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6070 External Noise Impact Analysis

TRAFFIC and INDUSTRIAL NOISE IMPACT ASSESSMENT

ORCHARD GATE SHD

RESIDENTIAL APARTMENT DEVELOPMENT

KENNELSFORT ROAD UPPER
PALMERSTOWN
CO DUBLIN

AAI Palmerstown Ltd

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Contents

1 Introduction

1.1 Report purpose

This report details the effects of external noise impact from traffic and the neighbouring industrial site on the new proposed development and exams / compares the results against recommendations set out in the relevant standards.

1.2 Instruction

DKPartnership (DKP) have been commissioned by AAI Palmerstown Ltd to carry out the analysis and report for the proposed Orchard Gate residential development described below.

1.3 Development detail

The development is located at the former warehouse facility at units 54 & 65 ,Cherry Orchard Industrial Estate . The site presents a gateway location at the western junction of Kennelsfort Road Upper and Cherry Orchard Industrial Estate Road. This location represents the start of the lands zoned 'REGEN'continuing to the east.

The proposal is for 144 no. 'build to sell' apartments and associated facilities with a mix of 72 no. one bedroom apartments and 72 no. 2 bedroom apartments . The development is set out in 4 no. five storey buildings enclosing a raised podium courtyard with the junction corner building having a 9 storey gateway feature element .On site parking of 65 no. resident spaces is contained within a landscaped podium element with 2 no. on street care share spaces provided.

2 Executive summary

2.1 Analysis conducted

This report details the calculated predicted noise levels in the habitable rooms and amenity areas in the proposed development using the survey data from noise measurements taken from the Kennelsfort Upper Road covering the traffic of the Kennelfort Road Upper and partial traffic into/from the Cherry Orchard Industrial Estate to the South-Eastern side of the proposed development and compares the results with the recommended noise data published by the world health organisation, CIBE guides, BS8233 and the EPA guidelines.

2.2 Standards and regulations overview

The following guideline/standards have been applied and used for information:
European Environmental Noise Regulations 2018 (S.I. No. 549),
National Planning Framework 2040,
British Standard BS 8233 and the
World health Organisation(WHO)
EPA NG4 guidelines

2.3 Methodology

To arrive at the most accurately predicted ambient internal room noise levels and general noise levels in the amenity area in the centre of the new proposed development we use actual noise survey data from taking from the Kennelfort Road Upper and noise data from the EPA noise maps covering both the traffic and any industrial noise impacts from the Cherry Orchard Industrial Estate to the South-East. The North and West side are facing residential units/gardens and a secondary school where the noise levels are assumed not to be of any significance. The survey noise data is than used to calculate the predicted internal room (ambient) noise levels by deducting the façade overall noise reduction capability from the noise levels at the external façade and predicted noise levels in the amenity spaces. These are then compared with the CIBSE/WHO/BSEN8233 maximum recommended Noise levels (NC) for habitable rooms and guidelines on recommended amenity space noise levels to check if they are within the relevant detailed limits. Likewise for the amenity space the predicted noise level in the amenity space is compared with the EPA NG4 guide for day/night time maximum noise level.

2.4 Technical summary

The following is a summarised version of the survey details, the calculated noise levels at the facades and the predicted ambient noise levels within the habitable rooms at the relevant facades. See section 5 for more in-depth details.

2.4.1 - The survey & EPA noise map data:

The table below details the summarised day time and night time noise level survey results and the relevant EPA data from the EPA's round 3 (2019) noise survey results.

Location	Sound exposure	Maximum noise level	16 hour day noise indicator (day)	8 hour noise indicator (night)
Station 1 (Kennelfort Road Upper)	92 dB	69 dB(A)	67 dB(L_{AEQ16})	57 dB(L_{AEQ16})
Station 2 (Kennelfort Road Upper)	96 dB	71 dB(A)	68 dB(L_{AEQ16})	57 dB(L_{AEQ16})
EPA data (round 3 2019)			65-69 dB(L_{AEQ16})	55-59 dB(L_{AEQ16})

Table 2.1

2.4.2 - Maximum recommended room noise level guidelines

The table below shows the maximum recommended noise levels (Noise Criteria) as published by BS 8233, CIBSE and the world Health Organisation for habitable rooms in different environments as illustrated below;

Room type	Very good / Country	Good / Suburban	Reasonable / Urban	City centre
Bed room	25	30	35	40
Living room	30	35	40	45

Table 2.2

EPA NG4 guidelines. Amenity spaces.

