

**ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT**

**FOR A  
LARGE SCALE RESIDENTIAL DEVELOPMENT**

**AT  
LANDS NORTH OF OLD CONNAUGHT AVENUE  
OLD CONNAUGHT  
CO. DUBLIN**



**Prepared for**

Castlethorn Old Conna ULC

**Prepared by:**

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This report refers, within the limitations stated, to the condition of the site at the time of the report. No warranty is given as to the possibility of future changes in the condition of the site. The report as presented is based on the information sources as detailed in this report, and hence maybe subject to review in the future if more information is obtained or scientific understanding changes.

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## 1.0 INTRODUCTION

### 1.1 Terms of Reference

TraynorEnvironmental Ltd has been commissioned by Castlethorn Old Conna ULC to undertake an Environmental Noise and Vibration Impact Assessment in support of a planning application for a proposed Large-Scale Residential Development (LRD) at lands North of Old Connaught Avenue, Old Connaught, Co. Dublin.

The proposed development comprises 271 residential units in a mix of houses, duplex units and apartment blocks, together with a childcare facility, communal and public open spaces, internal roads, car parking, bicycle parking, utility infrastructure and all associated site development works.

Given the proximity of the site to the M11/N11 corridor, Old Connaught Avenue and the surrounding road network, an assessment of the potential noise and vibration impacts associated with both the construction and operational phases of the proposed development has been undertaken. The assessment also considers the potential effects of transportation noise on the future residential amenity of the proposed development and identifies the mitigation measures necessary to achieve an appropriate acoustic environment.

The purpose of this assessment is to:

- Characterise the existing acoustic environment at the site.
- Assess the potential construction-phase noise and vibration impacts.
- Assess operational environmental noise affecting the proposed development.
- Assess potential noise and vibration associated with rock excavation and hydraulic rock breaking, where required during construction.
- Determine the façade sound insulation and ventilation requirements necessary to achieve the internal ambient noise criteria contained within BS 8233:2014.

The assessment has been undertaken in accordance with current Irish and UK best practice guidance, including relevant British Standards, EPA guidance documents, BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*, ProPG: *Planning & Noise* (2017), BS 4142:2014+A1:2019 (where applicable to fixed building services plant), the WHO *Environmental Noise Guidelines for the European Region* (2018), and recognised acoustic assessment methodologies. The assessment incorporates baseline environmental noise monitoring, predictive noise modelling, construction noise and vibration assessment, façade sound insulation assessment and the preparation of an Acoustic Design Statement to demonstrate that the proposed development can achieve an appropriate standard of residential amenity.

### 1.2 Site Location and Description

The application site comprises approximately 24,148 m<sup>2</sup> (2.41 ha) of land located at lands North of Old Connaught Avenue, Old Connaught, Co. Dublin. The site is bounded by existing residential development, transport infrastructure and undeveloped lands, Old Connaught Avenue to the south, and the M11/N11 transport corridor to the east. The site is situated approximately 1.6 km west of Bray Harbour. The proposed development site location is illustrated in Figure 1.

The site currently comprises predominantly greenfield and undeveloped lands. Surrounding land uses include existing residential developments, commercial premises, local road infrastructure, and the M11/N11 road network. The site is located within an established suburban environment where road traffic on the M11/N11 corridor and the surrounding local road network, including Old Connaught Avenue, represents the principal source of environmental noise affecting the site.

The location of the proposed development in the context of the surrounding receiving environment is illustrated in Figure 1.

**Figure 1: Indicative site context map. (Source: Bing Maps)**

### 1.3 Existing Use

The subject site comprises predominantly greenfield and undeveloped lands located at lands North of Old Connaught Avenue, Old Connaught, Co. Dublin. The site is currently vacant and consists primarily of grassland and open land, with no significant existing built development within the proposed development area. The site is bounded by agricultural and undeveloped lands to the north and west, Old Connaught Avenue to the south, and the M11/N11 corridor to the east. The lands are currently undeveloped pending redevelopment for residential use.

