

11.0 NOISE AND VIBRATION

11.1 INTRODUCTION

Planning permission is being sought for a residential development at Magee Barracks, Kildare Town, Co. Kildare. This section of the EIAR has been prepared by AWN to assess the likely noise and vibration impact of Phase 1 of the proposed development in the context of current relevant standards and guidance. This assessment has been prepared by Dr Stephen Smyth BA BAI MIEI MIOA, Principal Acoustic Consultant at AWN Consulting who has over 10 years' experience as an environmental consultant specialising in Acoustics, Impact Assessment and Management.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development during both the short-term construction phase and the long term operational phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

11.2 STUDY METHODOLOGY

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter and included in the references section. In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this chapter:

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002)
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003)
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015)

The study has been undertaken using the following methodology:

- Detailed baseline noise monitoring has been undertaken across the development site to determine the range of noise levels from road and aircraft at varying locations across the site;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site;

- Predictive calculations have been performed to assess the potential impacts associated with the operational phase of the development at the most sensitive locations surrounding the development site, and;
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.

11.2.1 Assessment Criteria

Construction Phase – Noise

There is no published statutory Irish guidance relating to the maximum permissible noise and vibration levels that may be generated during the construction phase of a project.

However, Kildare County Council (KCC) include the following construction noise limits within the *Kildare Local Authorities Second Noise Action Plan (2013 – 2018)* in order to control construction noise impacts at noise sensitive buildings.

Table 11.1 Maximum Permissible Noise Levels at the Façade of Dwellings During Construction

Day	Working Hours	Level, dB LAeq	Maximum, dB LAmax
Monday to Friday	07:00 to 19:00hrs	70	80
	19:00 to 22:00hrs	60	65
Saturday	08:00 to 16:30hrs	65	75
Sundays and Bank Holidays	08:00 to 16:00hrs	60	65

Construction Phase – Vibration

In terms of vibration, British Standard BS 5228-2:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration* recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis to use this lower value. Taking the above into consideration the vibration criteria in Table 11.2 are recommended.

Table 11.2 Recommended Vibration Criteria During Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:-		
Less than 15Hz	15 to 40Hz	40Hz and above
12 mm/s	20 mm/s	50 mm/s

Operational Phase

The baseline noise climate in the vicinity of the proposed development has been assessed and a detailed description is presented in Section 11.3. It is important to outline criteria against which the impacts of the

proposed development will be assessed. Appropriate assessment guidance as relevant in this instance have been outlined in the following sections.

Kildare Local Authorities Noise Action Plan

As discussed previously, Section 4.2.2 of the Kildare Local Authorities Second Noise Action Plan July 2013 States:

‘Where an environmental impact assessment is required as part of the planning process, noise would normally be one of the impacts considered but any noise limits or planning conditions is decided on a case by case basis.’

Assessment of Impact

To assess the impact of the development, it is proposed here to assess the significance of the impact at the nearest noise sensitive locations to the site. Assessing the significance of the impact involves the review of the existing baseline noise environment and the use of professional judgment.

The main potential source of outward noise impact associated with the proposed development relates to additional traffic flows on the surrounding road network. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 11.3 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011). It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10dB would be described as a doubling of loudness. In summary the assessment looks at the impact with and without development at the nearest noise sensitive locations.

Table 11.3 Significance in Change of Noise Level

Change in Sound Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Effects ¹
0	None	No Change	Neutral
0.1 - 2.9	Imperceptible	Negligible	Imperceptible
3 - 4.9	Perceptible	Minor	Slight
5 - 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Over a doubling of loudness	Major	Significant

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings. This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as summarised in Table 11.4.

¹ EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)

Table 11.4 Recommended Indoor Ambient Noise Levels from BS 8233: 2014

Typical situations	Design Range, $L_{Aeq,T}$ dB	
	Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq, 8hr}$ (23:00 to 07:00hrs)
Living / Dining Rooms	35 / 40	n/a
Bedrooms	35	30

For the purposes of this study, it is appropriate to derive external limits based on the internal criteria noted in the paragraph above. This is done by factoring in the degree of noise reduction afforded by a partially open window and typical 15dB attenuation is noted in this British Standard. Using this correction value across an open window, the following external noise levels would achieve the internal noise levels noted in Table 11.4 above.

1. Daytime / Evening (07:00 to 23:00 hours) 50 - 55dB $L_{Aeq,1hr}$
2. Night-time (23:00 to 07:00 hours) 45dB $L_{Aeq,15min}$

These criteria are also in compliance with the following guidance taken from the World Health Organisation publication “Community Noise”.