External space	Day time	Evening time	Night time
Amenity space	55	50	45

Table 2.3

2.4.3 - The calculated noise levels at facades and relevant internal ambient noise levels Receptors A to H.
Noise at facades : Noise reduces over distance at the rate of L_w·20log$_{10}$·L(m)-10.9 with the table below detailing the calculated noise levels at the relevant façade types A to H based on the noise survey data.
Ambient noise in habitable rooms : As the new proposed development is of modern construction and needs to comply to the current building regulations it must have a relative good noise reduction capability typically ranging from 45dB to 35dB without any special noise reduction measures.
For this report we have applied a modest 30dB noise reduction capability to calculate the predicted internal ambient noise level. See image 5.3 for receptor A..H locations.

Calculated internal room noise level after façade noise reduction.

Location	Noise reduction (dB)	Calculated noise level at façade			Calculated internal noise levels		
		Max level	Day (16h)	Night (8h))	Max level	Day (16h)	Night (8h)
Façade point A	25	66 dB	63 dB	52 dB	36 dB	33 dB	22 dB
Façade point B	25	67 dB	64 dB	52 dB	37 dB	34 dB	22 dB
Façade point C	25	64 dB	60 dB	50 dB	34 dB	30 dB	20 dB
Façade point D	25	63 dB	58 dB	49 dB	33 dB	28 dB	19 dB
Façade point E	25	64 dB	60 dB	50 dB	34 dB	30 dB	20 dB
Façade point F	25	63 dB	58 dB	49 dB	33 dB	28 dB	19 dB
Façade point G	25	60 dB	55 dB	46 dB	30 dB	25 dB	16 dB

Table 2.4

2.4.4 Noise level reduction of vegetation barriers. Amenity space receptor H
The noise reduction created by a vertical vegetation barrier is pending its density / solidness and should be made up by dense evergreen trees/vegetation and whereas a solid barrier achieves a calculated noise reduction a tree barrier can absorb (reduce) noise levels up to +/- 12dB. Thus applying the noise reduction formula "$L_r = L_w \cdot 20\log_{10} \cdot D(m) - 10.9$" for the centre point in the amenity space (H) plus a conservative additional 8dB for the variation barrier we calculate a predicted noise level of 50dB$_{day}$ and 41dB$_{night}$.

Location	Noise reduction (dB)	Calculated noise level		
		Max level	Day (16h)	Night (8h))
Amenity space distance 50m	8	55 dB	50 dB	41 dB

Table 2.5

2.5 Conclusion

The noise levels effecting the new proposed development are all but generated by the traffic noise on the Kenelforth Road Upper (and to some degree the M50) with no particular measured noise nuisance coming from any of the industrial units the neighbouring industrial estate. Whereas the general noise levels at the facades are at busy urban levels the actual predicted internal habitable room noise levels ranging from day time 34dB(A) to 25dB(A) and night time from 22dB(A) to 16dB(A) as shown in table 2.4 are well below with the WHO/CIBSE/BS8233 recommended maximum habitable room noise level shown in table 2.2 and we therefore conclude that the resultants noise levels in the habitable rooms would be deemed "Good / Reasonable" for day time and "Very good" for night time and we deem this to be satisfactory and within the recommendations of the relevant standards and guides. We further note that the calculated predicted noise levels in the amenity area of 50dB$_{day}$ and 41dB$_{night}$ (see table 2.5) are also well within the EPA NG4 day and night time noise level guidelines for general amenity spaces (see table 2.3) and we therefore deem this to be satisfactory and within the recommendations of the relevant standards and guides.

2.6 Recommendations and / or mitigation measures

Whereas, based on the internal room noise data, there would be no particular noise reduction measures required once the overall façade has a noise reduction capability of >=30bB we however would recommend to have any ventilation outlets on facades A, B, C and D to be of an acoustic type with a noise reduction capability of >=30dB.
C & D are precautionary measures in the case of a traffic surge on the road South of the new proposed development leading into the Cherry Orchard Industrial Estate. Tree vegetation barriers could be supported by some solid elements within the tree / vegetation barrier to bolster the sound reduction capability.