### 1.4 Proposed Development

The proposed development comprises 271 no. dwellings in a mix of houses and duplex / apartment units, including 103 no. 2 to 3-storey houses (22 no. 4-bedroom, 68 no. 3-bedroom and 13 no. 2-bedroom), 162 no. apartments (113 no. 2-bedroom and 49 no. 1-bedroom) across 4 no. blocks ranging from 1-5 storeys in building height and 6 no. 3-bedroom duplex units; 1 no. creche (c. 574 sqm) at ground floor of Apartment Block 3; and all associated and ancillary site development and infrastructural works including on site attenuation, hard and soft landscaping and boundary treatment works, including: public open space; communal open space; components of the regional attenuation pond; public lighting; surface car parking spaces; bicycle parking spaces/stores for houses and duplex / apartment units; 5 no. ESB substations; bin stores; vehicular access via existing Old Connaught Avenue and a proposed new primary north-south street into the eastern portion of the Central Character Area. The proposed development also includes the construction of a new pumping station, associated single storey building, twin rising mains extending circa 400m along Old Connaught Avenue under the M11 connecting to the existing gravity foul network on Old Connaught Avenue 125m east of the M11 bridge and associated storage, together with all ancillary site development and reinstatement works required to facilitate these elements. The proposed development layout is shown in Figure 2.

**Figure 2: Proposed Site Layout.**

This Noise and Vibration Impact Assessment has considered the following:

- Compliance with BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings*.
- The World Health Organisation (WHO) *Guidelines for Community Noise* (2018).
- Dublin Agglomeration Noise Action Plan 2024–2028.
- ProPG: *Planning & Noise – Professional Practice Guidance on Planning and Noise for New Residential Development* (2017).
- Construction phase noise and vibration impacts.
- Operational phase noise impacts.
- Building envelope and façade acoustic design.

The findings of this assessment demonstrate that:

1. Road traffic associated with the N11/M11 corridor represents the dominant source of environmental noise affecting the site.
2. The assessment has been undertaken in accordance with current published EPA guidance, relevant British Standards, ProPG and recognised acoustic best practice.
3. Subject to implementation of the mitigation measures identified within this report, significant adverse noise or vibration impacts are not predicted during either the construction or operational phases of the development.

4. A Good Acoustic Design approach has been incorporated into the development through site layout, building orientation, building massing, façade design and ventilation strategy.
5. The proposed residential units and childcare facility can achieve the internal ambient noise criteria contained within BS 8233:2014 through implementation of the recommended façade and ventilation specifications.
6. External amenity areas have been positioned and designed to maximise residential amenity while minimising exposure to transportation noise sources, consistent with the principles of Good Acoustic Design and ProPG.

### 1.5 Response to Planning Authority LRD Opinion

This Noise Impact Assessment has been prepared having regard to the issues identified within the Planning Authority's LRD Opinion, together with observations received from Transport Infrastructure Ireland (TII) and the Environmental Enforcement Department.

In particular, the assessment addresses:

- Existing baseline environmental noise conditions at the site and surrounding area;
- Construction phase noise and vibration impacts, including consideration of potential rock breaking activities and confirmation that piling is not anticipated based on the available design information;
- Operational noise impacts associated with the N11 corridor and surrounding transport infrastructure;
- Inward noise impact assessment of the proposed residential development arising from road traffic noise sources;
- Internal and external residential amenity having regard to the requirements of BS 8233:2014 and ProPG: Professional Practice Guidance on Planning and Noise;
- Residential amenity associated with balconies and external amenity areas, including those located closest to the Indicative Luas Reservation identified within the development lands.
- Potential future impacts associated with the proposed N11/M11 Junction 4 to Junction 14 Improvement Scheme;
- Noise attenuation and mitigation measures incorporated into the proposed development to ensure an acceptable standard of residential amenity; and
- Operational noise associated with building services plant and mechanical equipment.