‘To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level should not exceed 55dB L_{Aeq} .’

‘At night-time outdoors, sound pressure levels should not exceed 45dB L_{Aeq} , so that people may sleep with bedroom windows open.’

There are no expected sources of vibration associated with the operational phase, therefore, vibration criteria have not been specified for this phase.

11.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

The site under consideration is located at Magee Barracks, Kildare and is a disused army barracks with a mix of open space and existing buildings located across the site. The site is bounded to the south by Hospital Street (R445) and to the north, east and west by adjacent residential developments and Kildare Town Educate Together school.

11.3.1 Environmental Noise Survey

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

Choice of Measurement Locations

Three measurement locations were selected as shown in Figure 11.1 and described below.

Location N1 is located along the south western boundary of development site. This location was chosen to represent noise levels at the closest offsite noise sensitive location to the proposed commercial element of the development.

Location N2 is located along the western boundary of the development site within Melita Park.

Location N3 is located along the eastern boundary of the development within Ruanbeg Crescent.

Fig. 11.1: Site context and noise monitoring locations



Survey Periods

The noise survey was conducted between the following periods:

- 09:00hrs to 12:30hrs on 15 March 2017

The measurements cover a period that was selected in order to provide a typical snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed noise criteria associated with the development are commensurate with the prevailing environment. The weather during the survey periods was dry and clear with winds less than 1m/s and temperatures of some 15°C.

Personnel and Instrumentation

Stephen Smyth (AWN) performed the measurements during the survey periods. Unattended measurements were made using an NTi XL2 Sound Level Meter. Sample periods were 15-minutes for attended noise measurements

Before and after the survey the measurement instruments were check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator. The following instrumentation was used in conducting the noise survey:

Table 11.5 Instrumentation Details

Equipment	Type	Serial Number
Sound Level Meter	NTi XL2	A2A-11092-E0
Sound Calibrator	Brüel & Kjær 4231	3010369

Measurement Parameters

The unattended noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

Survey Results and Discussion

The results of the surveys at the three monitoring locations are summarised below.

Location N1

Table 11.6 below presents a summary of noise levels measured at Location N1.

Table 11.6 Summary of Noise Measurements at Location N1

Time	Measured Noise levels (dB re. 2×10^{-5} Pa)				
	L _{Aeq}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
09:00 – 09:15hrs	49	59	44	51	47
10:13 – 10:28hrs	50	62	43	51	46
11:27 – 11:42hrs	48	61	46	50	42

For daytime periods, ambient noise levels at this location were in the range of 48 to 50dB L_{Aeq 15min} and background noise levels were in the range of 42 to 47dB L_{A90,15min}.

Location N2

Table 11.7 below presents a summary of noise levels measured at Location N2.

Table 11.7 Summary of Noise Measurements at Location N2

Time	Measured Noise levels (dB re. 2×10^{-5} Pa)				
	L _{Aeq}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
09:23 – 09:38hrs	48	64	42	50	45
10:41 – 10:56hrs	50	71	44	52	46
12:00 – 12:15hrs	50	77	41	51	45

For daytime periods, ambient noise levels at this location were in the range of 48 to 50dB L_{Aeq 15min} and background noise levels were in the range of 45 to 46dB L_{A90,15min}.

Location N3

Table 11.8 below presents a summary of noise levels measured over the day and night-time periods at Location N3.

Table 11.8 Summary of Noise Measurements at Location N3

Time	Measured Noise levels (dB re. 2×10^{-5} Pa)				
	L _{Aeq}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
09:46 – 10:01hrs	53	67	45	56	48
11:06 – 11:21hrs	54	71	49	57	46
12:29 – 12:44hrs	50	61	44	51	47

For daytime periods, ambient noise levels at this location were in the range of 50 to 54dB L_{Aeq 15min} and background noise levels were in the range of 46 to 48dB L_{A90,15min}.

During the survey, the main sources of noise at all locations were distant road traffic and birdsong. At some locations local road traffic, dog barking and some distant construction noise was also audible.

11.3.2 Baseline Summary

The baseline environment within and adjacent to the development site is found to be typical of a suburban environment where road traffic, localised vehicle and pedestrian activities and environmental sources including bird song and leaf rustle are the main contributors to the prevailing noise environment.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the demolition of 16 no. existing buildings (including the Officers' Mess building and Water Tower structure) with a GFA of 16,115 sq.m, and the construction of a development comprising of 264 no. residential units, a neighbourhood centre comprising of 3 no. single storey retail units with a GFA of 115 sq.m, 105 sq.m and 100 sq.m respectively, a café (including gallery / exhibition area at mezzanine level) with a GFA of 300 sq.m, a two-storey childcare facility with a GFA of 680 sq.m and associated play area, all internal roads, car parking, pedestrian and cycle paths, public open space, and all associated site and infrastructural works on an application site of c. 11.14 ha.

