CLIENT: Exeter Ireland Property IV C Limited

PROJECT: Noise Impact Assessment Report for the proposed Warehouse Development at Site R, Jordanstown Road, Aerodrome Business Park, Greenogue, Rathcoole, Co Dublin.

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1 Introduction

AONA Environmental Consulting Ltd. was commissioned by Thornton O'Connor Town Planning to prepare a Noise Impact Assessment on behalf of Exeter Ireland Property IV C Limited in support of a planning application to be submitted to South Dublin County Council (SDCC) for development of a warehouse with ancillary office and staff facilities and associated development on lands extending to 5.67Ha on the south-eastern side of the Aerodrome Business Park (known as Site R) at Greenogue, Rathcoole, Co Dublin.

The development will comprise the construction of 1 No. warehouse with ancillary office and staff facilities and associated development. The warehouse will have a maximum height of 16 metres with a gross floor area of 22,966 sq m including a warehouse area (21,113 sq m), ancillary office areas (1,163 sq m) and staff facilities (690 sq m).

The development will also include: the provision of a new vehicular access to the site from Jordanstown Road including 2 No. additional access gates from this new road to the existing Site E to the north; pedestrian access; 210 No. ancillary car parking spaces; bicycle parking; HGV yards; level access goods doors; dock levellers; access gates; hard and soft landscaping; lighting; boundary treatments; ESB substation; plant; pedestrian access gate at the southern portion of the site from the R120; and all associated site development works above and below ground.

2 Assessment Methodology

The assessment and evaluation of the noise impact arising from the proposed development has included the following methodology:

- Reference to the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016 Update)
- Reference to recent relevant Baseline Noise Survey – noise monitoring survey during daytime, evening and night-time periods to determine the existing noise climate in proximity to the residential receivers in the vicinity of the proposed development site in proximity to the nearest residential properties from Friday 21st August 2020 to Wednesday 26th August 2020.
- Noise prediction modelling using CadnaA noise prediction software.
- A BS4142: 2014 'Method of Rating and Assessing Industrial and Commercial Noise' assessment has been carried out to assess the potential for 'adverse impact' at the nearest noise sensitive locations due to the proposed operations.
- A comparison of the measured noise levels and the noise impact on the nearest residential receivers against relevant guidelines and standards.

2.1 Setting Appropriate Noise Limits

The EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) January 2016 assists licensed sites with the assessment of their potential and actual noise impact on the local environment. This guidance note was updated in January 2016 to provide clear guidance in relation to the background understanding of environmental noise, monitoring and assessment of noise impact as well as applying applicable noise criteria and outlining suitable approaches to noise mitigation design and Best Available Techniques (BAT). The guidance note advises that noise assessment periods are now expressed in terms of day, evening and night and outlines recommended minimum durations for environmental noise surveys. The January 2016 update also provides additional information and clarifications including the following:

- Updated guidance to reflect the publication of BS 4142: 2014,
- Examples of circumstances where it may be appropriate to use detailed reference methods for the assessment of tonality and impulsivity, and;

- Guidance on the use of L_{AF90} in instances where extraneous noise sources may have an influence on measured L_{Aeq} values.

In the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) the steps to be followed in order to derive appropriate noise limit criteria are outlined as follows;

Step 1 – Quiet Area Screening of the Development Location

Step 2 – Baseline Environmental Noise Survey

Step 3 – Screen for Areas of Low Background Noise

Step 4 – Determine Appropriate Noise Criteria

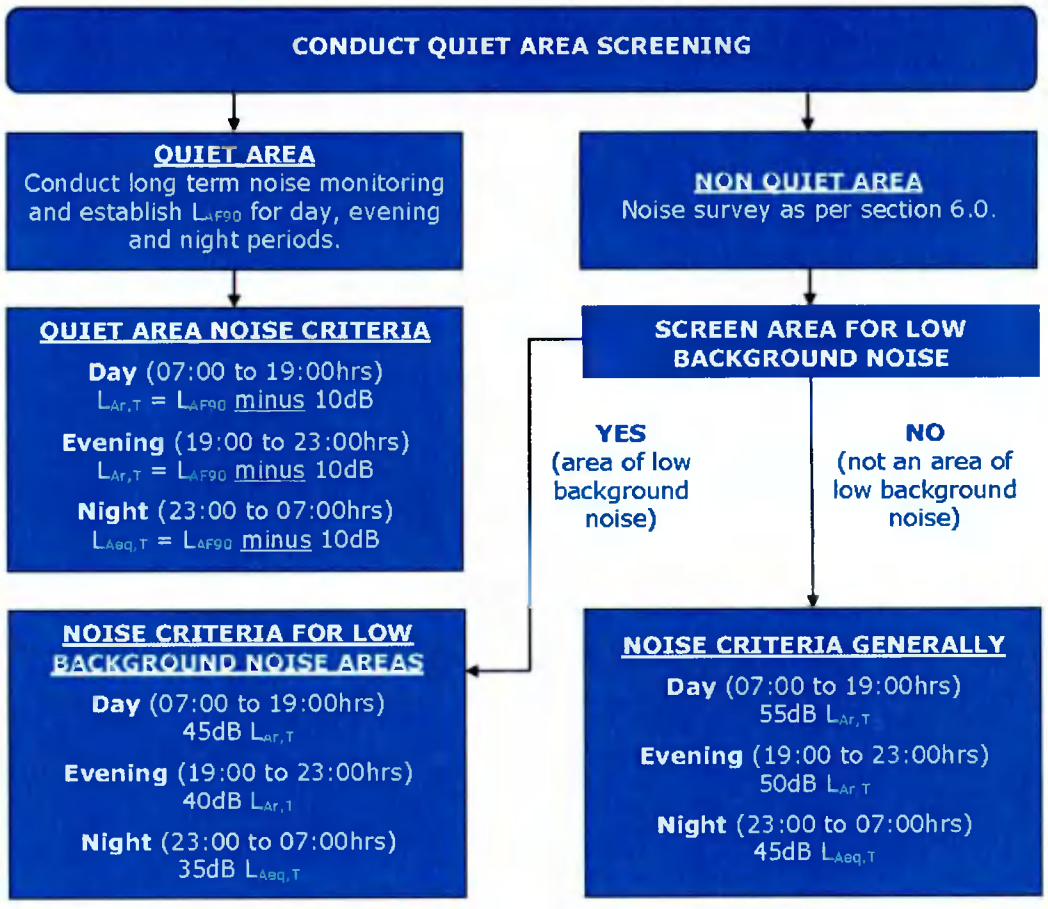


Table 1 outlines the noise limit criteria to be applied depending on the results of the screening processes in Steps 1 and 3, and the noise survey discussed in Step 2.

Table 1: The noise limit criteria to be applied depending on the results of the screening processes.

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-time Noise Criterion, dB $L_{Aeq,T}$ (23:00 to 07:00hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey.
Areas of Low Background Noise	45dB	40dB	35dB
All other Areas	55dB	50dB	45dB

2.2 Baseline Noise Survey Methodology

A baseline noise monitoring survey was undertaken in proximity to the proposed development site and the nearest residential properties from Friday 21st August 2020 to Wednesday 26th August 2020. The noise monitoring survey was undertaken in accordance with ISO 1996 Description and Measurement of Environmental Noise.

