



Belcamp SHD

DCC Lands / Wilson Architecture

Proposed Residential Development

6070

Aircraft & Traffic Noise Impact Analysis Report

DUBLIN AIRPORT & TRAFFIC NOISE ASSESSMENT

**Belcamp,
Malahide Road,
Dublin 17**

Gerard Gannon Properties

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1 Introduction

1.1 Report purpose

This report assesses any likely impacts of aircraft noise and traffic noise upon the new proposed development and compares any potential impacts with current to be achieved noise level standards and if deemed required mitigates against any noise levels in excess of such standards.

1.2 Instruction

DKPartnership (DKP) have been commissioned by Gerard Gannon Properties, to carry out the analysis and report for the proposed development at Belcamp, Malahide Road, Dublin 17.

1.3 Development description

The following is a brief summary of the proposed development; “A 10-year planning permission is sought by Gerard Gannon Properties for a proposed Strategic Housing Development on lands at Belcamp Hall (protected structure), Malahide Road, the R139 road and Carr’s Lane, Belcamp, Dublin 17. The proposed development will consist of the construction of 2,527 no. residential units comprising houses, apartments and duplex units, 2 no. childcare facilities; 1 no. sports changing facilities building; 3 no. cafés/restaurants; 18 no. retail/commercial units; and all associated engineering and site works necessary to facilitate the development.”



2 Executive summary

2.1 Analysis conducted

This report details the potential for noise impacts on the proposed development relating to aircraft noise from Dublin Airport and traffic noise mainly from the R139. Both aircraft and traffic noise impacts were assessed and evaluated against current standards to be achieved using live data and monitoring results obtained from EPA aircraft and traffic noise maps, Dublin Airport monitoring sites and a manual background noise level survey.

2.2 Standards and regulations overview

The following guideline / standards have been applied:

- Fingal development plan 2017-2023
- Dublin Agglomeration Noise Action Plan 2019 – 2023
- ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise
- World Health Organisation (WHO). Published External Environmental Noise Guidelines for the European Region
- British Standard BS 8233 Sound insulation and noise reduction for buildings.
- European Environmental Noise Regulations 2018 (S.I. No. 549).
- EPA guide NG4

2.3 Methodology

For compliance against the current guidelines and standards we need to establish the achieved noise levels at the facades of the buildings, the internal ambient noise levels in rooms within those buildings and the external noise levels in proposed amenity spaces. This is achieved by establishing the possible noise sources and then assessing whether the effects of these noise sources on the noise levels at facades, internal rooms and amenity spaces of the new proposed development are within the recommended parameters as set out in the various tables by the WHO / CIBSE / BS8233 and EPA. For this development both aircraft and traffic noise was assumed to be of possible influence and noise data was sourced from 4 no. different sources; Source A was gathered from DAA St Doolaghs noise monitoring station approximately 2km from the proposed site, data source B is from the EPA aircraft day time and night time noise mapping, source C is from the EPA day time and night time traffic noise mapping and source D is from a manual DKP 24 hour background noise survey undertaken December 1st / 2nd 2021.

2.4 Technical analysis

When we assess the noise levels from all data sources A, B, C, D as per sections 5.3, 5.4, 5.5 and 5.6 we note the traffic noise to be by far the most prominent noise source for this development with all or most coming from the R139. To establish the noise levels at facades and amenity spaces we need to take the average day time and night noise levels from the traffic noise data sets and calculate the resultant noise levels at the relevant facades by subtracting the noise reduction from the source data by applying the inverse square noise reduction law or reduction formula " $L_r = L_w - 20 \log_{10}(R_2/R_1)$ " where L_r is the resultant noise level, L_w is the source noise level, R_1 is the distance between the survey point and the noise source and R_2 is the distance between the noise source and receptor (façade or amenity space).

Façade noise levels;

From table 5.3 we note that the resultant calculated predicted day time noise levels are between 38.3dB and 53.3dB and predicted night time noise levels of between 27.3 dB to 42.3 dB at the relevant facades. When we compare the resultant façade noise levels with the noise impact assessment criterion table 4.5 we note that both the day time noise levels and night time noise levels to fall in the "A" category where no consideration to noise levels is required.

Achieved internal ambient room noise levels;

The noise levels achieved in internal rooms using a relative low façade noise reduction capability of 30.5 dB to be conservative resulting in maximum day time ambient internal room noise levels of 22.8 dB and maximum night time ambient internal room noise levels of 11.8 dB which is categorised in table 4.2 as "very good".

Achieved external amenity space noise levels;

The noise levels effecting the new proposed development amenity spaces are also all but generated by the traffic noise on the R139 and to some lesser degree the new internal access roads. All amenity spaces are a reasonable distance away from the noise source with final predicted calculated day time noise levels of between 41.1 dB and 51.3 dB and night time noise levels of between 30.1 dB and 40.3 dB. Comparing these noise levels for the relevant



day time & night time EPA recommended maximum external ambient amenity space noise levels shown in table 4.4 we note these to be well below the recommended maximum values.

2.5 Conclusion

Based on the achieved façade, internal ambient and amenity space noise levels we, DKP, are of the opinion that the proposed development is in compliance to the relevant standards and guidelines.

2.6 Recommendations and / or mitigation measures

Whereas no mitigation measures are required to achieve compliance to the relevant standards we would suggest to give consideration to the following measures;

To ensure the relative high internal ambient noise level standard achieved permanent ventilation or other openings in the façades facing South, East and West are to be avoided or where they can not be avoided for any reason to be fitted with sound attenuation in excess of 32dB.