The 264 no. residential units proposed consists of the following:

- 150 no. 3 bed semi-detached houses with a GFA of 117 sq.m (Type A)
- 16 no. 4 bed semi-detached houses with a GFA of 143 sq.m (Type B)
- 10 no. 4 bed detached houses with a GFA of 143 sq.m (Type C)
- 14 no. 3 bed terrace houses (semi-detached) with a GFA of 117 sq.m (Type E1)
- 8 no. 3 bed terrace houses with a GFA of 117 sq.m (Type E2)
- 2 no. 4 bed terrace houses (corner units) with a GFA of 143 sq.m (Type F)
- 26 no. 2 bed apartments (duplex blocks) with a GFA of 77 sq.m (Type G)
- 26 no. 3 bed duplex apartments (duplex blocks) with a GFA of 123 sq.m (Type G)
- 12 no. 1 bed apartments with a GFA of 54 sq.m (Type H)

The housing units are 2 to 3 storeys in height and the duplex/apartment units are 3 storeys in height. 1 no. electricity substation with a GFA of 12.5 sq.m and a bin store with a GFA of 12.5 sq.m are located at the proposed neighbourhood centre. The associated site and infrastructural works include foul and surface / storm water drainage, attenuation tanks, 540 no. car parking spaces comprising 482 no. spaces for the residential units, 26 no. spaces for visitors and 32 no. spaces to serve the proposed retail, café and childcare units, and public open space measuring c.1.9 hectares, bin and bike stores, landscaping, boundary walls, railings and fences.

A new signalised road junction providing access to the proposed development and additional road works to Hospital Street (R445) are proposed, including pedestrian crossings, upgrades to footpaths, signage, road markings and traffic signalling.

The proposed development comprises the first phase of the overall development of the applicant's c. 20.78 ha landholding at this location. This application is accompanied by an overall site masterplan drawing indicating future phases on the remainder of the lands, which include a supermarket, a cancer treatment clinic (proton therapy), and a Phase 2 residential development of c. 179 units, which will be subject to separate applications.

When considering a development of this nature, the potential noise and vibration impacts on the surroundings must be considered for each of two distinct stages, the short-term construction phase and the permanent operational phase.

During the construction phase the main site activities will include site clearance, demolition of existing buildings, building construction, road works, and landscaping. This phase has the greatest potential for noise and vibration impacts on the surrounding environment; however this phase will be of short term impact.

During the operational phase of the development, no significant sources of noise or vibration are expected with the development. The primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network and any operational plant noise.

11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

11.5.1 Construction Phase

It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators.

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays.

Construction Activity Onsite

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the nature of the construction works on site there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS5228-1:2009+A1:2014. Table 11.9 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme at a standard reference distance of 10 metres from the various plant items.

Table 11.9 Typical Noise Levels Associated with Construction Plant Items

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at 10m Distance (dB LAeq(1hour))
Site Preparation	Wheeled Loader Lorry (D3 1)	75
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
Demolition	Pulveriser on Tracked Excavator (C1.5)	72
	Tracked Crusher (C1.14)	82
	Breaker Mounted on Backhoe (C1.2)	92
	Dump Truck (C4.2)	78
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
General Construction	Hand tools	81
	Tower Crane (C4.48)	76
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

For the purposes of the assessment we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this chapter.

Table 11.10 presents the predicted daytime noise levels from an indicative construction period on site at the nearest off-site receptor. Note construction noise sources for site are assumed to be running 50% of the time. The predictions have been prepared for the worst case nearest residential noise sensitive locations as follows,

- Magee Terrace at a distance of some 25m from the nearest significant site works;
- Ruanbeg at a distance of some 20m from the nearest significant site works, and;
- Kildare Town Educate Together at a distance of some 75m from the nearest significant site works.

These calculations allow for the screening offered from construction hoarding or wall at a height of 2.4m along the boundary of the site between the nearest noise sensitive receivers and the construction activity. Further details on the use of screens to reduce noise levels at receiver locations can be found in Section 11.8.1.

