

HSE

# PROPOSED NATIONAL AMBULANCE BASE, BELGARD ROAD, TALLAGHT, D24.

Noise Impact Assessment

603572 (01)

OCTOBER 2022

**RSK**





## EXECUTIVE SUMMARY

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RSK Ireland Limited (RSK) was instructed by Thornton O'Connor Town Planning Ltd. on behalf of the HSE to conduct a noise impact assessment in respect of a proposed National Ambulance Base on the Belgard Road, Dublin 24.

This document considers the potential construction and operational phase noise impact of the proposed development on nearby existing receptors. The objective of this study is to assess the suitability of the site for the proposed development and to provide recommendations for noise mitigation measures, where necessary, to ameliorate potential impacts to nearby noise sensitive locations.

To assist with this assessment, the baseline noise environment at the development site has been determined through noise surveys over typical daytime and night-time periods. These attended surveys were conducted on the 3<sup>rd</sup> and 4<sup>th</sup> of June 2021.

Baseline monitoring has found pre-existing noise levels are typical of a suburban location in the vicinity of a busy regional road. Local and distant traffic were the primary contributor to the noise environment on site.

In conducting this review, reference is made industry standard guidance including BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* and BS 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*.

An assessment of the potential construction phase noise impacts has been conducted, following the procedures as outlined in BS 5228-1:2009+A1:2014. At the majority of locations, and for the majority of phases, calculated noise levels are within construction noise significance thresholds. At dwellings closest to the site, potential significant construction noise effects are predicted, this is primarily due to the short distance between the works area and these neighbouring dwellings. The adoption and implementation of the specified noise control measures outlined in the relevant sections of this document is expected to reduce impacts to an acceptable level.

In the developments operational phase, criteria have been set for new building services plant items in accordance with the methodologies outlined in BS 4142:2014+A1:2019. Mitigation measures for new building services plant items have been specified in order to ensure that the noise impact of the proposed development is not significant at the nearest receptors. Additional discussions are presented in relation to the sound from ambulance sirens and from deliveries to the development.

In summary, it is considered that the site is suitable for the proposed development subject to the provision of the noise control recommendations as outlined in this report.



## RSK GENERAL NOTES

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**Project No.:** 603572 (01)

**Title:** Noise Impact Assessment of Proposed National Ambulance Base, Belgard Road, Tallaght, D24.

**Client:** HSE

**Date:** 4<sup>th</sup> October 2022

**Office:** Dublin

**Status:** FINAL

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Date:	4 <sup>th</sup> October 2022	Date:	4 <sup>th</sup> October 2022

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Ireland Ltd.

RSK Ireland Ltd. Bluebell Business Centre, Old Naas Road, Bluebell, Dublin 12



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Appendix A: Service Constraints



# 1 INTRODUCTION

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RSK Ireland Limited (RSK) was instructed by Thornton O'Connor Town Planning Ltd. on behalf of the HSE to conduct a noise impact assessment of the construction and operational phases of the proposed National Ambulance Base at the Belgard Road, Tallaght, Dublin 24.

The objective of this study is to assess the site for potential outward impact and where necessary make recommendations to ameliorate these potential impacts.

## 1.1 Aim and Objectives

The aim of the assessment is as follows:

- Quantify the baseline noise environment at locations that are representative of nearby noise sensitive locations.
- Provide an assessment of the likely impacts of construction and operational phase noise and/or vibration emissions to nearby receptors.
- Provide design advice and recommendations for mitigation measures, where necessary, to reduce impacts to an appropriate level.

The objective of this assessment is to reduce the risk of nuisance to nearby noise sensitive locations resulting from construction and/or operational phase noise and/or vibration emissions.

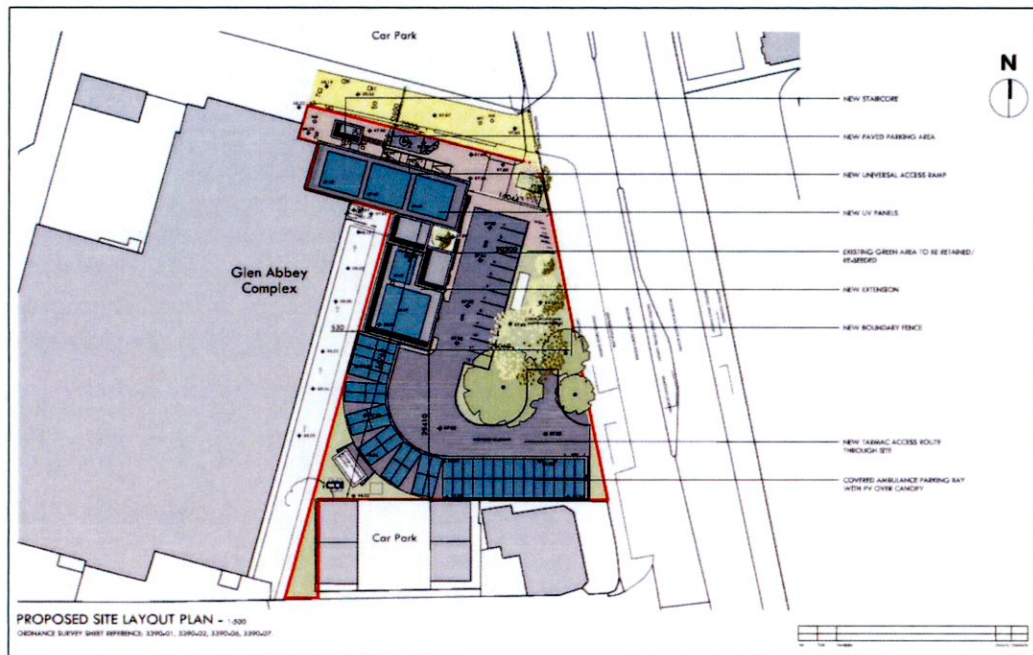


## 2 THE PROPOSED DEVELOPMENT

The site is a residential and industrial area with a mixed range of residential and industrial units in the nearby vicinity. To the north of the site there is the SBG Gym and a retail unit. To the east there is the Belgard Road and across that industrial units. To the south of the site is the India Gate Takeaway and above this is residential use on the 1<sup>st</sup> floor. There is also other industrial units, a car sales garage and residential dwellings on the Colberts Fort Road. To the west is a mix of industrial and retail units further into the business park.