To improve on achieved external amenity space noise level standards consideration could be given to planting dense evergreen vegetation in the gaps between the blocks to provide some additional form of noise reduction from traffic noise and in particular the R139. The noise reduction created by a vertical vegetation barriers is pending its density / solidness and should be made up by dense evergreen trees/vegetation and could absorb (reduce) noise levels up to +/- 6dB.



3 Geographical overview

3.1 Project overview

Image 3.1 the (google arial) site map below indicates the location of the site, approximately outlined.



Image 3.1 Google maps arial view - proposed development approximate outline and location of DCC section.



4 Approach and methodology

4.1 Guidelines / standards

The following guideline / standards have been applied:

- Fingal development plan 2017-2023
- Dublin Agglomeration Noise Action Plan 2019 – 2023
- ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise
- World health Organisation(WHO). Published External Environmental Noise Guidelines for the European Region
- British Standard BS 8233 Sound insulation and noise reduction for buildings.
- European Environmental Noise Regulations 2018 (S.I. No. 549).
- EPA NG4 guide and noise mapping

We note that despite the Brexit changes to standards or European standards the British Standards continue to be functional and applied for referenced under the Association of Acoustic Consultants of Ireland (AACI). Indeed the current building regulations TGD Part E still refer to BS8233 and BRE documents.

Fingal Development Plan Policy on Aircraft Noise

Fingal County Council's County Development Plan 2017 - 2023 has defined noise zones A-D representing potential site exposure to aircraft exposure, with zone A having the most potential for noise exposure during airport operations. The proposed development site is located in zone C, where the zone is identified as *"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 level"*.

Dublin Agglomeration Noise Action Plan 2019 – 2023

The Dublin Agglomeration noise action plan (NAP) states the following with respect to assessing the noise impact on new residential development: *"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested in the interim, that Action Planning Authorities should examine planning policy guidance notes, such as ProPG (2017). Such guidance notes have been produced with a view to providing practitioners with guidance on a recommended approach to the management of noise within the planning system."*

ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise

The Professional Practice Guidance on Planning & Noise (ProPG) document was published in May 2017. since its publication it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance. The ProPG recommends a risk-based 2-stage approach for evaluating noise exposure on sites for residential development. The two stages of the approach can be summarised as follows:

Stage 1: Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels

Stage 2: Involves a full detailed appraisal of the proposed development covering four "key elements" that include: Element 1 - Good Acoustic Design Process; Element 2 - Noise Level Guidelines; Element 3 - External Amenity Area Noise Assessment, and; Element 4 - Other Relevant Issues.

World health Organisation(WHO)

The World Health Organisation (WHO) have published in October 2018 Environmental Noise Guidelines for the European Region. These guidelines provide recommendations for protecting human health from exposure to environmental noise from different sources of noise. The guidelines present recommendations for each noise source type in terms of Lden and Lnight levels above which there is risk of adverse health risks.



British Standard BS 8233 Sound insulation and noise reduction for buildings

Internal noise level: BS 8233 sets out recommended internal noise levels for several different building types from external noise sources. The recommended indoor ambient noise levels for residential dwellings are reproduced in Table 4.1

Activity	Location	Day (07:00 to 23:00hrs) dB LAeq,16hr	Night (23:00 to 07:00hrs) dB LAeq,8hr
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

Table 4.1 : Indoor Ambient Noise Levels for Dwellings (BS8233: 2014)

4.2 Maximum recommended room noise level guidelines

The table below shows the maximum recommended noise levels for residential dwellings as published by 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 4.2: recommended room noise level (dB) in different environments (CIBSE/WHO)

4.3 External noise level:

BS 8233 and EPA guide NG4 also provides desirable noise levels for external amenity areas such as gardens, patios and balconies. It states: *“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. 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.”*

Amenity spaces	Desirable condition	Acceptable conditional in noisier environments
Outdoor gardens, patios, balconies	< 50 dB LAeq,T,	> 50-55 dB LAeq,T

Table 4.3 : External Ambient Noise Levels interpreted from BS 8233

EPA NG4. Noise limits in external dedicated amenity space 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. See table below.

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

Table 4.4 : External Ambient Noise Levels recommended under EPA NG4 guise.

4.4 EPA Ireland noise mapping

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} .



4.5 Aircraft Noise metrics

There are a range of noise metrics that can be used to describe and manage aircraft noise. Some of these noise metrics are used to help develop policies and describe overall exposure to noise, namely Leq noise metrics. These noise metrics describe the 'equivalent continuous sound level' and are a measure of the average sound energy over time. Whilst these are often described as 'an average' it is important to note that these allow comparison of the total amount of noise exposure in one location as opposed to another. The key noise metrics used in policy are the Lden and Lnight which are equivalent sound level (Leq) noise metrics.

- 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.

4.6 Background noise criterion at facades of residential receptors

The table below shows the different noise categories as published by BS8233-“Guidance on sound insulation and noise reduction for buildings” in residential area's for the day time and night time periods with the relevant assessment criterion.

Background noise	7.00-23.00 L _{den} / L _{AEQ16}	23.00-7.00 L _{night} / L _{AEQ8}	Assessment / Action.
Cat “A”	<= 55 dB	<= 45 dB	Noise need not to be considered
Cat “B”	55 – 66 dB	45 – 59 dB	Noise impact need to be considered
Cat “C”	66 – 72 dB	59 – 66 dB	Noise impact mitigation need to be considered
Cat “D”	> 72 dB	> 66 dB	Unless quieter sites are not available residential use is not recommended

Table 4.5: Background noise criterion at facades of buildings

4.7 Predicted noise nuisance complaints

The table below shows the predicted level of compliant for residential dwellings as a result of exceeding the particular sound level. This table is an appraisal in term of both the margin of excess above the measured back ground noise and existing sound environment which may already have a high ambient or residual sound level. It should also be noted that not all differences or impacts lead to complaints and that not every complaint is proof of an adverse impact.