The assessment has been undertaken in accordance with relevant national guidance, recognised British Standards and applicable planning policy to determine the suitability of the proposed development from a noise and vibration perspective.

#### 1.5.1 N11/M11 Junction 4 to Junction 14 Improvement Scheme

The proposed development is located adjacent to lands reserved for the N11/M11 Junction 4 to Junction 14 Improvement Scheme. The scheme is being progressed by Wicklow County Council in conjunction with Dún Laoghaire-Rathdown County Council and Transport Infrastructure Ireland (TII) and comprises the proposed upgrade of approximately 22 km of the N11/M11 corridor between the M50/M11 interchange and Coyne's Cross, Co. Wicklow.

The scheme has been identified as a strategic transport infrastructure project within national planning policy and has been referenced within submissions received during the LRD Opinion process. Accordingly, consideration has been given to the potential influence of the existing N11/M11 corridor and the future road reservation area on the proposed development.

The assessment has therefore been undertaken using the existing road network which represents the current lawful baseline. The recommended façade specifications have been developed to provide a robust level of protection and may be refined at detailed design stage should the final N11/M11 scheme materially alter future façade incident noise levels.

The recommended façade specifications represent minimum performance standards. Should the final N11/M11 Improvement Scheme result in higher façade incident noise levels than those currently predicted, the glazing and ventilation specification can be refined at detailed design stage without affecting the planning assessment.

#### **1.6 Statement of Competence**

In accordance with Article 5(3)(a) of Directive 2014/52/EU, the Applicant has appointed suitably qualified and experienced competent experts to prepare this Noise and Vibration Impact Assessment. EPA guidance notes that competent experts should possess an appropriate combination of technical knowledge, practical experience and professional expertise, together with ongoing professional development relevant to the subject matter being assessed. The monitoring programme, data analysis, environmental noise modelling and report preparation were undertaken by Nevin Traynor of Traynor Environmental. Mr Traynor is certified as competent in Environmental Noise Measurement by the Institute of Acoustics (IOA) and has more than 25 years' experience in environmental noise, vibration and acoustic consultancy.

## 2.0 GUIDELINES AND METHODOLOGY

This assessment has been prepared with reference to the following guidance documents and standards:

- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise.
- BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration.
- BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound.
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.
- BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings – Part 1: Vibration Sources Other Than Blasting.
- BS 7385-1:1990 Evaluation and Measurement for Vibration in Buildings – Part 1: Guide for Measurement of Vibrations and Evaluation of Their Effects on Buildings.
- BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-Borne Vibration.
- ISO 1996:2017 Acoustics – Description, Measurement and Assessment of Environmental Noise.
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).
- ProPG: Planning & Noise – Professional Practice Guidance on Planning and Noise (2017).
- Dublin Agglomeration Noise Action Plan 2024–2028

The assessment has been undertaken using the following methodology:

- Baseline environmental noise monitoring was undertaken to quantify the existing acoustic environment at representative locations across the site.
- A review of the relevant standards, guidance documents and assessment criteria was undertaken to establish appropriate noise and vibration criteria for both the construction and operational phases of the proposed development.
- Predictive noise and vibration calculations were undertaken to assess the potential impacts associated with site preparation, excavation, localised rock breaking where required, foundation construction, general construction activities and construction traffic at the nearest noise-sensitive receptors.
- Environmental noise modelling was undertaken to predict future operational noise levels across the development site and at the façades of proposed buildings.
- A façade sound insulation assessment was completed to determine the acoustic performance requirements necessary to achieve compliance with BS 8233:2014 internal ambient noise criteria.
- External amenity areas were assessed with reference to the recommendations contained within BS 8233:2014 and the principles of Good Acoustic Design.
- Potential operational noise impacts associated with traffic, building services plant, residential activity and the proposed childcare facility were assessed.
- Mitigation measures were identified where necessary to minimise potential noise and vibration impacts during both the construction and operational phases of the development.
- An Acoustic Design Statement (ADS) was prepared to define the façade sound insulation, glazing and ventilation requirements necessary to achieve the recommended internal acoustic design criteria.

