizod Bypass have been modelled using SoundPLAN 8.0 software, which implements the 'Calculation of road traffic noise (CORTN) algorithm'. The model accounts for the following factors:

- Traffic Flow in terms of Average Daily Traffic (ADT)
- Percentage Heavy Vehicles
- Traffic Speed
- Gradient
- Distance attenuation, including source and receptor heights.
- Barrier effects due to facility structures and other buildings.
- Ground effects and absorption
- Atmospheric attenuation.

Inputs into the model are summarised in Table 5 below.

Table 5: Parameters used to model the Traffic Noise of the Chapelizod Bypass.

Parameter	Value
Annual Average Daily Traffic (AADT)(1)	79690 Vehicles
Percentage Heavy Vehicles(1)	3.9%
Traffic Speed(2)	60 km/hr
Annual traffic growth (3)	4.2 %
Ground absorption	0.6
Terrain(4)	Ordnance Survey Map Sheet 3196-21

1. Model input data has been derived from transport info http://www.tii.ie/roads-tolling/operations-and-maintenance/traffic-count-data/
2. Observed local signage.
3. Annual traffic growth has been derived from N4 – N7 Corridor Study, and 'Transport Strategy for the Greater Dublin Area 2016-2035
4. Provided by Downey Planning and Architecture.

An annual traffic volume growth of 4.2% is adopted to estimate the 10-year traffic volume forecast. The forecast traffic growth based on available data within *SDCC 'N4 – N7 Corridor Study 2017'* and the *National Transport Authority 'Transport Strategy for the Greater Dublin Area 2016-2035'.*

5.1 Prediction Results

Using the traffic noise model, the noise levels at each exposed façade of each building has been predicted based on the current traffic volume details summarised Table 5. The traffic noise model was modified to predict the 10-year forecast traffic noise levels based on a forecast traffic volume increase of 4.2% annually. Table 6 summarises the traffic noise levels predicted at the most exposed façade of the development based on the existing and forecast traffic volumes.

Table 6: Average traffic noise measurements for 12th - 14h February 2018 at noise monitor location.

Time period	Assessment period	Predicted Noise Levels at most exposed facade	
		Existing Traffic	Forecast Growth[1]
Day	07:00 to 23:00 Hrs	70 dB(A) $L_{Aeq, 16\ hour}$	72 dB(A) $L_{Aeq, 16\ hour}$
Night	23:00 to 07:00 Hrs	65 dB(A) $L_{Aeq, 8\ hour}$	67 dB(A) $L_{Aeq, 16\ hour}$

1. Forecast growth based on 4.2% increase in traffic volume annually over 10 years.

The results in Table 6 indicate an increase of up to 2dB in the traffic noise impact on the proposed development over the next 10 years. The 10-year forecast noise levels have been adopted when calculating the construction requirements required to achieve the Acoustic Criteria specified in Section 3.

5.2 Internal Noise Levels

Construction details required to achieve internal noise levels within the project criteria are outlined in Section 6 of this report.

5.3 External Amenity Areas

Construction details required to reduce the external amenity noise levels for the playground and rooftop amenity space are outlined in Section 6 of this report.

6 Construction Requirements

Based on the results of the measured noise levels, glazing requirements have been calculated to achieve the required internal noise levels in accordance with BS 8233 (Table 1) at the proposed development.

6.1 Façade Requirements

The indicative façade glazing requirements for the development are shown in Table 7. Appendix A shows a mark-up of the required glazing types with regard to layout of the proposed the development. It is a requirement that the full composite system including the window frame has as a minimum, the same sound insulation performance as the glazing specified.

Table 7: Glazing Requirements

Glazing Type & Colour Code	Glazing Acoustic Performance R_w[1]	1/1 Octave Band Minimum Performance Requirements R					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Type A	44	30	34	42	47	46	50
Type B	40	28	30	35	43	50	50

1. The performance of a double and triple-glazed system is significantly improved by varying the pane thicknesses, e.g. 1 x 4mm pane + 2 x 6 mm panes. Different glazing options which achieve the acoustic performance requirements can be considered.

Internal noise level predictions are based on the sound transmission loss performance of typical glazing where no manufacturer is nominated. The glazing configurations presented in Table 7 are indicative only. Glass from various manufacturers is available that will meet the acoustic performance requirements, however any proposed glazing should be approved by an acoustic consultant prior to selection.