Level over the back ground noise	Compliant indication
10 dB or more	Likely to cause noise nuisance complaints
5 dB	May give rise to some extend of noise nuisance complaints
0 dB	Unlikely to give rise to noise nuisance complaints

Table 4.6: predicted level of compliant for residential dwellings



5 Development site current noise environment assessment

5.1 Site location

The proposed development site at Belcamp is located off the Malahide Road in Balgriffin in the northern suburbs of Dublin. Balgriffin lies within southern Fingal in the traditional County Dublin and it is partly in the jurisdiction of Dublin City Council and partly that of Fingal County Council, situated approximately 8km from Dublin city centre. The site is approximately 7km from Dublin Airport. On inspection the development lands at DCC Belcamp are located on the fringe / slightly outside the area highlighted on Dublin Airport's noise contour map. Fingal County Council's County Development Plan 2017 - 2023 has defined noise zones A-D, with zone A having the most potential for noise exposure during airport operations. The proposed development site is located in zone C, where the zone is identified as '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. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design'.

5.2 Noise monitoring data

Noise data for the development site was obtained from a number of sources. Source A was gathered from DAA noise monitoring data, source B is from the EPA aircraft noise mapping, Source C is from the EPA traffic noise mapping and source D is from a manual DKP background noise survey undertaken December 1st / 2nd 2021.

5.3 Source A) St. Doolaghs results

Dublin Airport have recently installed a noise monitoring system to ensure minimum disruption to the local community and to challenge deviations when they occur through an investigation process with the IAA and the airlines in question. This system is comprised of a number of fixed monitoring locations. In relation to Belcamp development site, St. Doolaghs Monitoring station is located the nearest, approximately 2km from the proposed development site. Results have been examined in the next section.

DAA publish half yearly reports on monitoring stations, the years 2017-2021 are available for public information. Summary of St. Doolaghs noise monitoring data is presented in table 5.1 showing the different noise events types, namely the percentage of noise in either, weather, human activity of aircraft related events. The impact of the national lockdown can be seen in the data for the year 2020/1 with a drop in aircraft noise recordings. Depending on the season, weather events have a significant input also.

Month / Year	Daytime noise level $L_{Aeq,16h}$ (dB)		Night-time noise level $L_{Aeq,8h}$ (dB)	
	Total	Aircraft	Total	Aircraft
07/12/2017	59.9	59	53.4	52.3
01/06/2018	61.1	60.5	56.5	54.9
07/12/2018	61.9	61.1	54.5	56.5
01/06/2019	62.2	61.2	57.9	56.3
07/12/2019	62.2	61.4	57.8	57
01/06/2020	59.9	58.1	55.5	53.1
07/12/2020	56.9	55	54.2	52.6
01/03/2021	56.7	52.6	55.3	52.2
04/06/2021	55.1	52.8	53.7	51.8

Table 5.1 summarizes the average measured noise levels at St. Doolaghs (Daytime noise level $L_{Aeq,16h}$ and Night-time noise level $L_{Aeq,8h}$).

St. Doolaghs Noise Measurement Overview:

During daytime periods average daytime noise levels were in the range 55.1 to 62.2dB L_{den} and average night-time background noise levels were in the range 54.3 to 57.9dB L_{night} .

5.4 Source B) EPA aircraft noise map:

EPA noise contour maps: EPA noise contour maps available show L_{den} and L_{night} contours. L_{night} is the A-weighted long-term average sound level for the night time period (23.00 to 07.00). L_{den} – is the A-weighted long-term average sound level for the day-evening-night noise indicator in decibels (24 hours). All data has been taken from the EPA Mapping website.