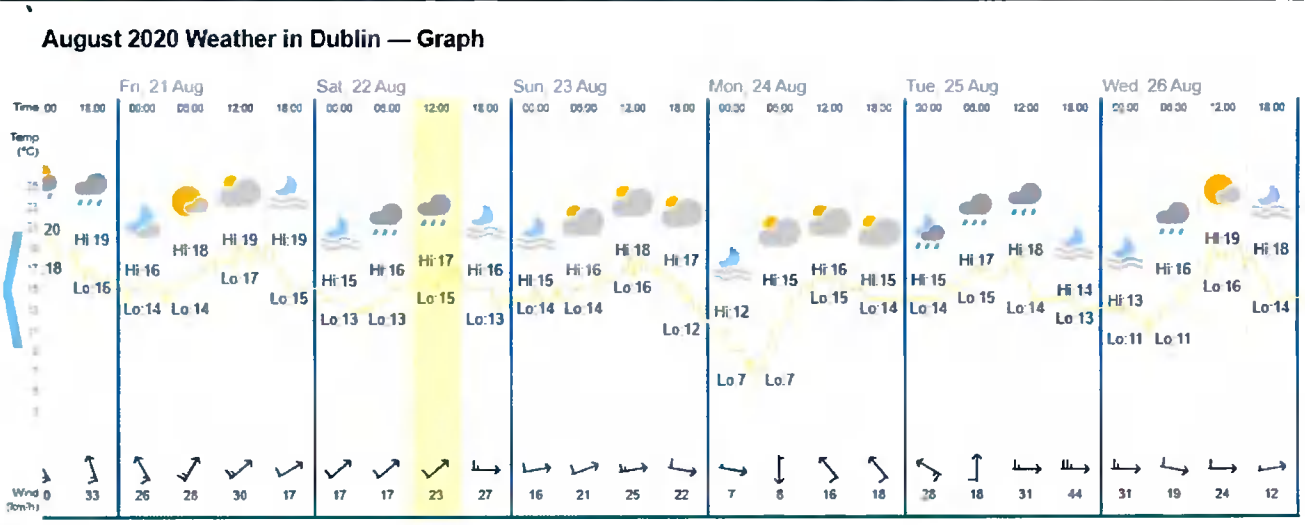
The noise survey was completed in proximity to the proposed development site in close proximity to the nearest noise sensitive receiver (NSR) locations to establish the current ambient background noise levels in the area. The long-term noise monitoring survey location was selected so as to be representative of the nearest noise sensitive receiver (NSR) locations to the north and south of the site. The noise monitoring location was 560m from the N7 motorway and traffic noise was dominant at the monitoring location. The long-term noise monitoring survey location was located so as to give a realistic lowest background noise level in the area and provided security for the sound level meter. The baseline noise survey took place during weekday and weekend periods.

The closest NSRs located in the vicinity of the proposed development site have been selected for the noise impact assessment. The noise climate in the area of the proposed development is mainly influenced by traffic flows on the N7 motorway and industrial developments in the area.

An EM2010 Sound Level Analyser was used during the long-term noise monitoring survey, fitted with a suitable outdoor noise measurement kit, which allows the microphone to retain its Class 1 specifications according to IEC6051 and IEC61672-1 when the weather protection system is in place. Noise measurements were taken at a height of 1.5m above ground level and measurements were free-field. The noise monitoring location was selected in an open area to minimise the potential effect of reflections from buildings and is representative of the existing background noise level in the area. The sound level meter was set to record data over 15-minute intervals. The sound level meter was calibrated before and after the survey. The Time Weighting used was Fast and the Frequency Weighting was A-weighted. The main measurement parameters recorded during the baseline survey are defined as follows:

- L_{Aeq} is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.
- L_{A10} is the A-weighted sound level that is exceeded for 10% of the sample period and is used to quantify traffic noise.
- L_{A90} is the A-weighted sound level that is exceeded for 90% of the sample period and is used to quantify background noise in the absence of the main noise source.

Weather conditions during the noise survey period were typically warm conditions (~16-19°C during daytime & ~11-14°C during night-time) with intermittent periods of rainfall and occasional light to moderate breezes throughout the survey periods. This allowed for an accurate typical background noise level to be established from the noise survey results.



2.2.1 Noise Prediction Modelling Methodology

Noise modelling has been undertaken using CadnaA noise modelling software. This allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios. Noise level predictions have enabled the potential impact on the noise climate in the vicinity of the proposed development resulting from the construction of the proposed development to be determined. Noise modelling has been used to predict impacts from noise sources on the nearest noise sensitive receptors to the site. Models have been run for worst-case scenarios to determine if the future noise impact will be in compliance with the relevant guidelines. The modelling software calculates noise levels based on the emission parameters and spatial settings. Table 2 outlines the parameters, sources, settings and assumptions that have been incorporated into the model.

Table 2: Modelling Parameters, Sources and Assumptions

Parameter	Details
Horizontal distances	Scaled development drawings in AutoCAD format as received from client
Proposed development dimensions	Scaled development drawings in AutoCAD format (including location of buildings and dimensions) as received from client
Receptor Locations	At 1m from residential property façade locations at 1.5m height.
Reflections	First order reflections applied
Façade Correction	Façade corrections have been incorporated into the modelling. All surfaces have been assumed to be "smooth, reflective surfaces".

2.2 Guidelines & Standards

IEMA Guidelines for Noise Impact Assessment (2014)

The Guidelines for Noise Impact Assessment (October 2014) produced by the Institute of Environmental Management and Assessment (IEMA) address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. The guidelines state that the noise level threshold and significance should be determined, based upon the specific evidence and likely subjective response to noise. The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level. An impact scale offered by the IEMA guidelines is shown in Table 3.

Table 3: IEMA Impact from the Change in Sound Levels

Long-term impact classification	Short-term impact classification	Sound Level Change LpAeqT (positive or negative) T = either 16hr day or 8hr night
Negligible	Negligible	>0 dB and <1 dB
	Minor	>1 dB and <3 dB
Minor	Moderate	>3 dB and <5 dB
Moderate	Major	>5 dB and <10 dB
Major		>10 dB

To determine the overall noise impact, the magnitude and sensitivity to changes in noise levels, the Noise Effects Descriptors presented in Table 4 are offered by the IEMA guidelines.

Table 4: IEMA Impact from the Change in Sound Levels

Level of Impact	Description
Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise sensitive receptor, or a 5 to 9.9 dB LAeq change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB L_{Aeq} change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 2.9 dB L_{Aeq} change in a sound level at a receptor of some sensitivity
None/not significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development

Table 5: Relationship between Noise Impact, Effect and Significance (IEMA)

Magnitude (Nature of Impact)		Description of Effect (on a specific sensitive receptor)	Significance
Beneficial	Substantial	Receptor Perception = Marked Change Causes a material change in behaviour and/ or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect)
	Moderate	Receptor Perception = Noticeable Improvement Improved noise climate resulting in small change in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	↕
	Slight	Receptor Perception = Just Noticeable Improvement Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect character of the area but not such that there is a perceived change in quality of life.	(Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect) Less Likely to be Significant
-	Negligible	N/A = no discernible effect on receptor	Not Significant
Adverse	Slight	Receptor Perception = Non-intrusive Noise impact can be heard, but does not cause change in behaviour or attitude, e.g. turning up volume of television, speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect)
	Moderate	Receptor Perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awaking sleep disturbance. Affects the character of area such that there is a perceived change in the quality of life.	↕
	Substantial	Receptor perception = Disruptive Causes material change in behaviour and /or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in character of area.	Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect) More Likely to be Significant
	Severe	Receptor Perception = Physically Harmful Significant Changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or psychological effects, e.g. regular sleep deprivation / awakening ; loss of appetite, significant , medically definable harm, e.g. auditory and non-auditory.	Significant

BS 4142: 2014 'Method of Rating and Assessing Industrial and Commercial Noise'

BS 4142: 2014 'Method of Rating and Assessing Industrial and Commercial Noise' (October 2014) describes methods for rating and assessing sound of an industrial or commercial nature. It enables the effects on people nearby to be assessed and the associated risks to be minimised. It is designed to give consistent results across situations ranging from a single air-conditioning unit to a large industrial installation.