The assessment has also had regard to the Planning Authority's LRD Opinion, including comments relating to the N11/M11 Improvement Scheme, the Indicative Luas Reservation, balcony amenity, building services plant and construction activities involving rock breaking and piling.

## 2.1 Construction Phase - Assessment Criteria (Noise)

There is currently no statutory Irish guidance specifying maximum permissible construction noise levels for development projects. Accordingly, reference has been made to BS 5228-1:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*. This Standard provides guidance on the prediction, measurement and assessment of construction noise together with source noise data for a wide range of construction plant and activities. BS 5228-1 identifies threshold values that may be used to assess the significance of construction noise impacts at residential receptors. One commonly adopted approach is the ABC Method, which establishes threshold values based on the prevailing ambient noise environment. The example threshold values presented within BS 5228-1 are reproduced in Table 1.

**Table 1: BS 5228 – Example of significant effect at dwellings**

| Assessment Category and Threshold Value Period (L <sub>Aeq</sub> )                                                                                                                                                                                                                                                        | Threshold Value (dB)                                                                                                   |            |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------|------------|
|                                                                                                                                                                                                                                                                                                                           | Category A                                                                                                             | Category B | Category C |
| Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)                                                                                                                                                                                                                                                                     | 65                                                                                                                     | 70         | 75         |
| Evenings and weekends <sup>D</sup>                                                                                                                                                                                                                                                                                        | 55                                                                                                                     | 60         | 65         |
| Night-time (23:00 to 07:00hrs)                                                                                                                                                                                                                                                                                            | 45                                                                                                                     | 50         | 55         |
| <b>NOTE 1</b> A significant effect has been deemed to occur if the total L <sub>Aeq</sub> noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.                                                                                                       |                                                                                                                        |            |            |
| <b>NOTE 2</b> If the ambient noise level exceeds the threshold values given in the table (i.e., the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L <sub>Aeq</sub> noise level for the period increases by more than 3 dB due to construction activity. |                                                                                                                        |            |            |
| <b>NOTE 3</b> Applied to residential receptors only.                                                                                                                                                                                                                                                                      |                                                                                                                        |            |            |
| <sup>A</sup> Category A:                                                                                                                                                                                                                                                                                                  | threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.        |            |            |
| <sup>B</sup> Category B:                                                                                                                                                                                                                                                                                                  | threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values. |            |            |
| <sup>C</sup> Category C:                                                                                                                                                                                                                                                                                                  | threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values. |            |            |
| <sup>D</sup> 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays                                                                                                                                                                                                                                    |                                                                                                                        |            |            |

For residential receptors, a significant effect is generally deemed to occur where the total construction noise level exceeds the applicable threshold value identified in Table 1.

Where existing ambient noise levels exceed the threshold values presented in Table 1, BS 5228-1 indicates that a significant effect may occur where construction activities result in an increase in ambient noise levels of more than 3 dB.