It is acoustically preferable for windows to be of a hinged (awning) construction and have cam locks to ensure a compression seal is achieved. In this case, windows are to have compression rubber seals around the perimeter such as Raven RP500 or RP540.

Where glazed sliding doors and windows are located on facades, the glazing and framing of the doors is required to match the acoustic performance of fixed glazing.

6.2 Ventilation Systems

Ventilation systems have the potential to impair the acoustic performance of a façade system. Standard passive ventilation grilles offer minimal acoustic performance and are not suitable for this development. It is recommended that mechanical ventilation is used on this development. Should natural ventilation be selected all ventilation will need to be acoustically rated. Ventilation systems (including trickle vents) will be required to achieve:

- Facades with Type A glazing should have ventilation systems which achieve a $D_{n,e,w}$ of 47 dB
- Facades with Type B glazing should have ventilation systems which achieve a $D_{n,e,w}$ of 43 dB

The façade and ventilation requirements are based on the achieving the ventilation requirements with the windows closed and a maximum of one (1) trickle vent in each room with the above referenced acoustic performance.

6.3 External Wall Constructions

The external wall construction of the proposed development should be designed to achieve an acoustic performance of R_w 55dB or above. Typical brick and timber framed constructions normally achieve this value.

6.4 Roof Constructions

The roof construction should be designed to achieve an acoustic performance of R_w 50 dB or above. All penetrations through the roof/ceiling system should be filled with insulation, faced with plasterboard and sealed with a resilient acoustic sealant.

6.5 External Amenity Spaces

6.5.1 Balconies

The residential units will include balconies with winter-gardens or balustrades of 1500mm in height. These will provide local screening of the incident noise, increasing the amenity of these spaces.

6.5.2 Playgrounds

The playgrounds have been purposely located at the rear of Blocks C and E. This will provide acoustic screening from the buildings to the playgrounds. The proposed layout has been modelled and the predicted noise contours across each playground can be seen in Figure 3 below. It can be seen that the noise levels in general achieve the recommended external amenity noise level of 55dB(A) L_{day} with some of the playground boundary areas just above 'the Desirable Low Sound levels' in the 55-60 dB(A) L_{day} contour.