BS 4142: 2014 states that 'the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context. BS 4142: 2014 states that you should 'obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level', and consider the following;

(a) Typically, the greater this difference between the rating level of the specific sound source and the background sound level, the greater the magnitude of the impact.

(b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

(c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

(d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

BS 4142: 2014 states that 'adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact'.

BS 4142: 2014 states the following with regard to the "Objective method for assessing the audibility of tones in sound: One-third octave method;

The test for the presence of a prominent, discrete-frequency spectral component (tone) typically compares the LZeq,T sound pressure level averaged over the time when the tone is present in a one-third-octave band with the time-average linear sound pressure levels in the adjacent one-third-octave bands. For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference. The level differences between adjacent one-third-octave bands that identify a tone are:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz); and
- 5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz)".

World Health Organisation Guidelines

The World Health Organisation (WHO) published Guidelines for Community Noise in April 1999. The 1999 WHO guidelines recommend a daytime limit of 50 – 55 dB(A) for outdoor living areas. The report states that "to protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development". Table 6 shows the WHO Guideline noise levels applicable to residential properties.

Table 6: Guideline values for community noise in specific environments (World Health Organisation, 1999)

Specific Environment	Critical Health Effects	L_{Aeq} (dB)	Time Base (Hrs)	L_{Amax} Fast (dB)
Outdoor Living Area during daytime	Serious Annoyance, daytime & evening Moderate Annoyance, daytime & evening	55 50	16 16	- -
Outside Bedrooms during night-time	Sleep disturbance, window open (outdoor values)	45	8	60

In 1999 and 2009, WHO published guidelines to protect human health, specifically from community noise and night noise exposure. Since then there has been a substantial increase in the number and quality of studies on environmental noise exposure and health impacts. Also, newer studies included noise from sources such as railways and wind turbines. In light of this new evidence, the WHO Environmental Noise Guidelines for the European Region have been developed.

The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices.

WHO has conducted national surveys on noise annoyance. According to these large-scale surveys, road traffic noise is the most important source of annoyance, generally followed closely by neighbour noise. Aircraft noise can also be a substantial source of annoyance. Railway noise and industrial noise are enumerated less frequently. The guidelines do not outline specific recommendations for industrial noise and do not explicitly consider industrial noise as an environmental noise source, affecting people living in the vicinity of industrial sites. This is due to the diversity of features of industrial noise, and the fact that exposure to industrial noise has a very localised character. The guidelines state "that research regarding industrial noise in general is required".

3 Existing Environment

3.1 Operational Noise Limits

Step 1 – Baseline Area Description

The existing environment in the area of the proposed development is described in accordance with the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

Table 7: Step 1 – Quiet Area Screening of the Development Location

Site Details	
Site Name	Proposed warehouse development with ancillary office and staff facilities & the provision of a new vehicular access to the site
Licence Application Reference	N/A
Site Address	Aerodrome Business Park, Greenogue, Co. Dublin
Quiet Area Screening of the Development Location	
Screening Question	Answer – Yes / No
Is the site >3km away from urban areas with a population >1,000 people?	No
Is the site >10km away from urban areas with a population >5,000 people?	No
Is the site >15km away from urban areas with a population >10,000 people?	No
Is the site >3km away from any local industry?	No
Is the site >10km away from any major industry centre?	No
Is the site >5km away from any national primary route?	No
Is the site >7.5km away from any motorway or dual carriageway?	No
QUIET AREA?	No.
Other Relevant Comments	The site is not considered to be a "Quiet Area" as per the EPA NG4 definition.

Step 2 – Baseline Environmental Noise Survey

The screening process in Step 1 has not identified a 'quiet area', and a noise measurement survey has been undertaken at the proposed development site in proximity to the nearest residential properties. The noise monitoring location is shown in Figure 1 which is representative of the prevailing background noise level for the area. The proposed development site is in a mainly industrial area on industrial zoned lands with traffic on the M7 motorway and industrial noise sources dominating the noise climate in proximity to the site. There is sporadic residential development in the area. The noise monitoring location is indicative of the noise levels at the nearest residential properties in the area.

Figure 1: Step 1 – Noise monitoring location and noise sensitive receiver locations entered into noise prediction model.

Table 8: Noise sensitive receiver (NSR) locations in proximity to the development site.

Ref.	ITM Grid Coordinates		Distance to Site Access	Distance to Warehouse
NSR 1	702384.48	727577.91	~530m	~300m
NSR 2	702406.67	727542.43	~570m	~330m
NSR 3	702443.96	727485.81	~640m	~380m
NSR 4	701998.77	727831.62	~390m	~450m

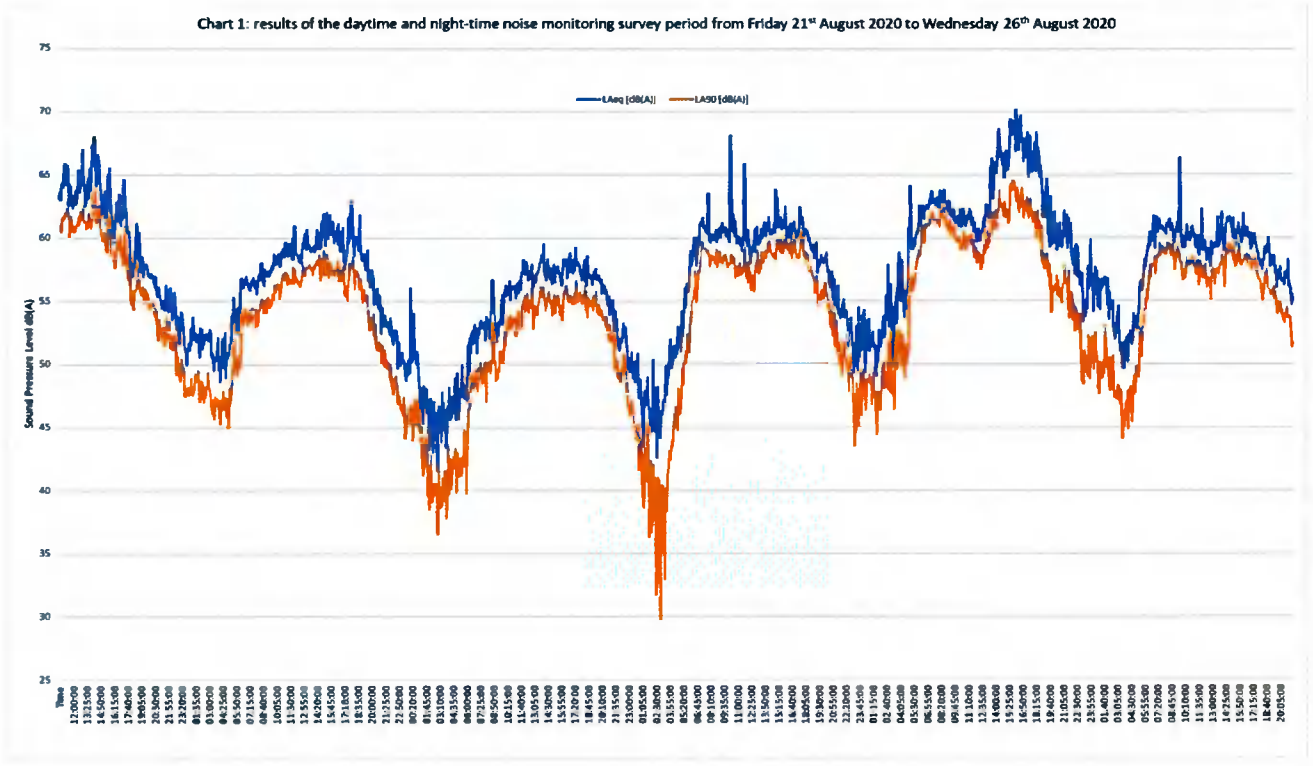
Table 9: Baseline Noise Survey Details.