The proposed development is for the redevelopment of a mental health facility to become an ambulance base.. The development will consist of the refurbishment of the existing building as well as the addition of an extension. The proposed station on Belgard Road will provide for both local response and National Services.

Figure 1 shows the proposed site layout plan.



## 3 NOISE CRITERIA

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In deriving noise criteria for the development, consideration has been given to the following documents:

- *Dublin Agglomeration Action Plan Relating to The Assessment and Management of Environmental Noise, December 2018 – July 2023, (Noise Action Plan), Volume 4, South Dublin County Council.*
- BS 5228: 2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites.*
- BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound.*

### 3.1 Construction Phase

During the construction phase, the range of activities with potential to generate noise and vibration emissions to off-site sensitive receptors will include site preparation works, demolition of the existing building, construction of the proposed development, landscaping and erection of any temporary buildings/compounds that may be required.

#### 3.1.1 Noise

The closest neighbouring NSL's to the proposed development are the residential houses primarily to the south of the site. The distance between the construction site and nearby NSL's varies, the closest distance between the site and neighbouring dwelling will be approximately 6 metres. Generally, construction works will occur between 40 and 65 metres from existing dwellings, depending on the location where specific works are occurring.

In lieu of official guidance by South Dublin County Council on construction sites reference is made to the "Industry Standard" guidelines in relation to construction phase noise i.e. BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites.*

BS 5228:2009+A1:2014 is considered to represent the industry standard methodology for the assessment of construction noise and describes two methods for deriving noise significance thresholds for construction sites.

BS 5228:2009+A1:2014 (Appendix E.1) describes a method for identifying 'Potential significance based upon noise change'. Following this methodology, BS 5228:2009+A1:2014 designates a noise sensitive location (NSL) into a specific category based on pre-existing ambient noise levels and then sets a threshold noise value that, if exceeded, indicates a significant construction noise impact.

Table 1 presents the threshold values for significant noise impacts for weekday daytime and Saturday morning activity.



**Table 1 BS5228 Construction Noise Thresholds for Significant Effects**

Assessment category and threshold value period (LAeq)	Threshold value, in decibels (dB)		
	Category A <sup>A</sup>	Category B <sup>B</sup>	Category C <sup>C</sup>
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

- A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
- B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
- C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Annex E.2 of BS 5228-1:2009+A1:2014 also provides the following comments in relation to ‘Potential significance based on fixed noise limits’:

*“Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels (dB(A))– see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*

- *70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*

*These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19.00 and 22.00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours.”*

Taking account of the measured ambient noise levels and BS5228 significance thresholds, the recommended noise limits for construction activity are as follows:

<i>Monday to Friday</i>	<i>07.00 – 19.00</i>	<i>70 dB LAeq,12hrs</i>
<i>Saturday</i>	<i>07.00 – 13.00</i>	<i>70 dB LAeq,6hrs</i>

It is assumed that construction works will take place during the above working hours only.

### 3.1.2 Vibration

Following the same approach, 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. The recommended construction vibration criteria are presented in Table 2.

**Table 2 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
15 mm/s	20 mm/s	50 mm/s

## 3.2 Operational Phase

### 3.2.1 Plant Noise Levels

Reference is made to British Standard BS4142:2014+A1:2019: '*Methods for Rating and Assessing Industrial and Commercial Sound*' in setting criteria for any new mechanical plant items. This standard outlines methods for analysing building services plant sound emissions to residential receptors. BS 4142:2014 is frequently referenced in Planning Conditions in the Dublin region and is considered the relevant assessment standard for noise from mechanical plant items in the Dublin region.

BS4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature, using outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling upon which the sound is incident.

The BS4142:2014 assessment methodology compares the measured external background sound level (in the absence of plant items) to the rating sound level, of the plant items, when operational. Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS4142:2014 advises that penalties be applied to the specific level to arrive at the rating level.

Based upon measured day and night-time background sound levels on the site (as referred in Section 4.0), appropriate plant noise criteria to nearby dwellings are as follows:

- Daytime (07:00 to 23:00hrs) 49 dB  $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 38 dB  $L_{Aeq,15-min}$

Plant noise emissions should not contain any characteristics that would warrant any acoustic feature penalties under the BS 4142:2014 assessment procedure.