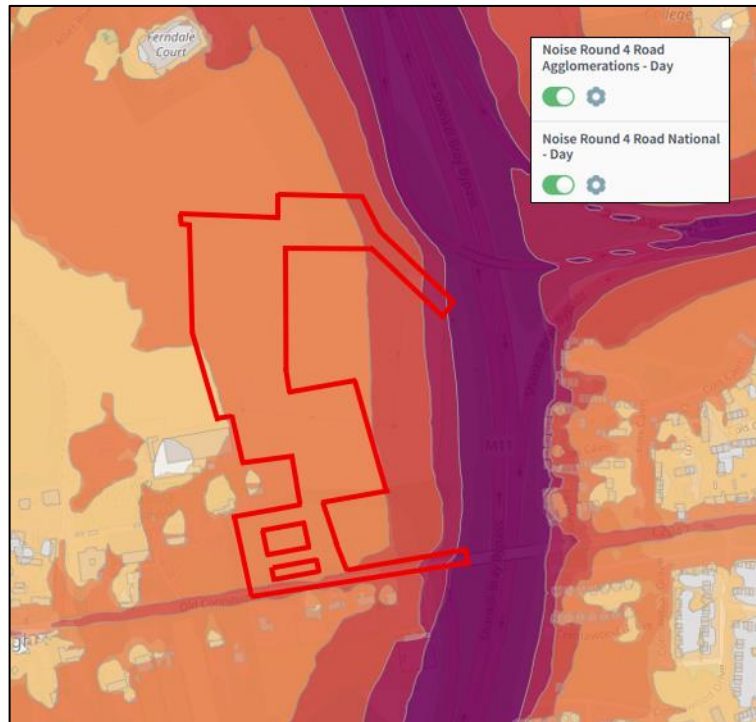
In general, the magnitude of construction noise impacts depends upon:

- The type and number of plant items in operation.
- The duration of the construction activity.
- The location of the activity relative to nearby sensitive receptors.
- The time of day during which the activity occurs.
- The construction methodology employed.

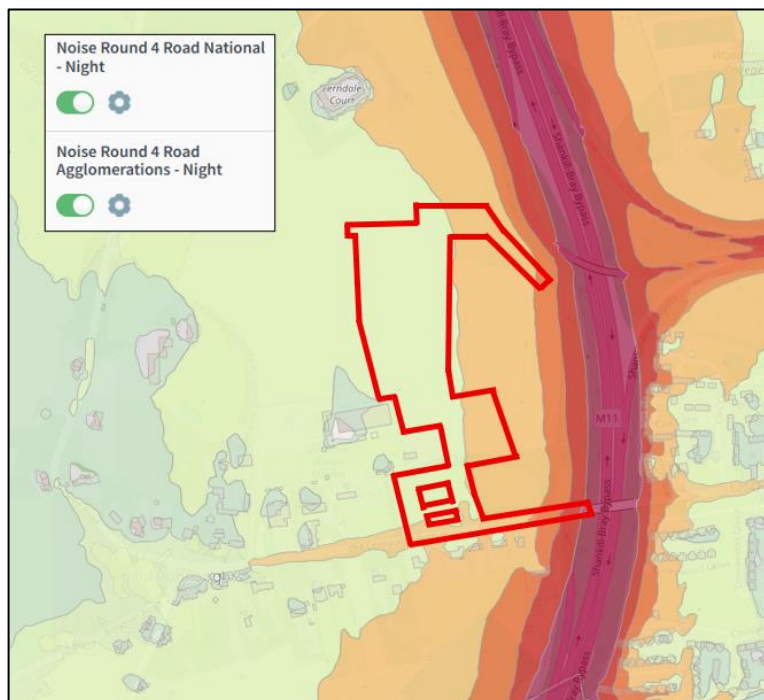
At the planning stage, a detailed contractor methodology is not available. Accordingly, a reasonable worst-case assessment has been undertaken based on representative plant and equipment associated with the principal construction phases, including site preparation, excavation, rock excavation, foundation construction, structural construction and external works. The assessment assumes that representative construction plant associated with each phase may operate concurrently within a defined work area. This approach provides a robust basis for the prediction of potential construction noise impacts and informs the mitigation measures identified later in this report. The site and surrounding receiving environment were reviewed with reference to EPA mapping resources and site-specific baseline noise monitoring. Relevant site context, including the N11/M11 corridor, surrounding residential receptors and the proposed development layout, is illustrated in Figures 3 and 4. For the purposes of this assessment, and to provide a

consistent and conservative basis for assessment, a daytime construction noise threshold of 65 dB LAeq,T has been adopted as a management criterion for nearby noise-sensitive receptors.