Site Details	
Site Name	Proposed warehouse with ancillary office and staff facilities & the provision of a new vehicular access to the site
Licence Application Reference	N/A
Site Address	Aerodrome Business Park, Greenogue, Co. Dublin
Baseline Noise Survey – Set Up of Equipment	
Date	Friday 21st August - Wednesday 26th August 2020
Start Time (hh:mm)	Daytime Survey Periods - 07:00 - 19:00 Evening Survey Periods - 19:00 - 23:00 Night-time Survey Periods - 23:00 - 07:00
Noise Meter Set to Record	
L_{Aeq}	Yes
L_{AF90}	Yes
L_{AFMax}	Yes
Set to record L_{Leq} in 1/3 octaves	Yes
At 15-minute intervals	Yes – 15-minute intervals

A summary of the results of the background noise monitoring survey are presented in Table 10. The background noise levels recorded were dominated by road traffic noise from the N7 motorway.

Table 10: Summary of Baseline Noise Survey Results.

Daytime	$L_{Aeq, 12\ Hour}$	$L_{A10, 12\ Hour}$	$L_{A90, 12\ Hour}$
Friday 21st August 2020	62.9	65	60
Saturday 22nd August 2020	58.8	60.7	56.4
Sunday 23rd August 2020	56.1	58.1	53.4
Monday 24th August 2020	60.5	62	58.3
Tuesday 25th August 2020	64	66.1	61.1
Wednesday 26th August 2020	60	61.5	57.8
Average	60.4	62.2	57.8
Evening	$L_{Aeq, 4\ Hour}$	$L_{A10, 4\ Hour}$	$L_{A90, 4\ Hour}$
Friday 21st August 2020	56	57.8	53.3
Saturday 22nd August 2020	54.7	57	51.4
Sunday 23rd August 2020	54.6	56.5	52.1
Monday 24th August 2020	56.1	58.2	53
Tuesday 25th August 2020	60.1	62.7	55.7
Wednesday 26th August 2020	57.6	59.8	54.1
Average	56.5	58.7	53.3
Night-time	$L_{Aeq, 8\ Hour}$	$L_{A10, 8\ Hour}$	$L_{A90, 8\ Hour}$
Friday 21st August 2020	52.2	54.6	48.5
Saturday 22nd August 2020	47.8	50.3	42.8
Sunday 23rd August 2020	50.4	53.3	44.7
Monday 24th August 2020	55.4	57.9	51.5
Tuesday 25th August 2020	55	57.7	50.2
Average	52.2	54.8	47.5



Step 3 – Screen for Areas of Low Background Noise

The existing environment in the area of the proposed development site is described in accordance with the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

For all areas not identified as Quiet Areas in Step 1, the existing background noise levels measured during the environmental noise survey, should be examined to determine if they satisfy the following criteria:

- Average Daytime Background Noise Level ≤40dB L_{AF90} - No
- Average Evening Background Noise Level ≤35dB L_{AF90} - No
- Average Night-time Background Noise Level ≤30dB L_{AF90} - No

As all three of the above criteria are not satisfied, this location is not deemed to be an area of low background noise, and the reduced noise limits detailed in Step 4 are not applicable at receivers in proximity to this proposed development location.

Step 4 – Determine Appropriate Noise Criteria

The operational noise limit criteria has been determined based on the results of the screening processes discussed in Steps 1 and 3, and the noise survey discussed in Step 2 above. This location is not deemed to be an 'area of low background noise' and the operational noise limits detailed in Table 11 are applicable at receptors in proximity to this proposed development location.

Table 11: Recommended EPA Guidance Noise Limits

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night-time Noise Criterion, dB $L_{Aeq,T}$ (23:00 to 07:00hrs)
All other areas	55dB	50dB	45dB

4 Predicted Impacts

4.1 Do Nothing Scenario

The existing environment in the area of the proposed development is described in accordance with the EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). This will remain unchanged in the event of the 'Do Nothing' scenario.

4.2 Construction Phase

4.2.1 Construction Noise Limits

There are no Irish statutory limits regarding construction noise. BS5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open site – Part 1: Noise', provides guidance on assessing the potential significance of noise effects from construction activities in Annex E.

In relation to Construction Noise Limits, BS 5228-1:2009+A1: 2014 Noise and Vibration Control on Construction and Open Sites Part 1: Noise details the 'ABC method', which recommends a construction noise limit based on the existing ambient noise level. General and short-term construction noise impacts that are deemed typical of any construction site noise sources, including activities such as ground preparation, site clearance, foundation earthworks, roadway construction, erection of new buildings, etc. are assessed in accordance with the 'ABC method' defined in BS 5228. The ambient noise levels have been determined through the baseline noise survey and then rounded to the nearest 5dB to determine the appropriate category (A, B or C) and subsequent threshold value. A potential significant effect is indicated if the construction noise level exceeds the appropriate category threshold value. If the existing ambient level exceeds the threshold category threshold values, then a potential significant impact is indicated if the total noise level, including both the ambient noise and the various contributions of construction noise, is greater than the ambient noise level by more than 3dB. Table 12, reproduced from BS 5228, demonstrates the criteria for selection of a noise limit for a specific receptor location.

Table 12: Construction noise threshold levels based on the BS 5228 'ABC' method.

Assessment Category and Threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A	Category B	Category C
Night time (23.00 to 07.00)	45	50	55
Evening and weekends (D)	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 - 13.00)	65	70	75

Notes:

Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

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

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

D: 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

No night-time or evening construction works will take place. At the nearest noise sensitive receptors, the ambient noise levels (rounded to the nearest 5 dB) are 50 dB - 55 dB $L_{Aeq,T}$ during daytime. Therefore, all noise sensitive receptors fall into Category A of the 'ABC' assessment methodology. Hence, daytime construction noise will be subject to a limit of 65 dB $L_{Aeq,T}$.

4.2.2 Construction Noise Prediction

There is likely to be temporary and intermittent increases in noise levels during the construction phase of the proposed development at the nearest residential properties. The main sources of noise due to construction of the proposed development will be from activities such as truck movements of excavated and construction materials as well as crane and excavator/loader noise sources. During the approximate 6 month construction phase, the proposed development will generate HGV movements. The noise impact of passing HGVs will be short-term at receiver locations in the area. The construction of the proposed development will include associated construction site traffic, comprising of contractors' vehicles and cars.

Construction noise can be assessed in terms of the equivalent continuous sound level and/or in terms of the maximum level. The level of sound that arises from a construction site depends on a number of factors and the estimation procedures need to take into account the following significant factors;

- the sound power outputs of processes and plant;
- the periods of operation of processes and plant;
- the distances from sources to receptor;
- the presence of screening by barriers;
- the reflection of sound;
- ground attenuation
- meteorological conditions (particularly wind speed and direction), and
- atmospheric absorption

Typical noise levels from construction works likely to take place during construction phase of proposed development are outlined in Table 13.