## 4 BASELINE NOISE SURVEY

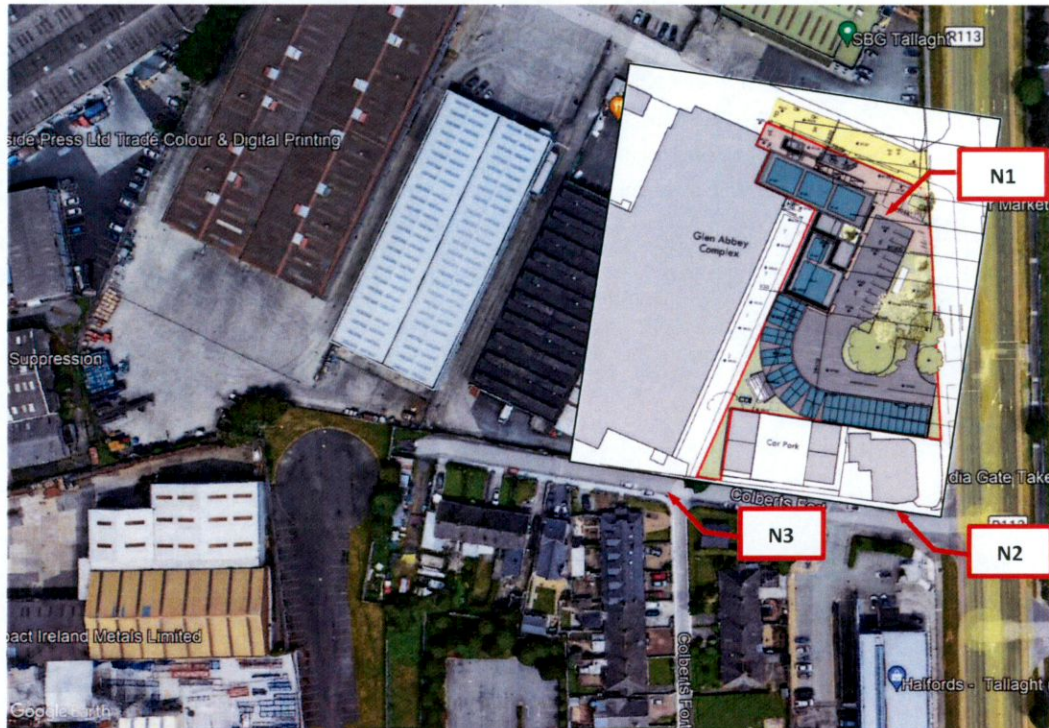
Environmental noise surveys have been conducted on site in order to establish the baseline noise environment. Noise survey have been conducted in accordance with ISO 1996-2:2017 "Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of sound pressure levels".

### 4.1 Monitoring Locations

Unattended noise measurements were conducted at Location N1 with additional attended measurements taken at Locations N2 and N3. The approximate noise measurement location is shown in Figure 2. A photograph of the measurement position can be seen below.

**Figure 2: Proposed Site Plan Showing Baseline Monitoring Positions**

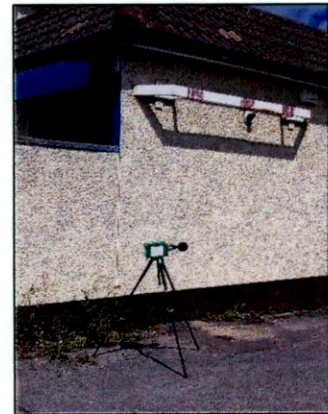
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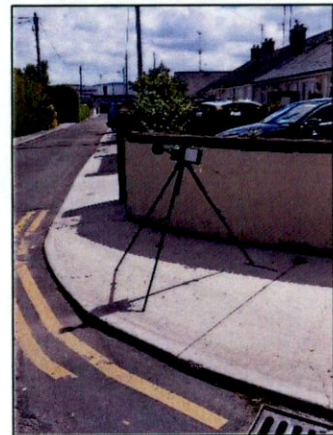
**Location N1** to the front of the existing site with the microphone positioned at a location representative of the proposed development facade that is closest to the Belgard Road. This noise survey position comprised of attended day and night time monitoring. Noise data captured at this location is used as reference in order to estimate noise levels at the proposed development façade closest to the R117 during both day and night-time periods.



**Location N2** to the south of the site with the microphone positioned at a location representative of the nearest noise sensitive location. This noise survey position comprised of attended day and night time monitoring. Noise data captured at this location is used as reference in order to estimate outward noise impacts from both construction and operational phases.



**Location N3** to the south of the site with the microphone positioned at a location representative of the nearby noise sensitive location. This noise survey position comprised of attended day and night time monitoring. Noise data captured at this location is used as reference in order to estimate outward noise impacts from both construction and operational phases.





## 4.2 Survey Periods

Noise measurements were conducted over the following periods:

**Table 3: Noise Survey Periods**

Period	Location	Date	Start Time	Stop Time
Daytime 07:00 – 23:00hrs	N1 – N3	03/06/21	3 <sup>rd</sup> June at 13:40	3 <sup>rd</sup> June at 16:22
Night-time 23:00 – 07:00hrs	N1 – N3	03/06/21 – 34/06/2021	3 <sup>rd</sup> June at 23:00	4 <sup>th</sup> June 00:41

## 4.3 Weather

The weather during the attended survey of the 3<sup>rd</sup> and 4<sup>th</sup> of June 2021 was calm dry and warm with levels of wind between 3 and 6 M/S. Temperatures were in the range of 9 and 18 degrees Celsius.

## 4.4 Instrumentation

The noise measurements were undertaken using the following equipment.

**Table 4: Survey Equipment**

Equipment	Type	Serial No.	Calibration Date
Class 1 Sound Level Meter	B & K 2260	1894051	14 <sup>th</sup> August 2019

The equipment used has a calibration history that is traceable to a certified calibration institution. The calibration of the sound level meter was field checked prior to commencing measurements and prior to removing the equipment from site upon completion. A calibration drift of -0.1dB was noted upon commencement of the survey and +0.1 upon survey completion. The sound level meter calibration certificates are available on request.

The sound level meter conformed to the Class 1 requirements of BS EN 61672-1:2013 'Electroacoustics. Sound level meter, Specifications'. The calibrator used conforms to the requirements of BS EN IEC 60942:2018 'Electroacoustics. Sound calibrators'.

## 4.5 Measurement Parameters

The noise survey results are presented in decibels (dB), using the following parameters:

$L_{Aeq,T}$	is the equivalent continuous sound level and is used to describe a fluctuating sound as a single value over the sample period (T).
$L_{AFmax,T}$	The maximum A-weighted sound pressure level occurring within a specified time period (T). Measured using the "Fast" time weighting.
$L_{AF10,T}$	Refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period (T). It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic. Measured using the "Fast" time weighting.
$L_{AF90,T}$	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval (T). It is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level without contribution from intermittent sources.