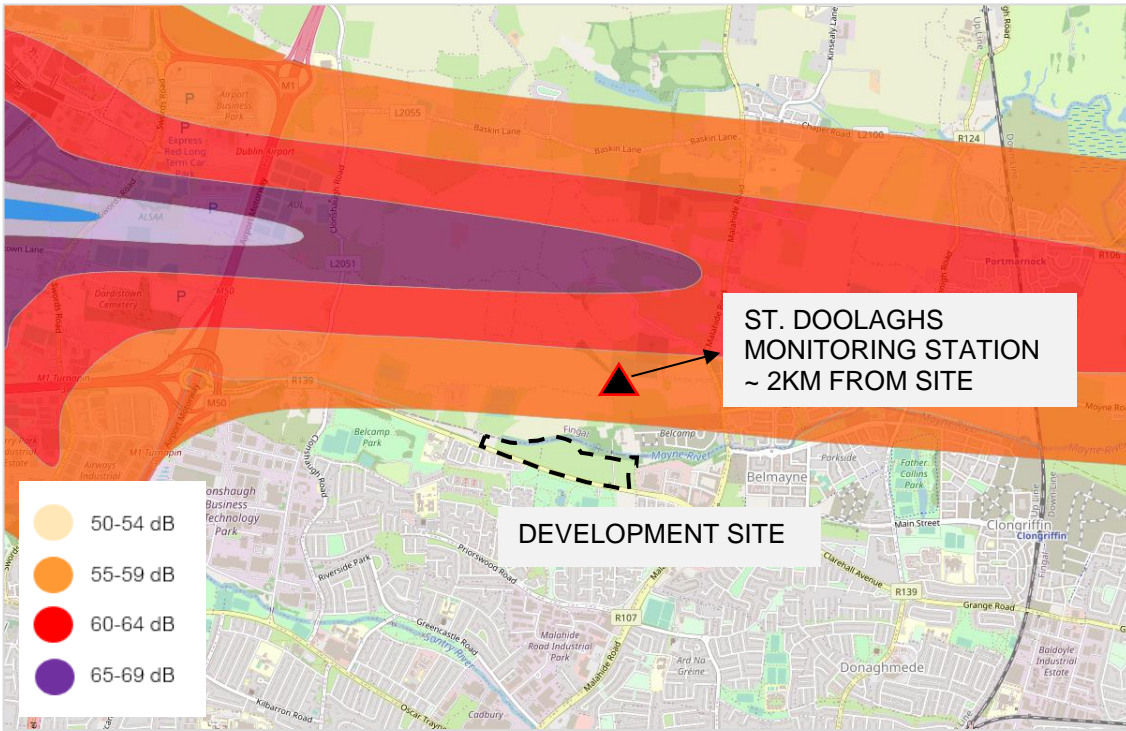


Image 5.1 EPA airport noise map – Lden Day time 07.00 – 23.00 noise map

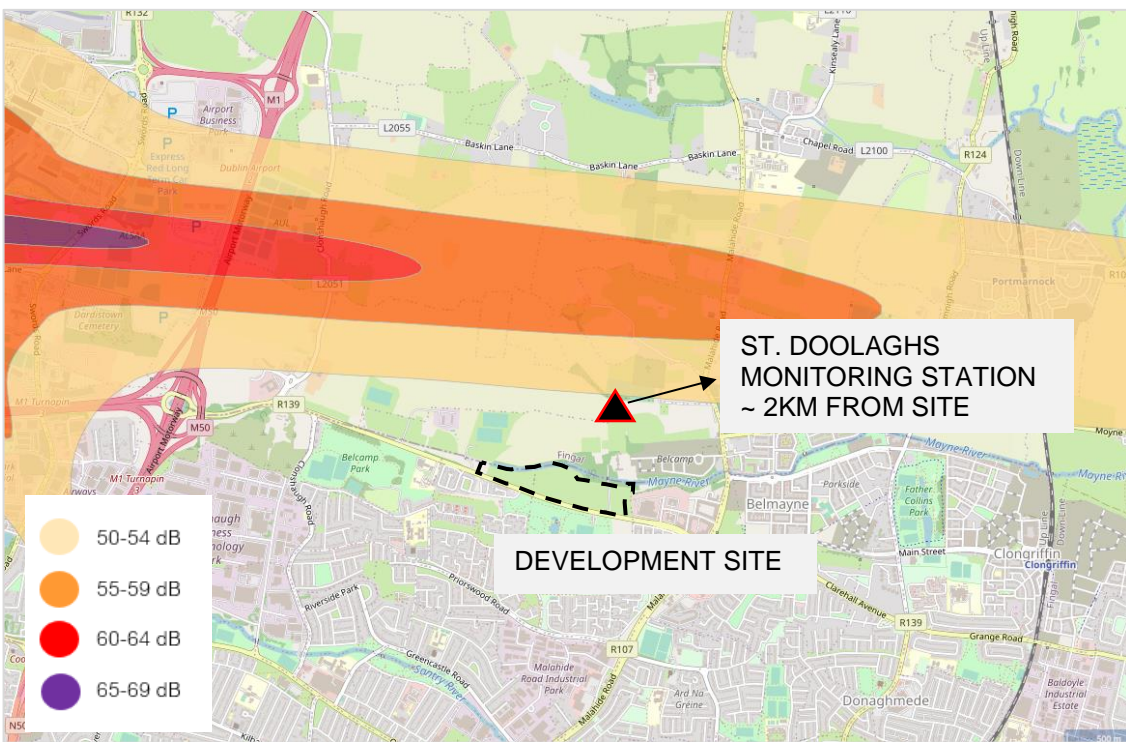



Image 5.2 EPA airport noise map – Lnight Night time 23.00 – 07.00 noise map

 Approximate development site location

From the aircraft noise maps we note the daytime periods average daytime noise levels for the development site to be in the range of 50-54dB Lden and average night-time background noise levels of be in the range of 40-44dB Lnight.



5.5 Source C) EPA traffic noise map:

EPA noise contour maps: EPA noise contour maps available show Lden and Lnight contours. Lnight is the A-weighted long-term average sound level for the night time period (23.00 to 07.00). Lden – is the A-weighted long-term average sound level for the day-evening-night noise indicator in decibels (24 hours). All data has been taken from the EPA Mapping website.