Table 13: Typical Noise Levels from Construction Works likely to take place during the construction phase of proposed development (Ref: BS 5228, Update of Noise Database for the Prediction of Noise on Construction and Open sites).

Activity	Plant	L_{Aeq} at 10m	Equivalent L_w used in Noise Prediction Model
Site clearance / excavation Removal of waste/rubble	Lorries (drive by) HGV and tippers	70 dB 84 dB	Construction activities represented as a continuous two distinct area of works on the site = Point Source L_w 115 dB(A) @ height of 2m.
Road works/landscaping	Surfacing/rolling	76 - 86 dB	
Infilling / Levelling	Dump truck Wheeled excavator/ Loader	82 dB 76 dB	
Lifting	Wheeled Mobile Telescopic Crane Mobile Telescopic Crane Mobile Telescopic Crane (Idling)	78 77 66	

Worst-case construction noise levels at noise sensitive receptors in the area of the proposed development have been predicted as outlined in Table 14. The closest residential noise sensitive receptors are approximately 300m from the nearest main construction areas on the warehouse development site. A worst case assessment of construction noise from the proposed development indicates that there will be no exceedance of the daytime construction noise limit of 65 dB $L_{Aeq,T}$ at the noise sensitive receptors in the area. It will be incumbent on the contractor to ensure that construction works are undertaken with particular sensitivity to ensure no significant construction noise impact. As stated, all construction works will take place during daytime hours and so the relative construction noise impact will not be significant.

Table 14: Predicted worst-case noise levels due to construction noise sources (Plant & equipment noise levels as outlined in BS5228) – See Figure 2.

Receiver	Predicted worst-case construction noise levels
NSR 1	60.3
NSR 2	60.5
NSR 3	59.6
NSR 4	44.5
Limit Value	65 dB(A)

4.3 Operation Phase

4.3.1 Operation Phase – Road Traffic Noise Impact

With regard to potential operational noise levels from the proposed development, AONA Environmental has based the assessment of the traffic noise impact on the surrounding road network based on the following relevant information from the Traffic Consultant and the Traffic Impact Assessment.

In terms of daily traffic, the core hours are the daytime hours from 07.00-19.00.

The vehicle trips from 07.00-19.00 are 413 arrivals and 413 departures.

The majority of the workforce (warehouse staff) arrive between 07.00 and 09.00 and depart between 16.00 and 17.00 with a smaller proportion (office staff) arriving between 08.00-09.00 and departing between 17.00 and 18.00. Therefore the peak hour flows in the TIA are heavily weighted toward cars related to the staff commuter movements, with the HGVs spread more evenly across the day (08.00-17.00).

The daily traffic is in the following percentage split :
- 90.5% cars/vans:
- 9.5% HGVs

This equates to approx. 40 HGV arrivals and 40 HGV departures per day (4-5 each way per hour from 08.00-17.00).

5.2 PERCENTAGE IMPACT ON KEY JUNCTIONS
The IHT and TII Guidelines for Transport Assessments state that the thresholds for junction analysis in Transport Assessments are as follows:
- "Traffic to and from the development exceeds 10% of the existing two-way traffic flow on the adjoining highway."
- "Traffic to and from the development exceeds 5% of the existing two-way traffic flow on the adjoining highway, where traffic congestion exists or will exist within the assessment period or in other sensitive locations".

R120 to south of Aerodrome Roundabout (Link J2-J3)
As noted in the previous section, the majority of development traffic will arrive and depart on the southern section of Jordanstown Road, passing through the Aerodrome Roundabout (i.e. in the AM peak hour there is a total of 47 pcu and in the PM peak hour there is a total of 125 pcu), with an element to/from the west to/from Newcastle, but with the predominant percentage of development traffic arriving from and departing to the southeast (to/from the N7 Junction 4).

Therefore, the worst case impact on the R120 to the south of the Aerodrome Roundabout (link J2-J3) during weekday peak hour conditions is as follows (comparing the Do Nothing and Do Something two-way total link flows):

- R120 south of Aerodrome Roundabout 2023 AM peak hour 2,384 v 2,417 pcu = +1.38%
- R120 south of Aerodrome Roundabout 2023 PM peak hour 2,194 v 2,282 pcu = +4.01%

R120 to South of Advanced Waste Access (Link J3-J4)

The worst case impact on the R120 to the south of the Advanced Waste Recycling priority junction during weekday peak hour conditions is as follows (comparing the Do Nothing and Do Something flows):

- R120 south of Advanced Waste 2023 AM peak hour 2,381 v 2,414 pcu = +1.39%
- R120 south of Advanced Waste 2023 PM peak hour 2,208 v 2,296 pcu = +3.99%

R120 Overbridge at N7 Junction 4 (Link J4-J5)

The worst case impact on the R120 overbridge at the N7 Junction 4 during weekday peak hour conditions is as follows (comparing the Do Nothing and Do Something flows):

- R120 south of N7J4 Northern Roundabout 2023 AM peak hour 2,173 v 2,199 pcu = +1.20%
- R120 south of N7J4 Northern Roundabout 2023 PM peak hour 1,869 v 1,901 pcu = +1.71%

R120 to east of Rathcoole Village Roundabout (Link J5-J6)

The worst case impact on R120 to the east of Rathcoole Village Roundabout (passing Avoca) during weekday peak hour conditions is as follows (comparing the Do Nothing and Do Something flows):

- R120 east of Rathcoole Village Roundabout 2023 AM peak hour 1,846 v 1,872 pcu = +1.41%
- R120 east of Rathcoole Village Roundabout 2023 PM peak hour 1,866 v 1,898 pcu = +1.71%

N7 Westbound Exit Slip to J6

The worst case impact on the N7 Junction 4 westbound exit slip during weekday peak hour conditions is as follows (comparing the Do Nothing and Do Something flows):

- N7-J4 Westbound Exit Slip 2023 AM peak hour 841 v 864 pcu = +2.73%
- N7-J4 Westbound Exit Slip 2023 PM peak hour 804 v 814 pcu = +1.24%

It should be noted that the percentage impact at each junction in the 2023 opening year will diminish slightly in the 2028 and 2038 design years as the background traffic growth increases the Do-Nothing total flow, while the development trips remain constant for each assessment year.

From the foregoing, it is clear that the proposed development will not have any significant traffic impacts on the road network during the AM or PM peak period, and the volume of off-peak movements are also at a level which will not result in operational issues for the road network or impact on road user safety.

To put changes in traffic noise levels into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB(A), while an increase or decrease of more than 25%, in traffic flow represents a change of 1 dB(A) in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds). Therefore, based on the above predicted changes in traffic flows, such as 'R120 south of Aerodrome Roundabout 2023 PM peak hour 2,194 v 2,282 pcu = +4.01%' will not result in a perceptible change in noise levels at the surrounding residential properties.

4.3.2 Operation Phase – Site Traffic & Activities Noise Impact

Noise Model Inputs -

The noise source levels input to the noise prediction model for the Site Traffic & associated activities are as follows;

HGV Traffic movements on site;

The proposed warehouse will be serviced by a HGV yard with 30 loading docks. The HGV yard will be located to the north and north-east of the proposed warehouse which will provide noise attenuation in terms of noise breakout towards the nearest residential properties. The car parking areas will be accessed separately from the HGV yard.