All sound levels in this report are expressed in terms of decibels (dB) relative to  $2 \times 10^{-5}$  Pa. Noise measurements use a reference time period (T) of 15-minutes.

## 4.6 Measurement Results

### 4.6.1 Location N1

Table 5 summarises the measured daytime and night-time noise levels at Location N1.

**Table 5: Measured Daytime & Night-time Noise Levels at Location N1**

Period	Date	Start Time	Measured Noise Levels (dB re. $2 \times 10^{-5}$ Pa)				Notes
			$L_{Aeq}$	$L_{Amax}$	$L_{A10}$	$L_{A90}$	
Daytime	03/06	13:40	63	80	66	53	Road traffic dominant.
		14:31	63	81	66	55	
		15:22	62	75	65	52	
Night-time	03 - 04/06	23:00	57	74	60	43	Road traffic dominant
		23:52	54	73	56	40	

The daytime ambient noise levels were in the range 62 to 63 dB  $L_{Aeq,15min}$ . The night-time ambient noise levels were in the range of 54 to 57 dB  $L_{Aeq,15min}$ . Road traffic movements were noted to be the dominant source of noise at this measurement position. Other noise sources included HGV's entering and exiting the wider industrial lands, birdsong and airflow in building pipes.



Table 6 summarises the measured day time and night-time noise levels at Location N2.

**Table 6: Measured Daytime & Night-time Noise Levels at Location N2**

Period	Date	Start Time	Measured Noise Levels (dB re. $2 \times 10^{-5}$ Pa)				Notes
			L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	
Daytime	03/06	13:57	64	78	67	57	Road traffic dominant.
		14:48	63	78	66	57	
		15:50	63	83	66	53	
Night-time	03 - 04/06	23:17	60	81	62	46	Road traffic dominant
		00:09	55	74	56	44	

The daytime ambient noise levels were in the range 63 to 64 dB L<sub>Aeq,15min</sub>. The night-time ambient noise levels were in the range of 55 to 60 dB L<sub>Aeq,15min</sub>. Road traffic movements were noted to be the dominant source of noise at this measurement position. Other noise sources included nearby car garage activity, birdsong, tree song and pedestrians passing.

**Table 7: Measured Daytime & Night-time Noise Levels at Location N3**

Period	Date	Start Time	Measured Noise Levels (dB re. $2 \times 10^{-5}$ Pa)				Notes
			L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>	
Daytime	03/06	13:40	63	80	66	53	Road traffic dominant.
		14:31	63	81	66	55	
		15:22	62	75	65	52	
Night-time	03 - 04/06	23:00	57	74	60	43	Road traffic dominant
		23:52	54	73	56	40	

The daytime ambient noise levels were in the range 62 to 63 dB L<sub>Aeq,15min</sub>. The night-time ambient noise levels were in the range of 54 to 57 dB L<sub>Aeq,15min</sub>. Road traffic movements were noted to be the dominant source of noise at this measurement position. Other noise sources included nearby, birdsong, tree song and pedestrians passing.

## 4.7 Traffic Flows

### 4.7.1 Impact of Covid-19 on Traffic Flows

Due to the Covid-19 pandemic, there have been reduced traffic flows on many roads around the country. Corrections have therefore been applied in order to account for the potential impact that reduced traffic flows may have had on the baseline noise survey.

At the time of the baseline noise survey (i.e. June 2021) there had been a general easing of travel restrictions and this was apparent upon conducting the site baseline noise surveys whereby the surrounding road network was witnessed to be generally busy.

Using the guidance outlined in the *Calculation of Road Traffic Noise* (CRTN), 1988, (HMSO), it is noted that a doubling of traffic flows on a road can be expected to increase noise levels by approximately 3dB. As the road network was witnessed to be generally busy, this would indicate that any change in noise level due to reduced traffic flows would be relatively small (i.e. less than 3dB), depending on the extent of the reduced traffic flows over the week of the baseline noise survey.

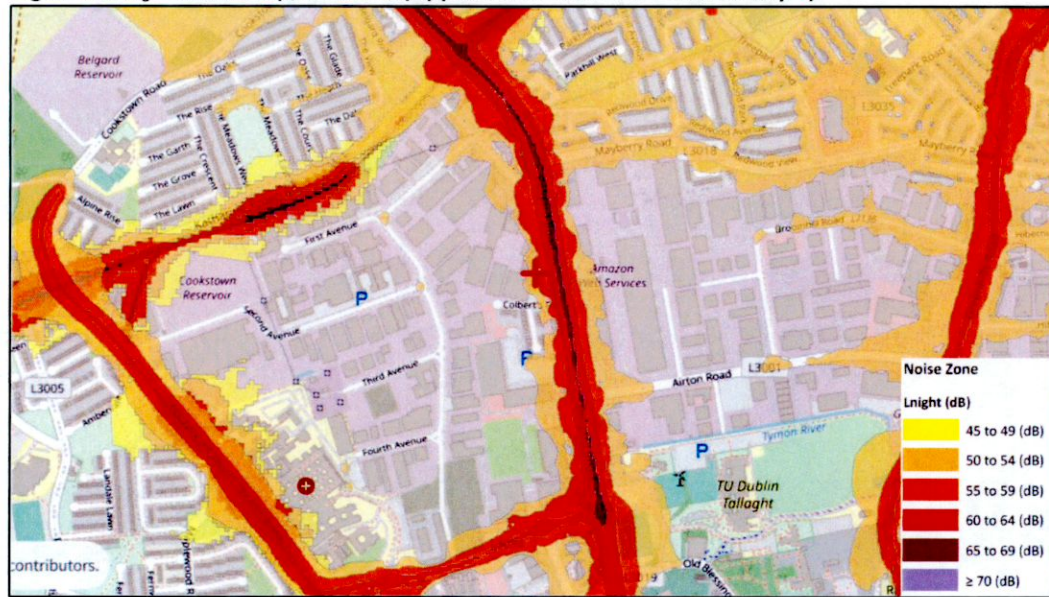
Information in relation to the traffic flow numbers for surrounding road network would be required for both the period of the baseline noise survey, and for a similar period pre-Covid-19, in order to provide a calculation of the expected reduction (if any) of noise levels that may be attributed to temporarily reduced traffic flows. This information was not available to assist with this review. However, in order to investigate this further, reference is made to published noise mapping and a comparison is made between the day and night-time noise levels measured at the unattended noise monitoring location N1, and night-time noise mapping noise levels on the site at the approximate same location.