3 Geographical overview

3.1 Project overview

Image 3.1, the (google maps) site map below is a basic overview of the site with proposed development approximately outlined in the area site map. Also showing the 2 no. (yellow) noise survey points.

Image 3.1 The new development site showing the 2 no (yellow) noise survey points.

4 Approach and methodology

4.1 Methodology applied

The new proposed development faces the Kennelfort Road Upper on the Western side, The Cherry Orchard Industrial Estate on the South-Eastern side, domestic dwellings/gardens on the Western side and a school on the Northern side. Any noise from the residential units and the school is not assumed to be of any significance hence the only possible noise generated to effect the new proposed development is most likely the traffic on the Kennelfort Road Upper and/or any noise emissions by the Cherry Orchard industrial estate. None of the neighbouring industrial units, Deli Meat Supplies, AVCOM Event specialists, Cawley's Furniture, Apache take away, AD Autos & Parts appear to have any particular noisy industrial processes hence the traffic noise will be the dominating noise impact.
To calculate the predicted ambient (internal) noise level within the habitable rooms of the apartments we need to establish the background noise outside the facades of the building. Once established we can calculate the noise reduction over the external façade construction and the internal room noise level. This is then compared with the CIBSE/WHO/BSEN8233 maximum recommended Noise Criteria (NC) for habitable rooms detailing the NC requirements for different environments.

4.2 Noise level survey

Based on the above assumptions the façades facing West and to a lesser extend South could be subject to higher background noise levels hence a 24 hour (16hour + 8hour) local monitoring survey has been conducted in 2 locations on Tuesday March 23rd 2021.
- Location1 : Kennelfort Road Upper at the entrance of existing Apache take-away.
- Location 2 : Kennelfort Road Upper at the junction of the Cherry Orchard Industrial Estate road due South of the new proposed development.

See fig 3.1 for locations on the site map.

4.3 Irelands noise framework

Environmental noise is unwanted sound arising from all areas of human activity such as noise from transport (road, rail, air traffic) as well as from industrial activities. The EPA is the national authority for overseeing the implementation of the Regulations. This role includes noise mapping and action planning for the purpose of the Directive. The EPA has made available the strategic noise mapping of agglomeration, major airports, major roads and major rail networks, in the form of noise contours for the L_{den} (day, evening, night) and L_{night} (night) periods. A noise map is a graphical representation of the predicted situation with regards to noise in a particular area with different colours representing different noise levels in decibels dB(A). All noise maps are presented in terms of two noise indicators: L_{den} and L_{night}.

- L_{den} is the day-evening-night noise indicator and it represents the noise indicator for overall annoyance. It is 'weighted' to account for extra annoyance in the evening and night periods. The Environmental Noise Directive defines an L_{den} threshold of 55 dB for reporting on the numbers of people exposed.
- L_{night} is the night time noise indicator and is used in the assessment of sleep disturbance. An L_{night} threshold of 50 dB is defined for reporting on the numbers of people exposed. These indicators are based on year long averages of the day (07:00-19:00), evening (19:00-23:00) and night (23:00-07:00) time periods.

4.4 Legislation and guidelines

The following guideline / standards have been applied:
- National Planning Framework 2040. Document sets out the Government's planning policies for Ireland and how these are expected to be applied. the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of noise pollution
- European Environmental Noise Regulations 2018 (S.I. No. 549). (Environmental Noise Regulations 2006).
- British Standard BS 8233 Sound insulation and noise reduction for buildings. BS 8233 contains guidance on the minimum recommended levels of noise reduction from external sources and general guidance on maximum habitable room noise standards.
- British Standard BS 4142:1997 'Method for Rating industrial noise affecting mixed residential and industrial areas'. To be used for assessing the effect of noise of an industrial nature, including mechanical services plant noise.
- British Standard 7445-1. Defines parameters, procedures and instrumentation for noise measurement and analysis.
- BS 5228-2 'Code of practice for noise and vibration control on construction and open sites. provides comparable 'best practice' for vibration control, including guidance on the human response to vibration and building damage.