HGV Delivery vehicles entering and exiting the site; represented in the noise prediction model as a moving line source with a worst-case sound power level L_w = 105 dB(A), a source height = 1m at a speed of 15 Km/Hr. The noise prediction model assumes a worst-case scenario of 6 HGV Delivery vehicles per hour entering the site during daytime (7AM-7PM), 3 HGV Delivery vehicles per hour entering the site during evening (7PM-11PM) and 2 HGV Delivery vehicles per hour entering the site during night-time (7PM-7AM). Therefore, this would equate to 100 HGV Delivery vehicles per day entering the site during daytime, evening and night-time, i.e. a worst-case assessment.

Car Traffic movements on site;

Cars entering and exiting the site; represented in the noise prediction model as a moving line source with a worst-case sound power level L_w = 95 dB(A), a source height = 0.5m at a speed of 15 Km/Hr. There are 210 car parking spaces provided on the site. The worst-case 1-hour noise level prediction models assumes a worst-case scenario of 60 car movements/hour to the car parking areas during daytime, 10 car movements/hour to the car parking areas during evening and 10 car movements/hour to the car parking areas during night-time.

Loading Bay Activities on site;

AONA Environmental previously took measurements at a similar loading bay, the results of which are outlined in Table 15 . The assessment of the future delivery noise levels is based on an identical delivery process, i.e. reversing lorry to the unloading dock and then loading / unloading of the HGV.

Table 15: Noise survey results at a similar loading bay – measurements taken at ~1 m from the specific loading activities.

Measurement Details & Location	dB L_{Aeq}	dB L_{AMax}	dB L_{AMin}	dB L_{A10}	dB L_{A90}
Reversing Lorry @1m from loading bay	71.6	84.4	52.6	77.0	56.5
During loading of the lorry @1m from lorry in the loading bay	64.3	84.8	49.4	65.5	52.5

The unloading of the HGV delivery vehicle in the unloading bay has been represented as a Point Source with a Sound Power Level L_w = 97 dB(A), Source Height = 2m. It has been assumed that 3 HGVs are being loaded / unloaded in each of the Loading Bays simultaneously, i.e. 6 in total.

4.3.3 Predicted Noise Levels - Operation Phase

The predicted worst-case daytime and night-time noise levels due to the operation of the proposed warehouse development from noise prediction model are as follows;

Table 16: Predicted worst-case 1-hour daytime noise levels at sensitive receiver locations (See Figure 3).

Receiver	Predicted worst-case 1-hour daytime (7AM-7PM) levels $L_{Aeq,1\ Hour}$			
	HGV Traffic Only	Car Traffic Only	Loading Bay Only	Cumulative
NSR 1	21.8	31.1	14.2	31.6
NSR 2	28.2	39.9	14.0	40.2
NSR 3	33.9	40.9	16.5	41.7
NSR 4	25.8	27.7	18.3	30.2

Table 17: Predicted worst-case 1-hour night-time noise levels at sensitive receiver locations (See Figure 4).

Receiver	Predicted worst-case 1-hour night-time (7PM-7AM) levels $L_{Aeq,1\ Hour}$			
	HGV Traffic Only	Car Traffic Only	Loading Bay Only	Cumulative
NSR 1	17.1	23.3	14.2	24.6
NSR 2	23.4	32.1	14.0	32.7
NSR 3	29.1	33.1	16.5	34.7
NSR 4	21.1	19.9	18.3	24.7

The predicted noise levels from the proposed warehouse development indicate that the future noise levels will be well below the EPA suggested noise limits for daytime, evening and night-time. The existing traffic noise levels in proximity to the nearest noise sensitive receivers from the N120 and the M7 motorway will make the proposed warehouse development and its associated transportation movements relatively inaudible at the nearest sensitive receiver locations.

4.3.4 BS 4142: 2014 Assessment

A BS4142 assessment has been carried out to assess the potential for 'adverse impact' due to the predicted specific noise levels at the worst affected receiver property during daytime and night-time. A lesser noise impact will be experienced at all other residential properties in the area. The background noise level in the area is dominated by road traffic on the N7. The L_{A90} background noise level recorded during daytime and night-time at the noise monitoring location in close proximity to the nearest residential properties has been used in the BS 4142 assessment.

Table 18: BS 4142 assessment of the predicted specific noise levels at the worst affected noise sensitive receiver during daytime and night-time.

BS4142: Assessment Parameter	Daytime	Night-time	Notes
Ambient Sound Level L_{Aeq}	60.4	52.2	Existing Noise level. Noise level influenced by traffic on N7
Residual Sound Level L_{Aeq}	60.4	52.2	Residual Noise level influenced by traffic on N7.
Background Sound Level L_{A90}	57.8	47.5	Background Sound Level L_{A90} during daytime & night-time.
Predicted specific noise level from site	41.7	34.7	Predicted Specific Noise Level at façade of worst affected receiver.
Acoustic Feature Correction	0	0	Acoustic feature correction – No significant distinctive features at noise receptor location
Rating Level L_{Ar} (Specific Noise Level + Acoustic Feature Correction)	41.7	34.7	Predicted Rated Noise Level at façade of worst affected receiver.
Background Sound Level L_{A90}	57.8	47.5	Background Sound Level L_{A90} during daytime & night-time.
Excess of Rating Level over Background Sound Level	-16.1	-12.8	According to BS 4142:2014 the greater the difference between the Background Sound Level L_{A90} and the Rating Level L_{Ar} the greater the magnitude of the impact. No potential adverse impact is likely to occur.

The BS 4142: 2014 assessment outlined in Table 18 indicates that the proposed development of the site will not cause an adverse noise impact at the nearest properties in comparison to the existing noise climate in the area.

The proposed development will not cause an adverse noise impact because existing daytime and night-time background noise levels at the nearest properties will not be exceeded with the development in operation.

This is because "a difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context". In terms of context, the site is near to the N7 motorway with a constant traffic flow, which is clearly audible, and dominates the background noise level.

Vehicular traffic entering the site will travel at a relatively slow speed in comparison to the passing traffic on the N120 and N7 motorway. The daytime and night-time traffic flows on the N120 and N7 motorway as well as existing industrial development in the area will continue to dominate the noise climate in the area. Therefore, the noise from the proposed warehouse development will not significantly affect the existing noise levels in the area.

As outlined in the Guidelines for Noise Impact Assessment (October 2014) produced by the Institute of Environmental Management and Assessment (IEMA) a change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. The predicted maximum specific noise level from the proposed site of approximately 42 dB(A) $L_{eq,\ 1\ Hour}$ during daytime and 35 dB(A) $L_{eq,\ 1\ Hour}$ during night-time at the worst affected property is below the existing measured ambient sound level of 60 dB L_{Aeq} during daytime and 52 dB L_{Aeq} during night-time. Therefore, in terms of the overall noise impact, the magnitude of change in noise levels in the area will not be significant at the nearest residential properties.

5 Mitigation Measures

5.1 Do Nothing Scenario

In the event of the 'Do Nothing' scenario, no mitigation measures are necessary.

5.2 Construction Phase

To avoid significant construction noise impacts during the construction phase, the following mitigation measures will be adopted.