### 4.7.2 EPA Published Noise Mapping

Reference is also made to published noise mapping available on the EPA website (ref. <https://gis.epa.ie/EPAMaps/>) for the proposed site. Figure 3 present the published noise mapping in terms of the calculated  $L_{\text{night}}$  values for Road Traffic Sources.



**Figure 3: L<sub>night</sub> Noise Map, Round 3 (Approx. Site Location Indicated by +)**



The L<sub>night</sub> noise mapping values may be discussed in the context of the measured values, in order to provide a comparison between on-site measurement data and noise mapping data. Figure 3 indicates L<sub>night</sub> values of approx. 55 to 59 dB at the location of the noise monitoring location N1. Reference to Table 5 presents measured night-time noise levels in the range 54 to 57 dB L<sub>Aeq,23:00</sub> - 08:00hrs.

The corrected noise levels measured on site can therefore be defined as equivalent to the modelled values taken from EPA data.

## 5 ASSESSMENT OF CONSTRUCTION IMPACTS

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The following sections discuss the methodologies followed in conducting the construction noise assessment and arriving at the various requirements for noise mitigation.

### 5.1 Noise Calculation Details

Calculations are made in accordance with BS 5228-1:2009+A1:2014, taking into account a range of factors affecting the propagation of sound, including:

- the sound power level (dB L<sub>w</sub>) of the sound source;
- the % of time that the sound source operates;
- the height of the sound source;
- the direction and angle that the source is pointing;
- the distance between the sound source and the receiver;
- the provision of obstacles such as buildings and/or barriers in the path between the source and receiver;
- the presence of sound reflecting/absorbing surfaces;

The noise calculations were generated from a plan of the proposed site and nearby buildings, with building heights, noise source heights and receiver locations derived from site sectional/elevation drawings. Noise levels are then calculated to specific receiver locations (i.e. nearby residential receptors) for comparison to the projects' noise significance thresholds.

### 5.2 Phases Considered in Noise Assessment

BS 5228-1:2009+A1:2014 provides catalogue of noise levels for various construction plant, machinery and activity that can be used for the prediction of noise levels. This allows for an assessment of the likely impacts of construction activity to nearby receptors.

Table 8 presents construction plant items that are typical for a site of this nature, along with the reference noise emission values.



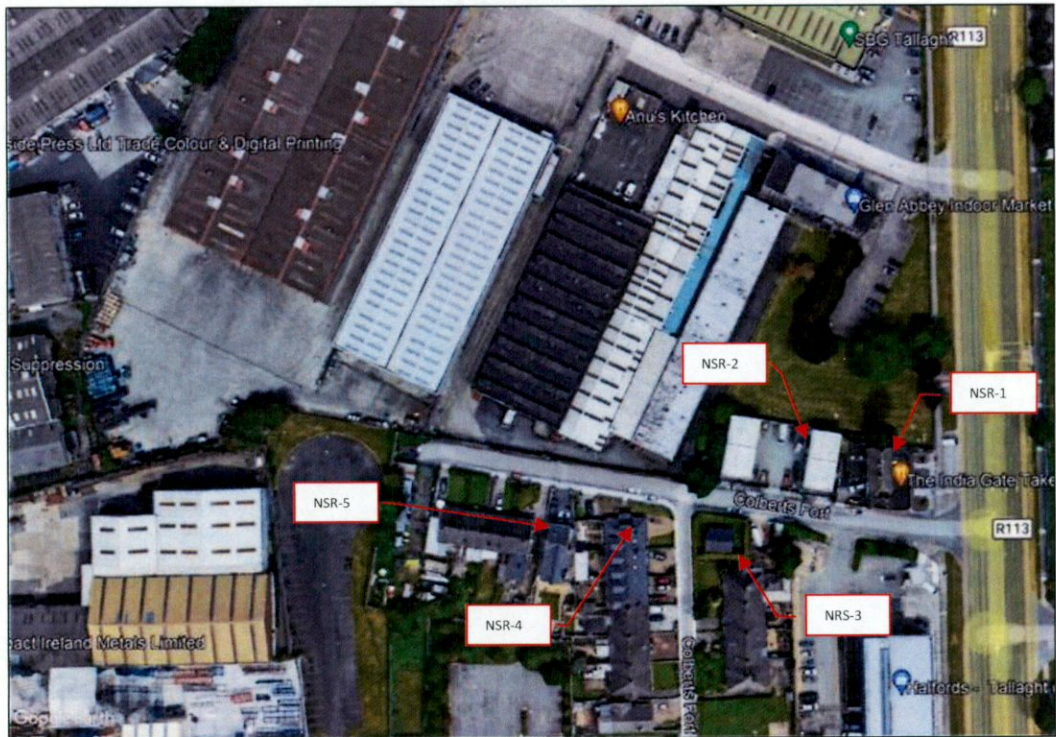
**Table 8: Typical Construction Plant Items and Reference Noise Emission Values**