- World health Organisation(WHO). Published External Environmental Noise Guidelines for the European Region which sets out how noise pollution in towns and cities is increasing, and that excessive noise particularly from transport sources is a health risk.
- EPA NG4. Noise limits in NG4 are based on the principle that an NSL *"for its proper enjoyment requires the absence of noise at nuisance levels".* The EPA sets a daytime limit of 55 dB(A), reducing to 50 dB(A) in the evening and 45 dB(A) at night.

4.5 Maximum recommended room noise level guidelines

The table below shows the maximum recommended noise levels (Noise Criteria) as published by BS 8233, CIBSE and the world Health Organisation for habitable rooms in different environments as illustrated below;

Room type	Very good / Country	Good / Suburban	Reasonable / Urban	City centre
Bed room	25	30	35	40
Living room	30	35	40	45

Table 4.1

4.6 Recommended day & night time amenity space noise.

EPA NG4 guidelines. Amenity spaces.

External space	Day time	Evening time	Night time
Amenity space	55	50	45

Table 4.2

4.7 Noise measurement

The noise survey measurements have been performed using a Bruel & Kjaer Type 2260 sound level meter and Bruel & Kjaer 4231 sound level calibrator.

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5 Results and conclusion

5.1 Survey results

The table below details the summarised noise survey data from the 2 no. noise survey locations covering the high and maximum sound exposure and average equivalent weighted noise levels for day and night. We note that high and maximum sound exposure data is only given for general information as this relates to a single (short time) event which is averaged as part overall weighted equivalent noise levels.

Survey results

Location	Sound exposure	Maximum noise level	16 hour day noise indicator (day)	8 hour noise indicator (night)
Station 1 (Kennelfort Road Upper)	92 dB	69 dB(A)	67 dB(L_{AEQ16})	57 dB(L_{AEQ16})
Station 2 (Kennelfort Road Upper)	96 dB	71 dB(A)	68 dB(L_{AEQ16})	57 dB(L_{AEQ16})

Table 5.1

We note that although the survey data excludes the new development's additional traffic noise but we deem this to be negligible given that the Kennelfort Road Upper Road data covers nearly permanent traffic and in particular during the peak times. Also, as part of the proposed plans of the new development it aims is to encourage the use of bicycles and electric vehicles both lowering any noise (and climate) impact.

5.2 EPA data

The Environmental Protection Agency (EPA) produces noise data in the form of noise maps which we have reviewed to check if the survey data in broad terms matches the EPA data. The images below and on the next page represent the day time and night time noise maps of round 3 (latest).