- To protect residential amenity, construction hours during site construction operations will be restricted to daytime hours as outlined;
- 0700 hours – 1900 hours - Monday – Friday
- 0800 hours – 1300 hours - Saturdays
- An on-site speed limit will be enforced for all traffic.
- The use of quiet working methods will be selected and the most suitable plant will be selected for each activity, having due regard to the need for noise control.
- Best practicable means will be employed to minimise noise emissions and will comply with the general recommendations of BS 5228. Operators will use "noise reduced" plant and/or will modify their construction methods so that noisy plant is unnecessary.
- All plant will be maintained in good working order. Where practicable, machines will be operated at low speeds and will be shut down when not in use.
- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately to minimise noise breakout from the site while still maintaining their effectiveness.
- If required, compressors will be of the "noise reduced" variety and fitted with properly lined and sealed acoustic covers.
- In all cases, engine and/or machinery covers should be closed whenever the machines or engines are in use.
- All pneumatic percussive tools will be fitted with mufflers or silencers as recommended by the equipment manufactures. Where practicable all mechanical static plant will be enclosed by acoustic sheds or screens.
- Employees working on the site will be informed about the requirement to minimise noise and undergo training on the following aspects:
- The proper use and maintenance of tools and equipment
- The positioning of machinery on-site to reduce the emission of noise to the noise sensitive receptors
- Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment
- The use and maintenance of sound reduction equipment fitted to power pressure tools and machines
- It is recommended that should complaints be received from nearby residential properties periodic noise monitoring will be undertaken during construction works to determine noise levels at noise sensitive receptors. Based on the findings of such noise monitoring, appropriate noise mitigation measures will be implemented to reduce noise impacts. Where excessive noise levels are recorded, further mitigation measures will be employed which may include temporary screening of the nearest receptor to on-site activities.
- Responsible Person - It is recommended that the Contractor will appoint a responsible and trained person who will be present on site and who will be willing to answer and act upon complaints and queries from the local public.

- To protect residential amenity, the cumulative noise level from construction activities on the development site (including plant and equipment) shall not exceed 65dB LAeq(12 hour) at residential dwellings outside the nearest window of the occupied room closest to the site boundary.

5.3 Operation Phase

No specific operational noise mitigation measures have been proposed but it is recommended that any external plant and equipment, if required in the future, is installed with suitable noise attenuation measures fitted. Ideally, such external plant and equipment, air handlings units, fans, etc. should all be fitted on the north or east facing facades of the warehouse building in order to be shielded from direct line of sight to any nearby residential properties.

6 Residual Impact

6.1 Do Nothing Scenario

In the event of the 'Do Nothing' scenario, there will be no residual effects.

6.2 Construction Phase

There will be no residual effects from the Construction Phase of the project.

6.3 Operation Phase

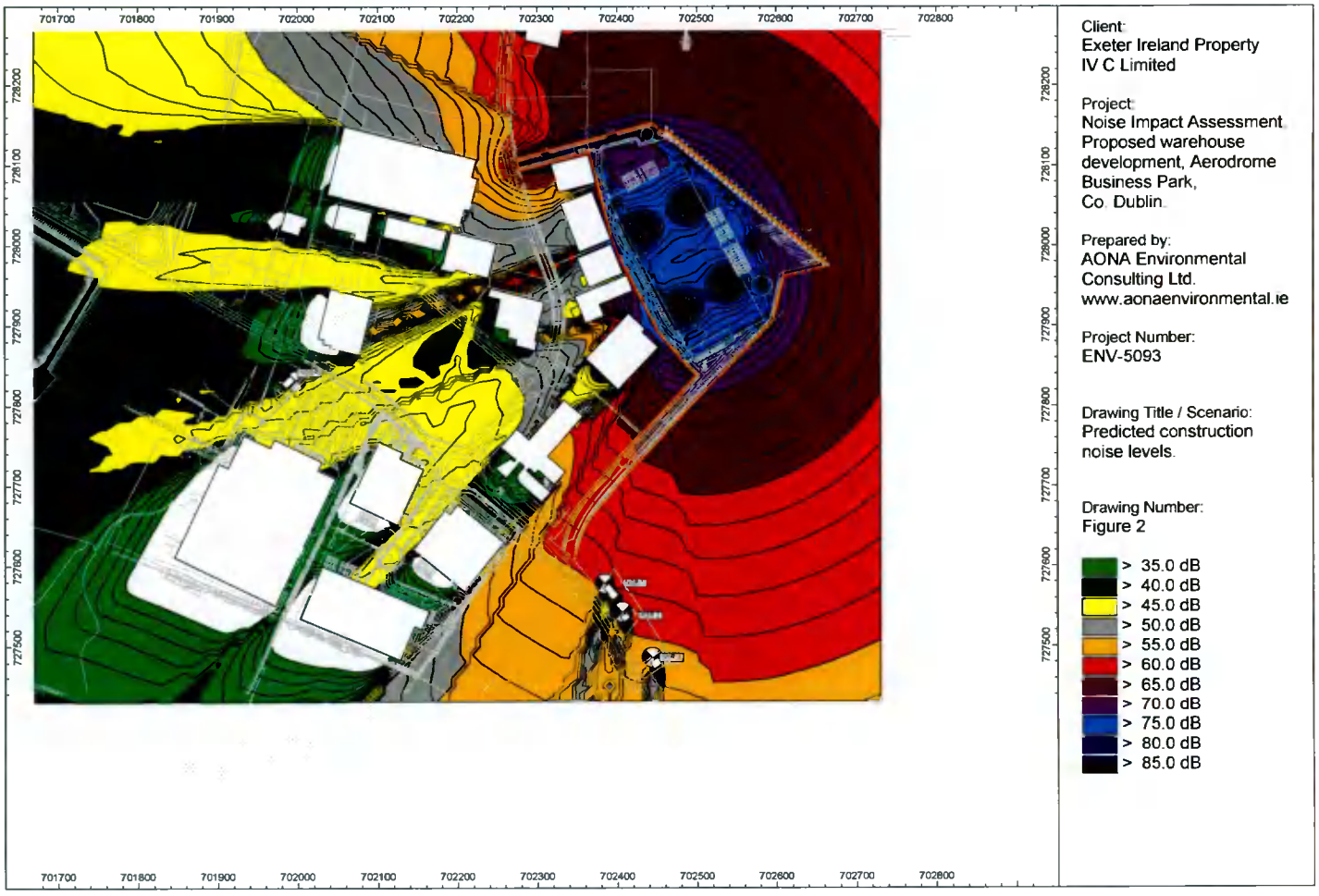
The noise impact of the proposed warehouse development will not be significant in relation to the existing background noise level in the area. There will be no significant residual impact from the operation of the proposed warehouse development.

7 Monitoring

No specific monitoring schedule is proposed. In the event of a noise complaint due to operations at the proposed warehouse development, a noise monitoring survey will be undertaken at the complainant property and if deemed necessary, suitable mitigation measures will be implemented on the site.