Phase	Item of Plant (BS 5228-1 Ref.)	Reference Sound Power Level dB L <sub>WA</sub>	Sound Level at Reference Distance (10m) dB L <sub>Aeq,1hr</sub>
(i) Site Clearance / Preparation	Wheeled Loader Lorry (C2.28)	105	76
	Diesel Generator (C4.76)	89	61
	Track Excavator (C2.22)	100	72
	Dozer (C2.13)	106	78
	Dump Truck (C4.2)	106	78
(iii) General Construction	Truck mounted concrete pump + boom arm	104	76
	Articulated lorry (C11.10)	105	77
	Hand tools	109	81
	Pneumatic Circular Saw (D7.79)	103	75
	Internal fit-out	97	70
(iv) Landscaping	Dozer (C2.13)	106	78
	Dump Truck (C4.2)	106	78
	Road Roller (D8.27)	104	76

### 5.3 Assessment of Predicted Construction Noise Levels

Construction noise levels are predicted, for the three scenarios presented in Table 9, to the following receptors.

**Figure 4: Receptors for Construction Noise Impact Assessment**



Calculations assume that the equipment 'on-time' will be ~66% of a typical working day, and that a standard 2.5-metre high site hoarding will be provided around the site perimeter.

Table 9 summarises the construction noise predictions to each location, and comparison to the noise significance thresholds.



**Table 9: Assessment of Predicted Construction Noise Levels**

Location	Construction Phase	Predicted Construction Noise Level dB L <sub>Aeq,T</sub>	Construction Noise Significance Threshold dB L <sub>Aeq,12hrs</sub>	Complies?
NSR-1 (Dwelling)	(i) Site Clearance / Preparation	64	70	✓
	(iii) General Construction	65		✓
	(iv) Landscaping	79		x
NSR-2 (Dwelling)	(i) Site Clearance / Preparation	69	70	✓
	(iii) General Construction	70		✓
	(iv) Landscaping	81		x
NSR-3 (Dwelling)	(i) Site Clearance / Preparation	56	70	✓
	(iii) General Construction	58		✓
	(iv) Landscaping	62		✓
NSR-4 (Dwelling)	(i) Site Clearance / Preparation	54	70	✓
	(iii) General Construction	56		✓
	(iv) Landscaping	58		✓
NSR-5 (Dwelling)	(i) Site Clearance / Preparation	51	70	✓
	(iii) General Construction	53		✓
	(iv) Landscaping	54		✓

At the majority of locations, and for the majority of phases, calculated construction noise levels are within the noise significance thresholds.

At the locations NSR-1 and NSR-2 potential significant noise effects are predicted for the Landscaping phase; this is primarily due to the short distance between the works area and Locations NSR-1 and NSR-2.

Noise mitigation measures that can be expected to further reduce construction phase noise impacts are presented in the following sections.

The proposed approach for construction noise management involves the following items:

- A review of noise sensitive locations in the vicinity of the site;
- Review of baseline noise levels at noise sensitive locations;
- Noise modelling of construction activities;
- Ongoing noise monitoring during construction;
- Implementation of best practice noise control measures, and;
- Regular noise control audits.



Further details in respect of these and other considerations are provided below. This report and associated recommendations shall be considered in conjunction with the detailed guidance set out in BS 5228:2009+A1:2014 .

## **5.4 Construction Noise & Vibration Mitigation**

### **5.4.1 Noise Monitoring**

It is recommended that continuous construction noise monitoring be provided, to be maintained on an ongoing basis by the contractor for the duration of the project.

It is proposed that a noise monitor be installed at the site boundary adjoining NSR-1 / NSR-2. The noise monitoring equipment shall meet the following minimum specification (or similar approved):

- Logging of hourly  $L_{Aeq}$  &  $L_{AFMax}$  samples;
- E-mail/text alert on threshold exceedance;
- E-mail/text alert on low battery and low memory, and;
- Remote access to measured data.

Data shall be reported on a monthly basis.

### **5.4.2 Introducing New Noise Sources onto the Site**

It is required that the contractor considers potential noise emissions and associated impacts prior to selecting a new plant item to be used on the site.

Where practicable, preference should always be given to the unit with the lowest noise output. This may necessitate the use of manufacturers' proprietary acoustic enclosures or other forms of noise control.

If there are any concerns in relation to the level of noise emissions from an item of plant already on the site, or if there is doubt over the output from an item that has recently been introduced, this should be investigated by way of in-situ noise level measurements.



### 5.4.3 Noise Control Audits

It is required that the Contractor conduct regular noise control audits throughout the construction programme. The audits will ensure that all appropriate steps are being taken to control construction noise emissions, including:

- hours of operation being correctly observed;
- opportunities for noise control “at source”;
- optimum siting of plant items;
- plant items being left to run unnecessarily;
- correct use of proprietary noise control measures;
- materials handling;
- poor maintenance, and;
- correct use of screening provided and opportunities for provision of additional screening.

The outcome of noise control audits shall be reported on a monthly basis.

### 5.4.4 Best Practice Guidelines for the Control of Construction Noise & Vibration

BS5228 provides guidance on construction site noise mitigation, including the following:

- liaison with neighbours;
- hours of work;
- selection of quiet plant;
- control of noise sources, and;
- screening.

Noise control measures that will be considered include the selection of suitable plant, enclosures and screens around noise sources, limiting the hours of work and ongoing monitoring.

#### Liaison with Neighbours

The Contractor shall be proactive in engaging with neighbours and notify occupants of the closest noise sensitive locations before the commencement of any works forecast to generate appreciable levels of noise, explaining the nature and duration of the works.

A designated noise liaison should be appointed by the contractor for the duration of the construction works. This person should log any complaints and follow up in a prompt fashion.

#### Hours of Work

The proposed hours for site operation are Monday to Friday, 07.00 – 19.00 and Saturdays, 07.00 – 13.00.

### Selection of Quiet Plant

Consideration must be given to the noise emission levels of plant items when they are being considered for use on the site.