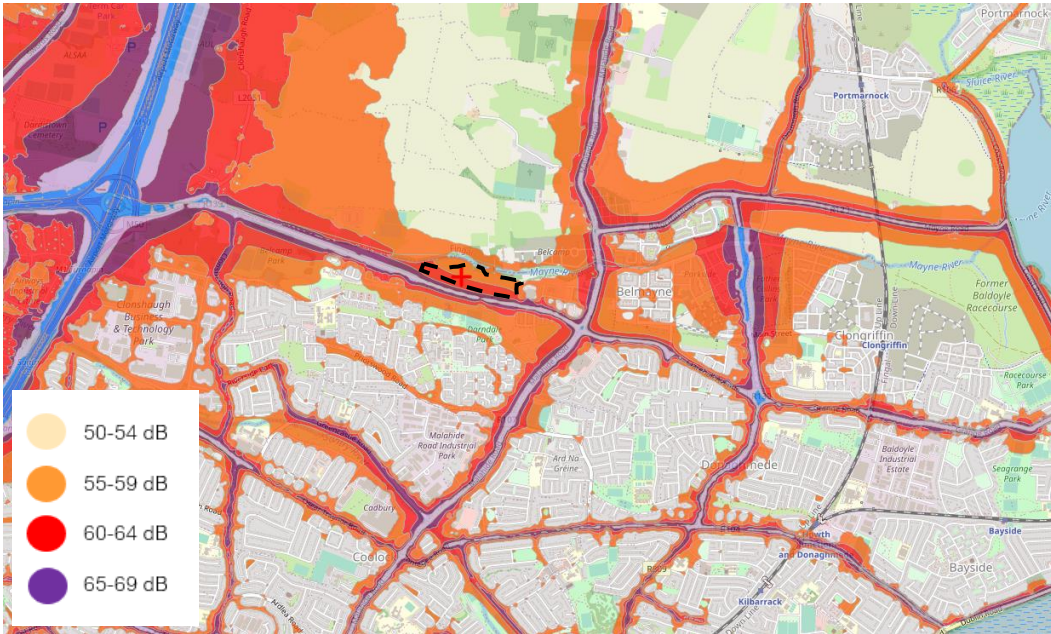


Image 5.3 EPA road noise map – Lden Day time 07.00 – 23.00 noise map

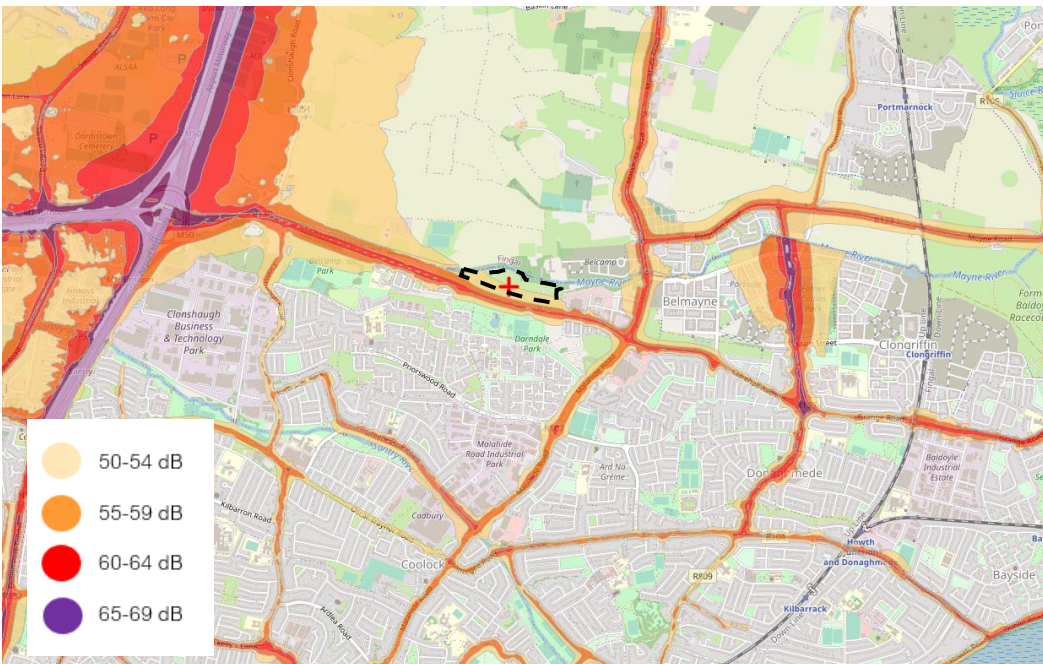


Image 5.4 EPA road noise map – Lnight Night time 23.00 – 07.00 noise map

 Approximate development site location

From the traffic noise maps we note the daytime periods average daytime noise levels for the greater part of the development site to be in the range of 55-59dB Lden and average night-time background noise levels of to be in the range of 50-54dB Lnight.



5.6 Source D) Background noise survey data

To assess the surrounding back ground noise levels, a daytime back ground noise survey was carried out on December 1st and 2nd 2021 outside the covid lockdown period. During the survey the station was monitored and consecutive 15-minute measurements were recorded during the period from 07:00 to 7:00. See image 5.3 for receptor locations (arial view). The station was approximately 3.0m from the road edge.



Image 5.5: Google arial view of receptor location of background noise study. ● Approximate survey point location.