8 Difficulties Encountered in Compiling this Information

No difficulties were encountered in the preparation of the Noise Impact Assessment.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Exeter Ireland Property IV C Limited
Project:
Noise Impact Assessment. Proposed warehouse development, Aerodrome Business Park, Co. Dublin.
Prepared by:
AONA Environmental Consulting Ltd.
www.aonaenvironmental.ie
Project Number:
ENV-5093
Drawing Title / Scenario:
Predicted construction noise levels.
Drawing Number:
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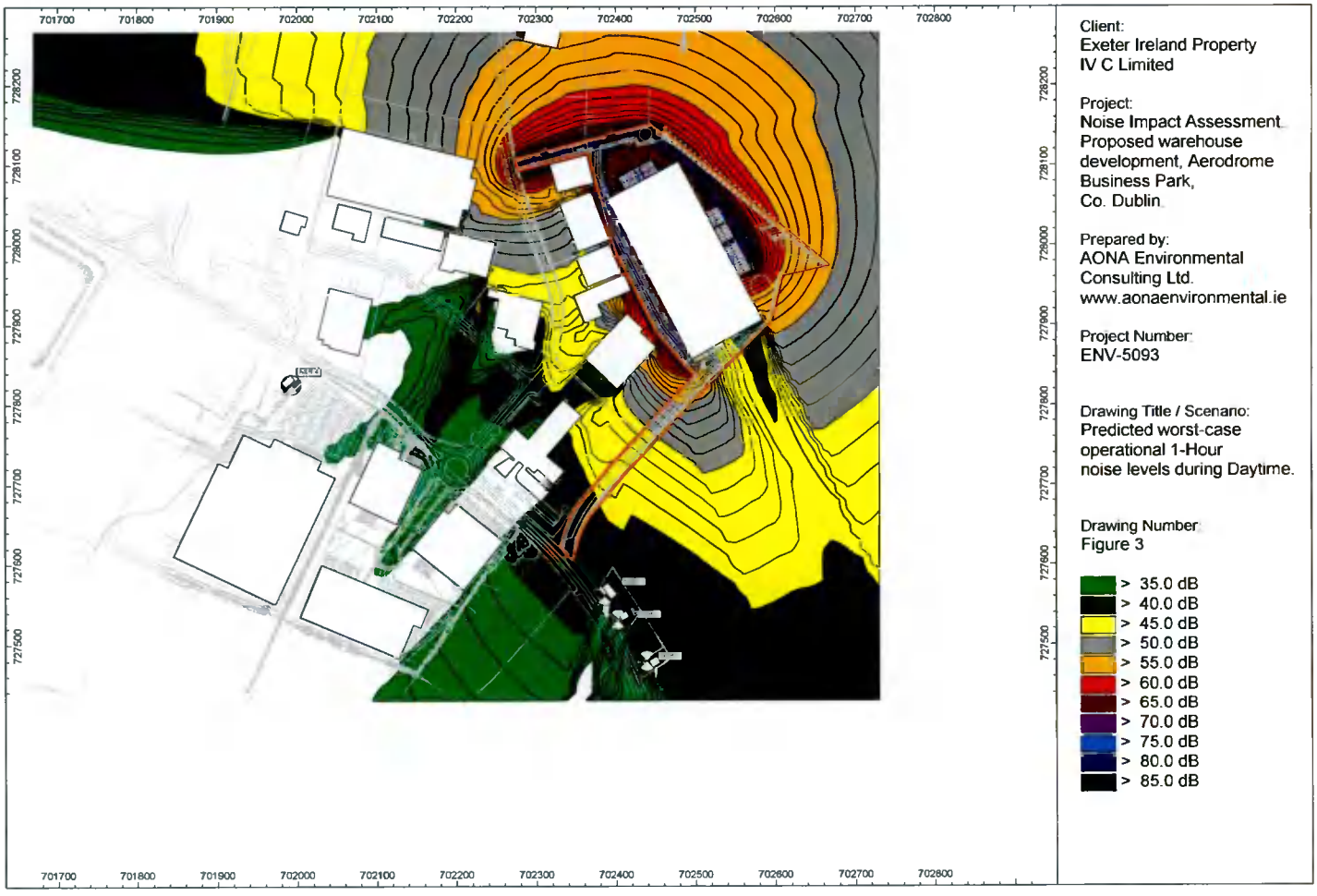
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Project:
Noise Impact Assessment Proposed warehouse development, Aerodrome Business Park, Co. Dublin
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www.aonaenvironmental.ie
Project Number:
ENV-5093
Drawing Title / Scenario:
Predicted worst-case operational 1-Hour noise levels during Daytime.
Drawing Number:
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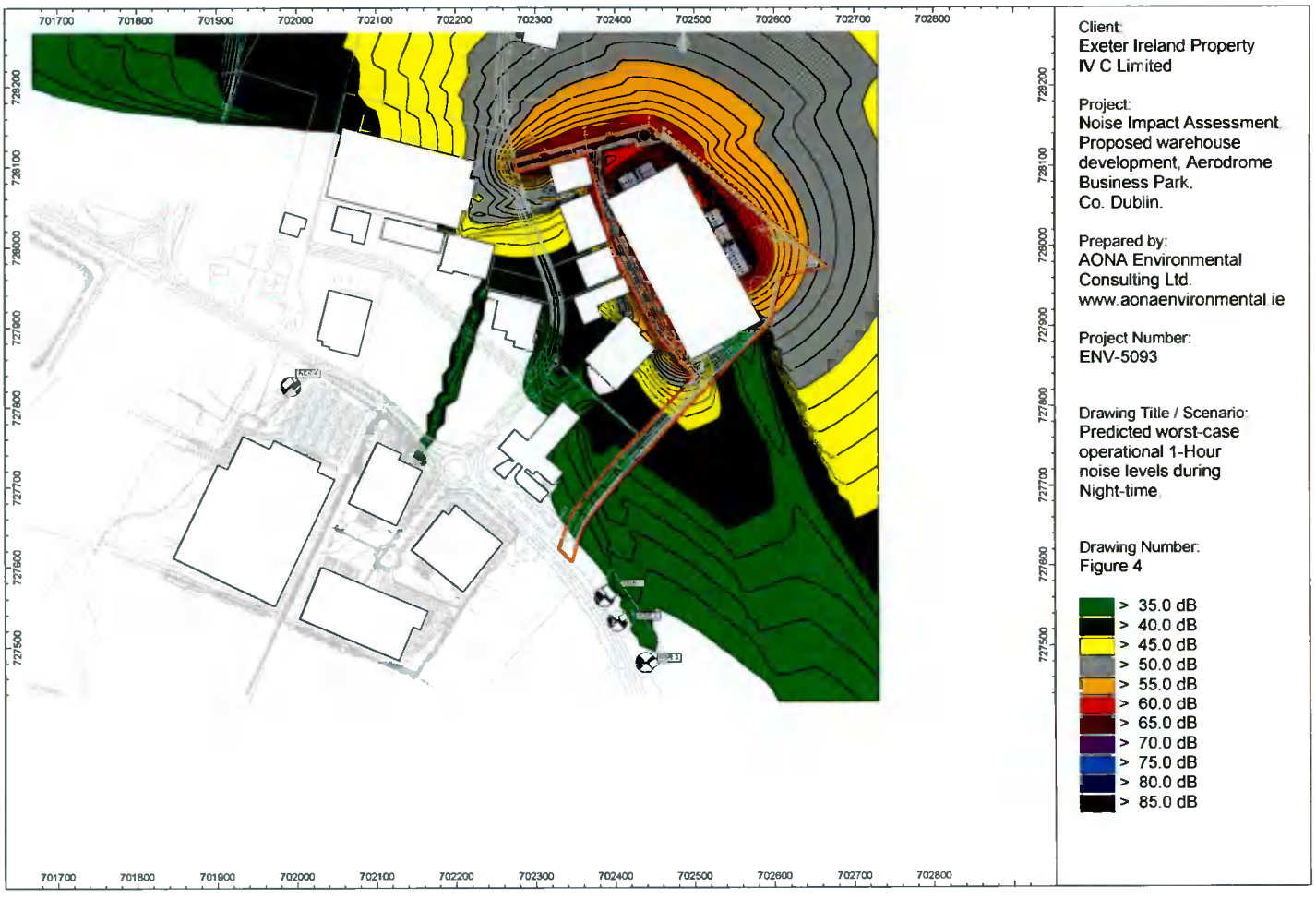
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Prepared by:
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Project Number:
ENV-5093
Drawing Title / Scenario:
Predicted worst-case operational 1-Hour noise levels during Night-time.
Drawing Number:
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