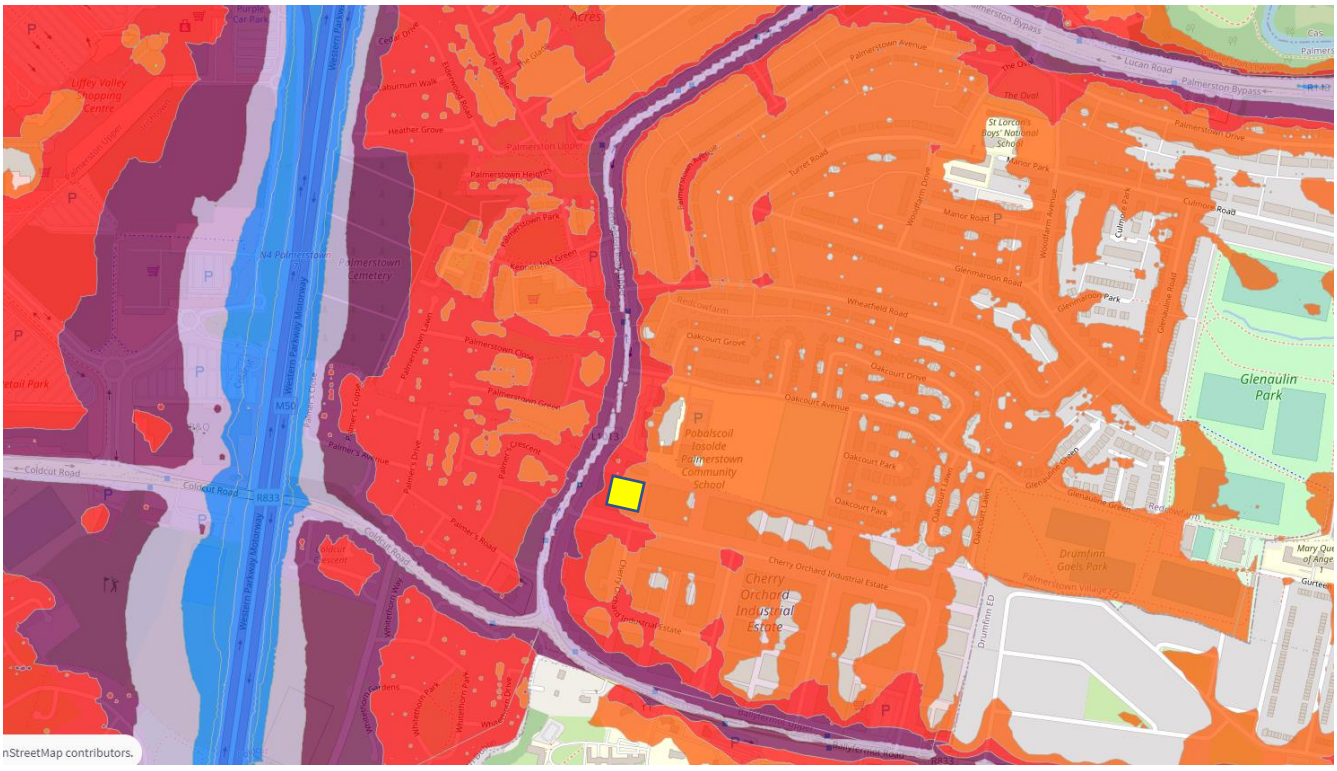

Image 5.1 The new development site (yellow square) in the EPA day time noise map.

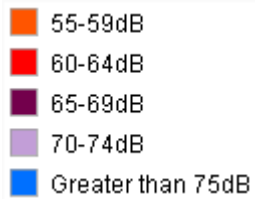

Image 5.2 The new development site (yellow square) in the EPA night time noise map.

5.3 Receiving environment

The facades of the new proposed development are a certain distance away from the Kennelfort Road Upper survey points and this would account for a noise reduction calculated at "$L_r = L_w \cdot 20\log_{10} \cdot D(m) - 10.9$" where D is the distance from the survey point to the receptor in meters. For this survey we have applied facades "types" (A, B, C, D, E, F) representing the different distances and noise level impacts from the Kennelfort Road Upper traffic noise (survey points).

Final noise levels at facades (Blue) and centre amenity space (green).

Location	Distance to survey point (m)	Source point measured noise level			Calculated noise level at façade		
		Max level	Day (16h)	Night (8h)	Max level	Day (16h)	Night (8h)
Façade point A	8-15	69 dB	67 dB	57 dB	66 dB	63 dB	52 dB
Façade point B	8-15	71 dB	68 dB	57 dB	67 dB	64 dB	52 dB
Façade point C	15-35	71 dB	68 dB	57 dB	64 dB	60 dB	50 dB
Façade point D	35-55	71 dB	68 dB	57 dB	63 dB	58 dB	49 dB
Façade point E	15-35	69 dB	67 dB	57 dB	64 dB	60 dB	50 dB
Façade point F	35-55	69 dB	67 dB	57 dB	63 dB	58 dB	49 dB
Façade point G	85	71 dB	68 dB	57 dB	60 dB	55 dB	46 dB
Amenity space point H	50	71 dB	68 dB	57 dB	55 dB	50 dB	41 dB

Table 5.2

Amenity space noise reduction is calculated with proposed reasonably dense evergreen type vegetation barrier taken a 2m height in locations 1, 2 and 3 shown in image 5.3 on the next page.

Illustration 5.3 New proposed development noise façade ID points A to G and vegetation noise barriers 1, 2 and 3 locations.