**Figure 3: EPA Strategic Noise Mapping  $L_{den}$**



**Figure 4: EPA Strategic Noise Mapping  $L_{night}$**



## 2.2 Construction Phase – Assessment Criteria (Vibration)

BS 5228-2:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration* outlines a number of methods for assessing and predicting vibration arising from construction activities.

The Standard references additional guidance documents which establish criteria relating to:

- Human disturbance:

- BS 6472-1:2008 *Guide to Evaluation of Human Exposure to Vibration in Buildings*.
- Building damage:
  - BS 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings – Guide to Damage Levels from Groundborne Vibration*.

### 2.2.1 Human Disturbance

BS 6472-1:2008 recommends assessment of human exposure to vibration using the Vibration Dose Value (VDV) methodology. However, for construction vibration assessments it is common practice to express vibration levels in terms of Peak Particle Velocity (PPV), as this parameter is routinely measured on construction sites and is directly comparable with building damage criteria.

Furthermore, the empirical vibration prediction methods contained within BS 5228-2 generally provide results in terms of PPV. Accordingly, PPV has been adopted as the primary vibration descriptor within this assessment.

Guidance regarding human perception and disturbance from vibration is summarised in Table 2.

**Table 2: Guidance on effects of vibration levels**

| Vibration Level  | Effects                                                                                                                                                                                                                                        |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0.14 mm/s</b> | Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.                                                |
| <b>0.3 mm/s</b>  | Vibration might be just perceptible in residential environments. It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents. |
| <b>1.0 mm/s</b>  | Vibration is likely to be intolerable for any more than a very brief exposure to this level.                                                                                                                                                   |
| <b>10 mm/s</b>   | Vibration would be readily perceptible and may be considered intrusive by occupants. While complaints are likely, cosmetic building damage would not normally be expected at this level.                                                       |

The vibration levels presented in Table 2 relate primarily to human perception and disturbance. These values are substantially lower than the vibration levels associated with cosmetic building damage presented in Table 3. It should be noted that vibration levels capable of causing disturbance to building occupants are significantly lower than those associated with cosmetic or structural building damage. Consequently, perceptible vibration may occur during certain construction activities without presenting any risk to nearby structures.

### 2.2.2 Building Damage

The response of a building to ground-borne vibration depends on a number of factors including foundation type, ground conditions, building construction and the structural condition of the building.

BS 7385-2:1993 provides guidance on vibration measurement, analysis and reporting together with threshold values above which cosmetic damage could occur.

**Table 3: Transient Vibration guide Values for Cosmetic Damage**

| Type of Building                                                                                 | Peak component particle velocity in frequency range of predominant pulse |                                                         |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------|
|                                                                                                  | 4Hz to 15Hz                                                              | 15Hz and above                                          |
| <b>Reinforced or framed structures<br/>Industrial and heavy commercial<br/>buildings</b>         | 50 mm/s at 4Hz and above                                                 | 50 mm/s at 4Hz and above                                |
| <b>Unreinforced or light framed Structures<br/>Residential or light commercial<br/>buildings</b> | 15 mm/s at 4Hz <sup>1</sup> increasing to 20 mm/s at 15Hz                | 20 mm/s at 15Hz increasing to 50 mm/s at 40Hz and above |

Minor cosmetic damage would not normally be expected below the guide values presented in Table 3. Structural damage would generally require vibration levels substantially in excess of these criteria.

BS 7385-2 further notes that historic or architecturally important buildings should not automatically be assumed to be more vibration-sensitive unless they are already structurally compromised.

Accordingly, while construction vibration may occasionally give rise to temporary perceptible disturbance, the potential for cosmetic building damage is generally low where vibration levels remain below the criteria presented in Table 3.

Where rock breaking or other high-vibration construction activities are undertaken near sensitive receptors, vibration monitoring may be implemented to verify compliance with the adopted criteria.

These criteria have been adopted in the assessment of potential vibration impacts associated with excavation, rock breaking and other high-impact construction activities identified within the Planning Authority's LRD Opinion.