Table 11.10 Review of Potential Daytime Construction Noise Impact

Noise Sensitive Receptors	Phase	Predicted Construction Noise Level	Daytime Construction Noise Criteria	Complies?
		L _{Aeq(1hour)} (dB)	L _{Aeq(1hour)} (dB)	
Magee Terrace	Site Preparation	66	70	✓
	Demolition	77		x
	Foundations	67		✓
	General Construction	66		✓
	Landscaping	66		✓
Ruanbeg	Site Preparation	68	70	✓
	Demolition	79		x
	Foundations	69		✓
	General Construction	68		✓
	Landscaping	68		✓
Kildare Town Educate Together	Site Preparation	57	70	✓
	Demolition	67		✓
	Foundations	58		✓
	General Construction	56		✓
	Landscaping	57		✓

There is potential for the adopted criteria to be exceeded when demolition works are taking place immediately adjacent to the dwellings at Magee Terrace and Ruanbeg with breaking of concrete slabs the dominant source of noise. A schedule of best practice noise mitigation measures is included in Section 11.8.1.

Note that the predicted noise levels referred to in this section are indicative only and are intended to demonstrate that it will be possible for the contractor to comply with current best practice guidance. It should also be noted that the predicted noise levels are expected to occur for only short periods of time at a limited number of properties. Construction noise levels will be lower than these levels for the majority of the time at the majority of properties in the vicinity of the proposed development.

Construction Traffic Offsite

Access routes to and from the site, delivery times and off-loading proposals will be formally agreed with the Local Authority. Peak traffic flows during the construction phase will occur during excavation. During the busiest period, a maximum of 50 lorries into and out of the site per day are anticipated. Vehicle movements will be planned to ensure arrival and departure times are maintained inside the agreed working hours.

Assuming all construction traffic travels along the R445 to the East or to the West, this would add an additional 100 HGV movements per day along this road.

Baseline traffic counts undertaken as part of this planning application have been used to calculate the change in noise level as a result of additional construction vehicles during this peak phase. Table 11.11 summarises the increase in noise levels associated with the additional HGV traffic assuming 100% of traffic travels either east or west of the site entrance.

Table 11.11 Construction Traffic Noise Assessment

Road	Base Traffic Flow (AADT)	Base HGV No's	Construction Traffic / day	Increase in Noise Levels, dB
R445 East of Site Entrance	4,883	156	100	2.2
R445 West of Site Entrance	5,205	104	100	2.9

Reference to Table 11.3 confirms that the addition of construction traffic to the existing traffic volumes are less than 2dB(A) which is barely perceptible and of negligible impact. During the remaining construction periods, HGV volumes will be further reduced and hence no additional noise impacts are predicted.

Construction Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited given the minimal level of concrete breaking and excavations required. Piling is not anticipated as part of the works. In this instance, taking account of the distance to the nearest sensitive off-site buildings, vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 11.2 to avoid any cosmetic damage to buildings. Vibration levels are also expected to be below a level that would cause disturbance to building occupants.

11.5.2 Operational Phase

Once the development is opened, the potential noise impacts to the surrounding environment are minimal. The residential aspect of the development is not expected to generate any significant noise sources over and above those which form part of the existing environment at neighbouring residential areas (estate vehicle movements, children playing etc.) and hence no significant impacts are expected from this area of the development site.

The main potential noise impact associated with the proposed development is considered therefore to relate to the generation of additional traffic to and from the site as a result of the new residential element. Potential noise impacts also relate to operational plant serving the commercial buildings within the development site. Once operational, there are no vibration sources associated with the development site.

Additional Vehicular Traffic on Public Roads

A traffic impact assessment relating to the proposed development has been prepared by Roadplan as part of this EIAR. Information from this report has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development, for the opening and design years.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the development. Traffic flow data in terms of the AADT figures has been assessed and the calculated change in noise levels during these two periods are summarised in Tables 11.12 and 11.13.

Table 11.12 Change in Traffic Noise Levels with Proposed Development – Opening Year

Road	Opening Year AADT		Change in Noise Level dB (A)
	Without Development	With Development	
R445 (East of junction)	4,960	7,601	+1.85
R445 (West of junction)	5,287	9,250	+2.43
R413 (East of junction)	3,129	3,638	+0.65
R413 (West of junction)	3,311	3,816	+0.62

Table 11.13 Change in Traffic Noise Levels with Proposed Development – Design Year

Road	Opening Year AADT		Change in Noise Level dB (A)
	Without Development	With Development	
R445 (East of junction)	5,492	8,380	+1.84
R445 (West of junction)	5,855	9,375	+2.04
R413 (East of junction)	3,464	4,130	+0.76
R413 (West of junction)	3,667	4,469	+0.86

The predicted increase in traffic noise levels associated with the development is less than 3dB in the vicinity of all roads for both the opening and design years. Reference to Table 11.3 confirms that this increase is barely perceptible and the resultant impact is negligible.