Noise level reduction of vegetation barriers

The noise reduction created by a vertical vegetation barrier is pending its density / solidness and should be made up by dense evergreen trees/vegetation and whereas a solid barrier archives a calculated noise reduction a tree barrier can absorb (reduce) noise levels up to +/- 12dB. Thus applying the noise reduction formula "$L_r = L_w \cdot 20\log_{10} \cdot D(m) - 10.9$" for the centre point in the amenity space (H) plus a conservative additional 8dB for the vegetation barrier we calculate a predicted noise level of $50dB_{day}$ and $41dB_{night}$.

Noise level reduction modern façade

The new proposed development is of modern construction and as part of the new building regulations and in particular Part L, requirement to have a very good airtightness standard giving the construction a relative high noise reduction capability. For this report we have applied conservative reduction capabilities.

Noise reduction capability of a modern façade.

	Solid external walls	Glazing	Façade average	Comments
Noise reduction capability	45 dB	33 dB	34 dB	30 dB applied as a conservative approach

Table 5.3

We note these noise reduction capabilities are conservative figures and the final façade noise reduction capability is more than likely to be higher than represented in the table above.

5.4 Predicted noise levels in habitable rooms

The resultant room noise levels shown in column 3 are the result of the traffic and industrial unit noise survey data detailed as the 16 hour day time noise indicators and 8 hour night time noise indicator (table 5.1) minus the noise reduction capability of the facades (table 5.2) of the new proposed development.

Calculated internal room noise level after façade noise reduction.

Location	Noise reduction (dB)	Calculated noise level at façade			Calculated internal noise levels		
		Max level	Day (16h)	Night (8h))	Max level	Day (16h)	Night (8h)
Façade point A	25	66 dB	63 dB	52 dB	36 dB	33 dB	22 dB
Façade point B	25	67 dB	64 dB	52 dB	37 dB	34 dB	22 dB
Façade point C	25	64 dB	60 dB	50 dB	34 dB	30 dB	20 dB
Façade point D	25	63 dB	58 dB	49 dB	33 dB	28 dB	19 dB
Façade point E	25	64 dB	60 dB	50 dB	34 dB	30 dB	20 dB
Façade point F	25	63 dB	58 dB	49 dB	33 dB	28 dB	19 dB
Façade point G	25	60 dB	55 dB	46 dB	30 dB	25 dB	16 dB

Table 5.4

The conservative approach (30dB) is used as when a building is completed the final reduction capability might slightly vary from the design parameters applied and give a comfortable buffer to compensate for same.
NB : The resultant room noise level are the mathematical result of the traffic and industrial unit noise survey data. The actual room noise level is also subject to other normal use sources from within the building.

5.5 Conclusion

The noise levels effecting the new proposed development are all but generated by the traffic noise on the Kenelforth Road Upper (and to some degree the M50) with no particular measured noise nuisance coming from any of the units in the neighbouring industrial estate. Whereas the general noise levels at the facades are at busy urban levels the actual predicted internal habitable room noise levels ranging from day time 34dB(A) to 25dB(A) and night time from 22dB(A) to 16dB(A) as shown in table 5.4 are well below with the WHO/CIBSE/BS8233 recommended maximum habitable room noise level shown in table 4.1 and we therefore conclude that the resultants noise levels in the habitable rooms would be deemed “Good / Reasonable” for day time and “Very good” for night time and we deem this to be satisfactory and within the recommendations of the relevant standards and guides. We further note that the calculated predicted noise levels in the amenity area of $50dB_{day}$ and $41dB_{night}$ are also well within the EPA NG4 day and night time noise level guidelines for general amenity spaces (see table 4.2) and we therefore deem this to be satisfactory and within the recommendations of the relevant standards and guides.

5.6 Recommendations and / or mitigation measures

Whereas, based on the internal room noise data, there would be no particular noise reduction measures required once the overall façade has a noise reduction capability of >=30bB we however would recommend to have any ventilation outlets on facades A, B, C and D to be of an acoustic type with a noise reduction capability of >=30dB.
C & D are precautionary measures in the case of a traffic surge on the road South of the new proposed development leading into the Cherry Orchard Industrial Estate. Tree vegetation barriers could be supported by some solid elements within the tree / vegetation barrier to bolster the sound reduction capability.