### 2.3 Operational Phase - Noise Assessment Criteria

There is currently no specific national Irish planning noise standard for new residential developments. Accordingly, the operational noise assessment has been undertaken with reference to the following guidance documents:

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings;

- ProPG: Planning & Noise – Professional Practice Guidance on Planning and Noise (2017);
- EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Environmental Factors (2022) and relevant EPA guidance relating to noise impact assessment;
- BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound (where applicable to fixed plant and mechanical services);
- WHO Environmental Noise Guidelines for the European Region (2018); and
- Relevant planning policy and guidance published by Dún Laoghaire-Rathdown County Council, where applicable.
- Dublin Agglomeration Noise Action Plan 2024–2028. (for strategic environmental noise management context).

As there are no specific statutory external noise limits for new residential developments in Ireland, the assessment adopts the internal and external amenity criteria contained within BS 8233:2014 together with the principles of good acoustic design set out in ProPG. These documents provide the primary basis for assessing the suitability of the proposed residential development with respect to environmental noise arising from road traffic, building services plant and other operational noise sources.

#### 2.3.1 BS 8233:2014

The assessment of environmental noise ingress to the proposed development has been undertaken with reference to BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings.

BS 8233:2014 provides recommended internal ambient noise levels for residential accommodation, with the objective of achieving suitable acoustic conditions for resting, dining and sleeping. The relevant internal ambient noise criteria adopted for the proposed development are summarised in Table 4.

**Table 4: BS 8233:2014 Recommended internal noise limits**

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

The 30 dB LAeq,8hr night-time criterion within bedrooms represents the principal BS 8233:2014 internal ambient noise criterion applicable during the night-time period and has informed the façade sound insulation and ventilation strategy adopted for the proposed development.

In addition to the BS 8233:2014 LAeq internal ambient noise criteria, an internal design objective of 45 dB LAFmax has been adopted for individual night-time noise events within bedrooms, having regard to WHO guidance and established acoustic practice. This additional design objective has been considered as part of the assessment of night-time transportation noise and the development of the recommended façade and ventilation specifications.

The façade sound insulation assessment has therefore been undertaken with the objective of achieving the BS 8233:2014 internal ambient noise criteria, together with appropriate consideration of individual maximum noise events during the night-time period. The resulting acoustic requirements for glazing, ventilation and other façade elements are presented in Section 5.5 and Appendix B of this report.

### 2.3.2 Professional Practice Guidance on Planning and Noise (ProPG)

ProPG promotes the application of Good Acoustic Design as an integral part of the planning and design process. The guidance recognises that environmental noise should be considered alongside other planning objectives and encourages the use of site layout, building orientation, building massing, façade design and amenity space design to achieve acceptable living conditions for future occupants. The principles of Good Acoustic Design have therefore informed the assessment and design recommendations presented in this report.

## 2.4 External Amenity Space Noise Levels

With regard to noise levels in external amenity spaces refers to the BS8233:2014 guidance which states that: "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed, and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr".

It also states that:

"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."

After mitigation/with mitigation if the adverse noise impacts are still above the recommended noise levels they can be offset by providing an alternative amenity space to partially offset the noise impact by providing access to:

- *"a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5-minute walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."*

BS 8233:2014 elaborates on this further, it acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within the guideline values. In respect of gardens and patios, BS 8233:2014 states: "However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient

use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

BS 8233:2014 acknowledges that the recommended external amenity noise levels may not always be achievable, particularly within urban locations adjacent to strategic transport corridors. In such circumstances, developments should be designed to achieve the lowest practicable noise levels through the application of Good Acoustic Design principles, including site layout, building orientation and acoustic screening. Where guideline values cannot be fully achieved, consideration may be given to the provision of alternative or additional amenity areas, quieter façades and other compensatory design measures. Accordingly, exceedance of the recommended external amenity guideline values does not necessarily preclude residential development where appropriate mitigation and design measures have been incorporated.