### Control of Noise Source

If the use of low noise plant or replacing a noisy item of plant are not viable or practicable options, consideration shall 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.

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators.

Demountable enclosures that could be moved around site as necessary may also be used to screen operatives using hand tools, such as Angle Grinders.

Proposed techniques should also be evaluated with regard to their potential effect on occupational health and safety.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These recommendations should be fully implemented on the site.

*"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.*

*Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*

*Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.*

*Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.*

*Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."*

All items of plant should be subject to regular maintenance to prevent unnecessary increase in plant noise.



### Screening

The use of screens can be effective in reducing noise to a receiver. The effectiveness of an acoustic screen will depend on the height and length of the screen and its position relative to both the source and receiver. To be effective, the height and length of any screen should be such that there is no direct line of sight between the source and the receiver.

BS5228 advises screens should be placed as close as possible to either the source or the receiver. The construction of the screen should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the barrier rather than the transmission through the barrier itself. Screens constructed of materials with a surface mass greater than 10kg/m<sup>2</sup> typically offer adequate sound insulation performance.

Annex B of BS5228 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials. BS5228 Figure B2 is included below for information purposes.

Figure B.2 Typical acoustic shed

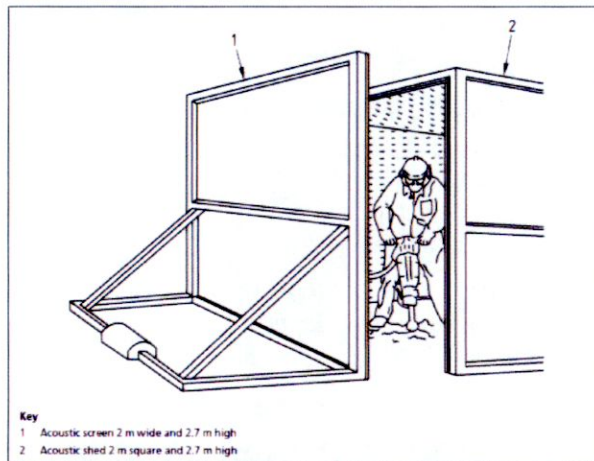


Table B.4 Measured sound reduction given by types of partial enclosure

Type of enclosure (see Figure B.3)	Reduction dB(A)		
	Facing the opening(s)	Sideways	Facing rear of shed
Open-sided shed lined with absorbent material: no screen	1	9	14
Open-sided shed lined with absorbent material: with reflecting screen in front	10	6	8
Open-sided shed lined with absorbent material: with absorbent screen in front	10	10	10

## 6 ASSESSMENT OF OPERATIONAL PHASE IMPACTS

### 6.1 Plant Noise Emissions from Proposed Development

Reference is made to BS4142:2014+A1:2019 in setting criteria for any new mechanical plant items. This standard outlines methods for analysing building services plant sound emissions to residential receptors. BS 4142 is frequently referenced in Planning Conditions and is widely considered the 'industry standard' methodology for the assessment of industrial noise in the Dublin region.

Based upon measured day and night-time background sound levels on the site, appropriate plant noise criteria to nearby dwellings are as follows:

- Daytime (07:00 to 23:00hrs) 49 dB  $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 38 dB  $L_{Aeq,15-min}$

Plant noise emissions should not contain any characteristics that would warrant any acoustic feature penalties under the BS 4142:2014 assessment procedure.

At detailed design stage, noise emissions from new plant servicing the development shall be designed so as not to exceed the above limit values.

### 6.2 Plant Noise Source Data

Table 10 presents the source sound power levels for proposed M&E plant, used for calculation purposes, which has been provided by equipment suppliers. Unless stated, plant items are assumed to operate at the same overall output for both day and night-time periods.

**Table 10: Source Sound Power Level for Proposed New Plant Items**

Source Ref	Location	Source Sound Power Level (dB $L_w$ ) in Octave Frequency Bands (Hz)								Overall dB $L_{WA}$
		63	125	250	500	1k	2k	4k	8k	
Extract Fan Air Outlet	Roof Level of the New Extension	53	67	66	61	60	58	50	41	71
Heat Recovery Unit Supply Inlet	Roof Level of the New Extension	54	54	53	53	50	50	46	38	56
Heat Recovery Unit Exhaust Outlet	Roof Level of the New Extension	62	65	66	65	68	64	60	56	71
Domestic Hot Water ASHP	Roof Level of the New Extension	71	61	59	62	62	63	58	55	68
Space Heating ASHP (ZETA REV HP XT)	External Compound	90	80	78	81	81	82	77	74	87

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Source Ref	Location	Source Sound Power Level (dB L <sub>w</sub> ) in Octave Frequency Bands (Hz)								Overall dB L <sub>WA</sub>
		63	125	250	500	1k	2k	4k	8k	
Fume Roof Fan (MSFG – 250)	Roof Level of the New Extension		86	90	77	75	76	71	65	84
Outdoor Air Conditioning Units (PUMY-P200YKM2)	Roof Level of the New Extension	63	62	61	58	57	52	48	41	75

## 6.3 Noise Mitigation Measures

### 6.3.1 In-Duct Attenuators

It is recommended that in-duct attenuators be installed to a number of plant items. Two no. performance specifications for attenuators are recommended, with varying performance depending on the sound power level of the plant items. The below table illustrates the attenuators required for each item of plant.

**Table 11: M&E Plant Attenuation Requirements**

Source Ref	Attenuator Required	Type of Attenuator (Ref Table 12)
Extract Fan Air Outlet	Yes	Type 2
Heat Recovery Unit Supply Inlet	No	N/A
Heat Recovery Unit Exhaust Outlet	Yes	Type 2
Domestic Hot Water ASHP	No	N/A
Space Heating ASHP (ZETA REV HP XT)	Yes	Type 1
Fume Roof Fan (MSFG – 250)	Yes	Type 1
Outdoor Air Conditioning Units (PUMY-P200YKM2)	No	N/A

The proposed attenuators shall achieve the following minimum sound insertion loss.