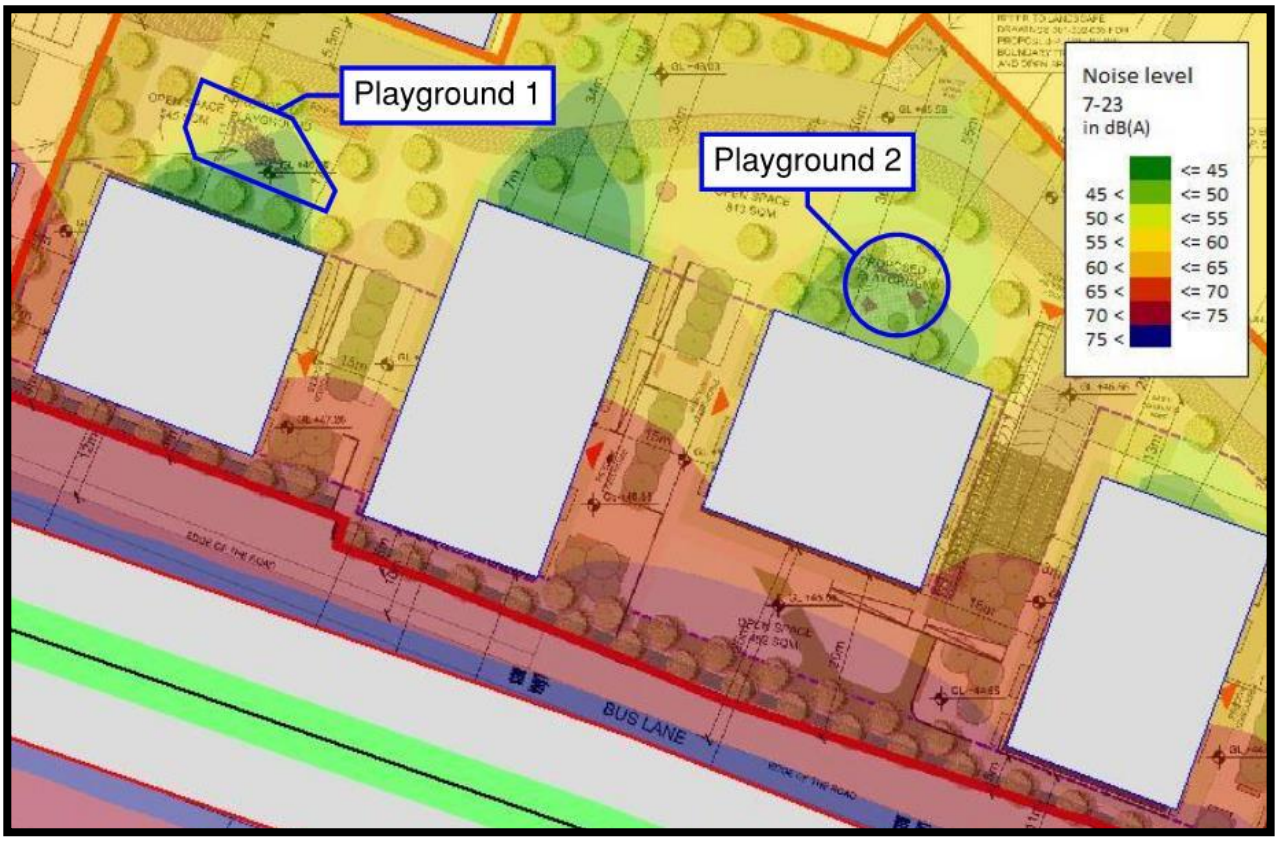

Figure 3: Playgrounds predicted noise levels

6.5.3 Block A Rooftop Amenity

The development will require a noise wall at the rooftop amenity level. A 3m high glazed noise wall around the perimeter of the rooftop amenity space has been included. This noise barrier has been modelled and the rooftop amenity noise levels are predicted to be below the recommended external amenity noise level of 55dB(A) L_{day}. The location of the 3m noise barrier can be seen in Table 8.

Table 8: Noise barrier details and extent.

Treatment	Description	Location
Noise Wall	**Height:** 3m above Roof Level **Proximity:** As shown by Blue Line	
Noise wall	The noise wall should be constructed of a material with a surface density of typically 15kg/m^2, unless otherwise noted. Examples of suitable materials to construct the noise wall include: • 125mm thick concrete block. • Multivario Transparent Noise Barrier • Hoesch Isorock® Akustik (Soundtec,http://www.acousticgrg.ie/suppliers/hoesch/.) There should be no cracks or gaps between individual barrier elements, between the barrier or ground, or where the ends of the barrier join another structure.	

7 Conclusions

Amplitude Acoustics have assessed the existing noise levels at the site of a development consisting of 250 residential housing units proposed at Kennelsfort Road Lower, Palmerstown, Dublin 20.

The traffic noise at the site has been measured using a noise logger as well as attended measurement. A traffic noise model has been developed and calibrated using the measured noise levels. The traffic noise model was modified to predict the 10-year forecast traffic noise levels based on a forecast traffic volume increase. Using the measured noise levels, the acoustic performance requirements for the building have been developed to achieve the internal noise levels defined in BS 8233 and ProPG.

Interior noise levels for the whole development are predicted to comply with interior sound levels from BS 8233 and ProPG provided that the construction requirements detailed in Section 6 are implemented.

The external noise levels in the rooftop amenity area are predicted to achieve the achieve 'the Desirable Low Sound levels' of L_{day} 55dB(A) specified in BS 8233/ProPG 2017 and Dublin Agglomeration Noise Action Plan through the installation of an appropriately design 3m glazed noise barrier as shown in Section 6.

The noise levels in general achieve the recommended external amenity noise level of 55dB(A) L_{day} with some of the playground boundary areas just above 'the Desirable Low Sound levels' in the 55-60 dB(A) L_{day} contour.

The residential units will include balconies with winter-gardens or balustrades of 1500mm in height. These will provide local screening of the incident noise, increasing the amenity of these spaces.

Appendix A – Glazing Mark Up

Amplitude Acoustics

Title:
Glazing Mark Up
Kennelsfort Road Lower
Client:
Randelswood Holdings Ltd

Legend

Glazing Performance

Rw 44 dB
Rw 40 dB

AMPLITUDE REVIEW
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