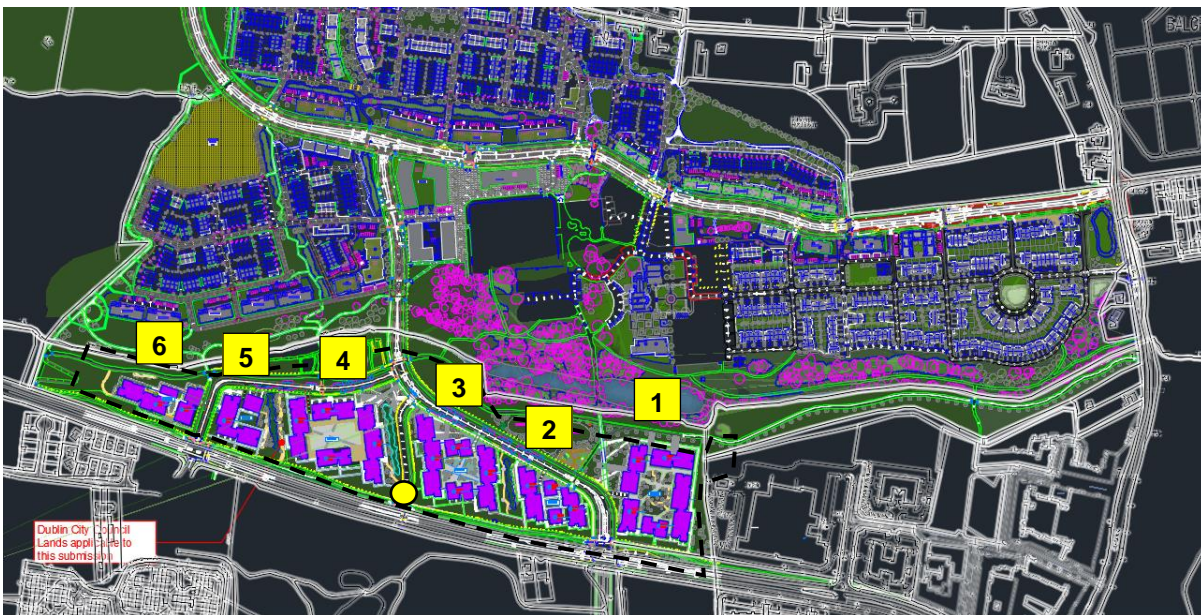


Image 5.6: Architects plans of receptor location of background noise study. ● Approximate survey point location.

The measurements taken are deemed to be representative of typical noise levels on the relevant roads. The measurements have been performed using a Bruel & Kjaer Type 2260 sound level meter and Bruel & Kjaer 4231 sound level calibrator. All measurements were carried out in accordance with ISO 1996: 'Acoustics-Description and measurement of environmental noise'. Weather conditions during the survey were in line with the conditions described within ISO 1996, Acoustics 'Description and Measurements of Environmental Noise'. Weather conditions were rainy and cool with a moderate wind. The following environmental noise parameters were measured which are defined below.



- LAeq is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value.
- LAmix is the maximum A-weighted sound level measured during the measurement period.
- LAmin is the minimum A-weighted sound level measured during the measurement period.
- LA10 is the A-weighted sound level that is exceeded for 10% of the sample period; this parameter is typically used to quantify traffic noise.
- LA90 is the A-weighted sound level that is exceeded for 90% of the sample period; this parameter is typically used to quantify background noise.

The following table is the measured and calculated (average) background noise levels from the monitoring location.

Station 2						R139
Time	LAeq	LAmix	LAmin	LA10	LA90	Comments
3	54.5	50.4	55.3	56.1	53.5	Main artery road Mainly general traffic noise with occasional lorry for construction site LAeq Avg 23.00 hr : 7.00 hr = 55.5 dB LAeq Avg 7.00 hr : 23.00 hr = 66.5 dB LAeq Avg = 65.3 dB
5	55.7	54.0	58.2	59.6	57.1	
7	62.6	72.0	58.2	70.1	59.5	
9	69.5	82.8	66.4	79.9	65.4	
11	66.4	76.3	64.0	73.6	58.3	
13	72.0	79.9	65.2	74.3	66.6	
17	71.4	81.3	65.8	73.6	66.0	
21	63.9	64.8	59.4	68.0	60.7	
23	60.1	62.6	57.1	65.2	57.1	
1	56.3	56.2	55.9	61.7	53.5	
Avg	65.3	72.0	61.5	70.8	60.9	

Table 5.2: R139 Site monitoring results

Background Noise Measurement Overview:

During daytime periods average background noise levels were in the range 60.1 and 72.0dB LAeq and average night time background noise levels were in the range 54.5 to 56.3dB LAeq. The background survey measurements are indicating that most of the measured noise levels would have arisen from traffic noise.

5.7 Noise source prediction at / in the development site

When we assess the noise levels from all data sources A, B, C, D as per sections 5.3, 5.4, 5.5 and 5.6 we note the traffic noise to be by far the most prominent noise source for this development with all or most coming from the R139. Noted on image 5.6 each block each block (1,2,3,4,5,6) South facing façades are all ≥ 16 m from the edge of the R139 the main noise source. Northern façades distances to the R139 vary from 35m to 90m with Eastern & Westerns façades distances to the R139 varying between the same parameters.

5.8 Calculated noise levels at the façades

The façades of the new proposed development are all a certain distance away from the noise source and this is accounted for using the noise reduction formula " $L_r = L_w \cdot 20\log_{10}(R2/R1)$ ". The table below details the final predicted & calculated noise levels at the relevant façades. For both the survey daytime and night-time average LAeq noise levels we added 1.3 dB to the survey data to allow for the potential additional traffic noise of both the DCC and FCC lands proposed developments as per EIAR Noise & vibration chapter.

The table below details the day time L_{den} & night time L_{night} noise source levels, the relevant distances from the source to the receptors and the final calculated day time and night time noise levels at the relevant façades.



Final noise levels at facades.

Location	Source Lden dB	Source Lnight dB	Distance		Reduction		Façade exposure Lden / LAEQ16 dB		Façade exposure Lnight / LAEQ8 dB	
			m min	max	Lden / LAEQ16 dB	Lnight / LAEQ8 dB	Lden / LAEQ16 dB	Lnight / LAEQ8 dB		
Block 1 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 1 façade East, West	67.8	56.8	16	90	14.5	29.5	53.3	38.3	42.3	27.3
Block 1 façade North	67.8	56.8	90		29.5		38.3		27.3	
Block 2 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 2 façade East, West	67.8	56.8	16	55	14.5	25.3	53.3	42.5	42.3	31.5
Block 2 façade North	67.8	56.8	55		25.3		42.5		31.5	
Block 3 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 3 façade East, West	67.8	56.8	16	70	14.5	27.4	53.3	40.4	42.3	29.4
Block 3 façade North	67.8	56.8	70		27.4		40.4		29.4	
Block 4 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 4 façade East, West	67.8	56.8	16	65	14.5	26.7	53.3	41.1	42.3	30.1
Block 4 façade North	67.8	56.8	65		26.7		41.1		30.1	
Block 5 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 5 façade East, West	67.8	56.8	16	50	14.5	24.4	53.3	43.4	42.3	32.4
Block 5 façade North	67.8	56.8	50		24.4		43.4		32.4	
Block 6 façade South	67.8	56.8	16		14.5		53.3		42.3	
Block 6 façade East, West	67.8	56.8	16	35	14.5	21.3	53.3	46.5	42.3	35.5
Block 6 façade North	67.8	56.8	35		21.3		46.5		35.5	

Table 5.3 Predicted noise levels at facades of proposed development.