In summary, the predicted increase in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is of long-term imperceptible impact.

Mechanical and Electrical Sources

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the commercial buildings associated with the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact.

To ensure noise impacts on the nearest sensitive locations, on and off site, are controlled to be within the criteria discussed in Section 11.2, noise from building services plant will be controlled such that it does not exceed a level of 70dB(A) at a distance of 1m from the façade of any building associated with the development.

11.6 POTENTIAL CUMULATIVE IMPACTS

Traffic volumes associated with the operational phase assessed within this chapter take account of the operation of the proposed cancer treatment clinic to the east, in addition to traffic associated with the proposed supermarket development to the west of the site entrance along the R445. Both of these developments are part of separate planning applications. Cumulative noise impacts associated with the traffic generated from other developments in the surrounding environment have therefore been assessed within this chapter.

Construction noise impacts associated with the adjacent developments being constructed at the same time as Phase 1 will contribute to a higher noise environment at the nearest noise sensitive locations during certain periods of construction. However, given that the majority of the Phase 1 works will occur away from the nearest sensitive locations any additional noise and vibration impact as a result of the adjacent developments is likely to be temporary in nature.

The operation of any mechanical or electrical services associated with the proposed cancer treatment clinic and supermarket will be designed by the relevant design teams to ensure that the cumulative noise levels do not exceed the relevant noise criteria. The overall impact is deemed to be long-term and not significant.

11.7 'DO NOTHING' IMPACT

In the event that the proposed development is not developed, the exiting noise environment is not predicted to be altered beyond that measured as part of the baseline assessment.

11.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

With regard to the above assessment the following control measures are recommended.

11.8.1 Construction Phase

NV CONST 1: Best practice noise and vibration control measures shall be employed by the relevant appointed contractor(s) and subcontractors during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009) Parts 1 and 2 shall be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening; and
- liaison with the public.

NV CONST 2: The relevant appointed contractor(s) and subcontractors shall ensure construction noise levels at the closest sensitive locations are within relevant limits set out within the Kildare Local Authorities Second Noise Action Plan (2013 – 2018). The relevant contractor(s) shall be required to undertake noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded. Noise monitoring shall be conducted in accordance with the International Standard ISO 1996: 2007: Acoustics – Description, Measurement and Assessment of Environmental Noise.

Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. This will specifically be required to protect neighbouring sensitive locations during the demolition works.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control 'at source'. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the key noise generating sources during the construction phases, the following best practice migration measures should be considered:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For percussive tools such as pneumatic concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding with a mass per unit of surface area greater than 7 kg/m² can provide adequate sound insulation.

Liaison with the Public

A designated noise liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If breaking works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities.

Noise Monitoring

The relevant contractor(s) will be required to ensure construction activities operate within the noise limits set out within Table 11.1. The relevant contractor(s) will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2007: Acoustics – Description, Measurement and Assessment of Environmental Noise.

11.8.2 Operational Phase

During the operational phase of the development, noise from building services equipment serving the commercial buildings will be selected such that the noise emission from any commercial building does not exceed 70dB(A) at 1m from the building facade.

11.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

During the construction phase of the project there is the potential for some minor impact on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. The residual impact of the proposed development during the construction phase will be short term and moderate.

The predicted noise level associated with additional traffic is predicted to be of insignificant impact along the existing road network. In the context of the existing noise environment, the overall contribution of traffic is not considered to pose any significant impact to nearby residential locations. It can be concluded that, once operational, noise levels associated with the proposed development will not contribute any significant noise impact to its surrounding environment. The resulting impact is neutral, long-term and non-significant.

11.10 MONITORING

The contractor will be required to ensure construction activities operate within the noise limits set out within Table 11.1. The contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2007: Acoustics – Description, Measurement and Assessment of Environmental Noise.

No noise or vibration monitoring is required once the development is operational.

11.11 REINSTATEMENT

Not applicable.

11.12 INTERACTIONS

The effects of noise and vibration on population and human health and material assets are assessed within chapters 3 and 12 of this EIAR, respectively.

11.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered in the course of this assessment.

11.14 REFERENCES

British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration

British Standard BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings

Kildare County Council - Kildare Local Authorities Second Noise Action Plan July 2013

ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation

WHO (1999): Guidelines for Community Noise

EPA Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)

EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, 2003)

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017)

EPA Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015).