**Table 12: Minimum Sound Insertion Loss for Attenuators**

Ref	Required Sound Insulation Performance (dB) in Octave Frequency Bands (Hz)							
	63	125	250	500	1,000	2,000	4,000	8,000
Type 1	6	10	19	27	37	36	26	19
Type 2	4	7	14	23	32	27	18	13



The above performance would typically be achieved with a 1200mm long 35% free area attenuator for Type 1 and a 900mm long, 43% free area attenuator for Type 2. Acoustic attenuators are available from Sweeney Sheet Metal Ltd (or similar approved), contact details below:

Sweeney Sheet Metal Ltd  
 Unit 3b  
 Santry Hall Industrial Estate  
 Santry  
 Dublin 9  
 T: +353 1 8420840  
 E: [Bernard@sweeneysheetmetal.ie](mailto:Bernard@sweeneysheetmetal.ie)  
 Contact: Bernard Sweeney

## 6.4 Plant Noise Calculation Results

Tables 13 and 14 presents the results of the noise calculation exercise, with the inclusion of the specified noise mitigation measures.

**Table 13: Assessment of Daytime Plant Noise Levels**

Receptor	Description	Calculated Plant Noise Level (dB $L_{Aeq,T}$ )	Plant Noise Criteria (dB $L_{Aeq,T}$ )	Complies?
NSR-1	1 <sup>st</sup> Floor Apartment (Colberts Fort Road)	26	≤ 49	✓
NSR-2	Offices (Colberts Fort Road)	29		✓
NSR-3	Residential Dwelling (Colberts Fort Road)	22		✓
NSR-4	Residential Dwelling (Colberts Fort Road)	20		✓
NSR-5	Residential Dwelling (Colberts Fort Road)	17		✓

**Table 14: Assessment of Night-time Plant Noise Levels**

Receptor	Description	Calculated Plant Noise Level (dB $L_{Aeq,T}$ )	Plant Noise Criteria (dB $L_{Aeq,T}$ )	Complies?
NSR-1	1 <sup>st</sup> Floor Apartment (Colberts Fort Road)	26	≤ 38	✓
NSR-2	Offices (Colberts Fort Road)	29	N/A	✓
NSR-3	Residential Dwelling (Colberts Fort Road)	22	≤ 38	✓
NSR-4	Residential Dwelling (Colberts Fort Road)	20		✓
NSR-5	Residential Dwelling (Colberts Fort Road)	17		✓

During both the daytime and night-time periods, plant noise levels are calculated to comply with noise criteria at all locations.



## 6.5 Ambulance and Delivery Noise

During the operation phase of the development, up to 30 ambulance movements per day are expected at peak level. The sound of ambulance emergency sirens can be expected to be audible as the emergency vehicles enter the R113 Belgard Road to the north of the site, when the road network is sufficiently busy such that the emergency sirens are required. Thus, it is anticipated that the sirens should not need to be turned on as frequently after peak evening traffic or overnight when the traffic levels will be much lower than the peak daytime periods. Thus, based on the HSE's experience of ambulance movements, sirens are much more likely to be required between the hours of 8am and 7pm, where they are less likely to disturb nearby properties.

The sound of emergency sirens is a requirement both in terms of reducing the Health and Safety risk to other road users, and to allow for a fast response and arrival of paramedics to the destination site. Therefore, due to the critical nature of the services offered by emergency vehicles that exit from this development, conducting a noise impact assessment of siren noise is not appropriate.

Deliveries will take place during normal working hours (09:00 - 17:30hrs). National Ambulance Service consumables are generally small components delivered via a transit-type van approximately once per week. On-site storage facilities mitigate against the need for frequent deliveries to the site. Deliveries are therefore not expected to cause any significant noise impact.

## 7 CONCLUSIONS

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RSK Ireland Limited (RSK) was instructed by Thornton O'Connor Town Planning Ltd. on behalf of the HSE to conduct a noise impact assessment in respect of a proposed National Ambulance Base on the Belgard Road, Dublin.

The aim of this study is to assess the potential impacts to nearby receptors and to provide recommendations, where necessary, to the risk of nuisance arising from construction and operational phase noise and/or vibration emissions.

Baseline monitoring has found pre-existing noise levels are typical of a suburban location in the vicinity of a busy regional road. Local and distant traffic were the primary contributor to the noise environment on site.

An assessment of the potential construction phase noise impacts has been conducted, following the procedures as outlined in BS 5228-1:2009+A1:2014. At the majority of locations, and for the majority of phases, calculated noise levels are within construction noise significance thresholds. At locations closest to the site boundary, potential significant construction noise effects are predicted, this is primarily due to the short distance between the works area and these neighbouring dwellings. The adoption and implementation of the noise control measures outlined in the relevant sections of this document is expected to reduce impacts to an acceptable level.

In the developments operational phase, criteria have been set for new building services plant items in accordance with the methodologies outlined in BS 4142:2014+A1:2019. Mitigation measures for new building services plant items have been specified in order to ensure that the noise impact of the proposed development is not significant at the nearest receptors. Additional discussions are presented in relation to the sound from ambulance sirens and from deliveries to the development.

In summary, it is considered that the site is suitable for the proposed development subject to the provision of the noise control recommendations as outlined in this report.





# APPENDIX A

## SERVICE CONSTRAINTS

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### RSK ENVIRONMENT LIMITED SERVICE CONSTRAINTS

1. This report (the "Services") was compiled and carried out by RSK Ireland Limited (RSK) for the HSE (the "client") in accordance with the terms of a contract between RSK and the "client". The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