Note that all façade exposure noise levels are calculated using “free range” noise reduction only meaning that any obstacles (trees, vegetation, fencing, screening, other buildings/blocks, etc or direction of sound have not been taken in account and would lower the actual façade exposure to some degree.

5.9 New development façade noise impact assessment criterion

To determine any possible actions from the predicted day time noise levels between 38.3dB and 53.3dB and predicted night time noise levels of between 27.3 dB to 42.3 dB at the relevant facades as per table 5.3 we compare these with the noise impact assessment criterion table 4.5 and note that both the day time noise levels and night time noise levels to fall in the “A” category where no consideration to noise levels is required.

Background noise	7.00-23.00 L _{den} / L _{AEQ16}	23.00-7.00 L _{night} / L _{AEQ8}	Assessment / Action.
Cat “A”	<= 55 dB	<= 45 dB	Noise need not to be considered
Cat “B”	55 – 66 dB	45 – 59 dB	Noise impact need to be considered
Cat “C”	66 – 72 dB	59 – 66 dB	Noise impact mitigation need to be considered
Cat “D”	> 72 dB	> 66 dB	Unless quieter sites are not available residential use is not recommended

Table 4.5: Background noise criterion at facades of buildings



5.10 Façade noise reduction capability

To predict the internal habitable room ambient noise levels we have to ascertain the noise reduction capability of the façade. The new proposed development will be of modern construction and as part of the new building regulations and in particular Part L requirements will need to have a high level airtightness standard giving the construction a relative high noise reduction capability. For this report we have applied a “low” noise reduction capability in order to be conservative.

Type	Solid external walls	Glazing	Façade average	Comments
Noise reduction capability good	> 55 dB	40 dB	40.5 dB	
Noise reduction capability standard	> 50 dB	35 dB	35.5 dB	
Noise reduction capability low	> 45 dB	30 dB	30.5 dB	Applied for assessment

Table 5.4: Noise reduction capability of a modern façade.

5.11 Predicted ambient noise levels in habitable rooms

The resultant internal ambient room noise levels shown in the table below are the results of the façade exposure noise levels from table 5.3 minus the noise reduction of the façade taken at 30.5 dB to be conservative.

Location	Exposure		Exposure		Façade Reduction dB	Ambient internal Day time noise levels dB		Ambient internal Night time noise levels dB	
	Lden / LAEQ16 dB		Lnight / LAEQ8 dB						
Block 1 façade South	53.3		42.3		30.5	22.8		11.8	
Block 1 façade East, West	53.3	38.3	42.3	27.3	30.5	22.8	7.8	11.8	0.0
Block 1 façade North	38.3		27.3		30.5	7.8		0.0	
Block 2 façade South	53.3		42.3		30.5	22.8		11.8	
Block 2 façade East, West	53.3	42.5	42.3	31.5	30.5	22.8	12.0	11.8	1.0
Block 2 façade North	42.5		31.5		30.5	12.0		1.0	
Block 3 façade South	53.3		42.3		30.5	22.8		11.8	
Block 3 façade East, West	53.3	40.4	42.3	29.4	30.5	22.8	9.9	11.8	0.0
Block 3 façade North	40.4		29.4		30.5	9.9		0.0	
Block 4 façade South	53.3		42.3		30.5	22.8		11.8	
Block 4 façade East, West	53.3	41.1	42.3	30.1	30.5	22.8	10.6	11.8	0.0
Block 4 façade North	41.1		30.1		30.5	10.6		0.0	
Block 5 façade South	53.3		42.3		30.5	22.8		11.8	
Block 5 façade East, West	53.3	43.4	42.3	32.4	30.5	22.8	12.9	11.8	1.9
Block 5 façade North	43.4		32.4		30.5	12.9		1.9	
Block 6 façade South	53.3		42.3		30.5	22.8		11.8	
Block 6 façade East, West	53.3	46.5	42.3	35.5	30.5	22.8	16.0	11.8	5.0
Block 6 façade North	46.5		35.5		30.5	16.0		5.0	

Table 5.5 Final predicted internal ambient room noise levels.

From the table above we note the internal day time ambient room noise levels to be maximum 22.8dB and predicted ambient internal room night time noise level to be maximum 11.8dB.



5.12 New development ambient internal room noise level criterion

When we assess the final predicted ambient noise levels we note the internal day time ambient room noise levels to be maximum 22.8dB and predicted ambient internal room night time noise level to be maximum 11.8 dB as per table 5.5. Using the criterion table 4.2 below we note the final resultant ambient internal room noise levels to be “very good”.

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

Table 4.2: recommended room noise level (dB) in different environments (CIBSE/WHO)

5.13 Predicted noise levels in the main amenity spaces

For this assessment we took 2 no. locations of each main amenity spaces within the blocks. Location South is the closest to the noise source and location North the furthest away from the noise source. The overall South and North or closest and farthest away located amenity spaces are subject to day time noise levels of between 33.5 dB and 51.3 dB and night time noise levels of between 22.5 dB and 40.3 dB.

Location	Source Lden dB	Source Lnight dB	Distance m min max	Reduction	Exposure	Exposure
				Lden / LAEQ16 dB	Lden / LAEQ16 dB	Lnight / LAEQ8 dB
Amenity space block 1 (South)	67.8	56.8	32	20.6	47.2	36.2
Amenity space block 1 (North)	67.8	56.8	65	26.7	41.1	30.1
Amenity space block 2 (South)	67.8	56.8	25	18.4	49.4	38.4
Amenity space block 2 (North)	67.8	56.8	35	21.3	46.5	35.5
Amenity space block 3 (South)	67.8	56.8	35	21.3	46.5	35.5
Amenity space block 3 (North)	67.8	56.8	45	23.5	44.3	33.3
Amenity space block 4 (South)	67.8	56.8	30	20.0	47.8	36.8
Amenity space block 4 (North)	67.8	56.8	50	24.4	43.4	32.4
Amenity space block 5 (South)	67.8	56.8	25	18.4	49.4	38.4
Amenity space block 5 (North)	67.8	56.8	45	23.5	44.3	33.3
Amenity space block 6 (South)	67.8	56.8	20	16.5	51.3	40.3
Amenity space block 6 (North)	67.8	56.8	30	20.0	47.8	36.8
Lake area West	62.4	52.8	45	23.5	38.9	29.3
Lake area East	60.8	51.7	60	26.0	34.8	25.7
Kick about areas block 2	64.8	52.8	15	14.0	50.8	38.8
Natural Muga	67.8	56.8	140	33.4	34.4	23.4
Kick about areas block 5/6	67.8	56.8	155	34.3	33.5	22.5

Table 5.6 Final predicted external amenity space noise levels.



5.14 Predicted noise levels in the main amenity spaces assessment

When we assess the final predicted noise levels in the amenity spaces we note the predicted calculated day time noise levels of between 41.1 dB and 51.3 dB and night time noise levels of between 30.1 dB and 40.3 dB. Comparing these noise levels for the relevant day time & night time EPA recommended maximum external ambient amenity space noise levels shown in table 4.4 below we note these to be below the recommended maximum values.

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

Table 4.4 : External Ambient Noise Levels recommended under EPA NG4 guide.

We note that all amenity space noise levels are calculated using “free range” noise reduction only meaning that any obstacles (trees, vegetation, fencing, screening, other buildings/blocks, etc or direction of sound have not been taken in account and would lower the final predicted noise levels.

Whereas the external amenity space noise levels are all within the guidelines consideration could be given to planting dense evergreen vegetation in the gaps between the blocks to provide some additional form of noise reduction from traffic noise and in particular the R139. The noise reduction created by a vertical vegetation barriers is pending its density / solidness and should be made up by dense evergreen trees/vegetation and could absorb (reduce) noise levels up to +/- 6dB.

5.15 Conclusion

Noise source data : For this development we used noise data sets source from various aircraft and traffic sources. Source A was gathered from DAA St Doolaghs noise monitoring station approximately 2km from the proposed site, data, source B is from the EPA aircraft day time and night time noise mapping, Source C is from the EPA day time and night time traffic noise mapping and source D is from a manual DKP 24 hour background noise survey undertaken December 1st / 2nd 2021.

Noise level criterion to achieve; For this report we targeted the final predicted noise levels at the relevant building facades with maximum recommended noise levels given by the WHO/CIBSE/EPA and also by using the façade noise level exposure to establish the final internal ambient room noise levels. Secondly a separate analysis was conducted on the external noise levels in provided amenity space with maximum recommended noise levels given by the EPA.

Achieved façade noise levels; The noise levels effecting the new proposed development are all but generated by the traffic noise on the R139 and to some lesser degree the new internal access roads. All calculated predicted day time façade noise exposure levels (38.3dB to 53.3dB) and night time façade exposure noise levels (27.3 to 42.3 dB) fall into the “A” category as shown in table 4.5 where the achieved noise level need not to be considered.

Achieved internal ambient room noise levels; The noise levels achieved in internal rooms using a relative low façade noise reduction capability of 30.5 dB to be conservative resulting in maximum day time ambient internal room noise levels of 22.8 dB and maximum day time ambient internal room noise levels of 11.8 dB which is categorised in table 4.2 as “very good”.

Achieved amenity space noise levels; The noise levels effecting the new proposed development amenity spaces are also all but generated by the traffic noise on the R139 and to some lesser degree the new internal access roads. All amenity spaces are a reasonable distance away from the noise source with final predicted calculated day time noise levels of between 41.1 dB and 51.3 dB and night time noise levels of between 30.1 dB and 40.3 dB and comparing these noise levels for the relevant day time & night time EPA recommended maximum external ambient amenity space noise levels shown in table 4.4 below we note these to be well below the recommended maximum values.

Based on the above achieved façade, internal ambient and amenity space noise levels we, DKP, are of the opinion that the proposed development is in compliance to the relevant standards and guidelines.



5.16 Recommendations and / or mitigation measures

Whereas no mitigation measures are required to achieve compliance to the relevant standards we would suggest to give consideration to the following measures;

To ensure the relative high internal ambient noise level standards all permanent openings (ventilation etc) in the façades facing South, East and West are to be avoided or where they can not be avoided for any reason to be fitted with sound attenuation in excess of 30.5 dB.

To improve on achieved external amenity space noise level standards consideration could be given to planting dense evergreen vegetation in the gaps between the blocks to provide some additional form of noise reduction from traffic noise and in particular the R139. The noise reduction created by a vertical vegetation barriers is pending its density / solidness and should be made up by dense evergreen trees/vegetation and could absorb (reduce) noise levels up to +/- 6dB.