This principle is particularly relevant to the proposed development given its proximity to the N11/M11 corridor and the Indicative Luas Reservation. The assessment has therefore considered both the achievement of desirable external amenity noise levels and the application of Good Acoustic Design measures, including building orientation, acoustic screening and the provision of alternative communal amenity spaces.

## 2.5 Operational (Traffic) Noise

Road traffic associated with the N11/M11 corridor and surrounding road network has been identified as the dominant source of environmental noise affecting the proposed development during the operational phase. The most appropriate criteria for assessing disturbance or annoyance from noise arising from the site would be related to the significance of perceived changes in noise levels. The Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Noise Impact Assessment' gives appropriate impacts which have been summarised with relevant guidance in Table 5. The criteria in Table 5 are provided for context when considering changes in traffic noise levels and are not used as the primary assessment criteria for residential amenity within this report.

**Table 5: Summary of Appropriate Impact from Change in Traffic Noise Levels**

| Change in Sound Level (dB) | Subjection Reaction              | Magnitude of Impact | EPA Glossary of Effects <sup>1</sup> |
|----------------------------|----------------------------------|---------------------|--------------------------------------|
| 0                          | No Change                        | None                | Imperceptible                        |
| 0.1 - 2.9                  | Barely perceptible               | Minor               | Slight                               |
| 3-4.9                      | Noticeable                       | Moderate            | Moderate                             |
| 5 - 9.9                    | Up to a doubling of loudness     | Substantial         | Significant                          |
| 10+                        | More than a doubling of loudness | Major               | Profound                             |

A change in traffic noise level of less than 3 dB is generally considered to be of low perceptibility and would not normally result in a significant impact. A change of approximately 3 dB is typically regarded as the minimum perceptible change in environmental noise levels, while increases of 5 dB or greater are generally considered readily noticeable.

The Design Manual for Roads and Bridges (DMRB LA111 Noise and Vibration) indicates that a change in traffic noise level of approximately 1 dB corresponds to a change in traffic flow of approximately 25%, assuming all other factors remain unchanged. A change of approximately 3 dB corresponds to a doubling or halving of traffic flow.

Accordingly, relatively substantial changes in traffic volumes are generally required before a noticeable change in environmental noise levels occurs.

### 3.0 RECEIVING ENVIRONMENT

#### 3.1 Development Description

The proposed development comprises 271no. dwellings in a mix of houses and duplex / apartment units, including 103no. 2 to 3-storey houses (22no. 4-bedroom, 68no. 3-bedroom and 13no. 2-bedroom), 162no. apartments (113no. 2-bedroom and 49no. 1-bedroom) across 4no. blocks ranging from 1-5 storeys in building height and 6no. 3-bedroom duplex units; 1no. creche (c. 574 sqm) at ground floor of Apartment Block 3; and all associated and ancillary site development and infrastructural works including on site attenuation, hard and soft landscaping and boundary treatment works, including: public open space; communal open space; components of the regional attenuation pond; public lighting; surface car parking spaces; bicycle parking spaces/stores for houses and duplex / apartment units; 5no. ESB substations; bin stores; vehicular access via existing Old Connaught Avenue and a proposed new primary north-south street into the eastern portion of the Central Character Area. The proposed development also includes the construction of a new pumping station, associated single storey building, twin rising mains extending circa 400m along Old Connaught Avenue under the M11 connecting to the existing gravity foul network on Old Connaught Avenue 125m east of the M11 bridge and associated storage, together with all ancillary site development and reinstatement works required to facilitate these elements.

#### 3.2 Noise Sensitive Receptors

The proposed development comprises a mix of residential dwellings, including houses and apartments, together with a crèche facility, all of which are considered noise-sensitive receptors. Residential receptors are particularly sensitive to environmental noise during both daytime and night-time periods, with sleep disturbance representing a key consideration during the night-time period. The proposed crèche has been considered specifically within the assessment due to the sensitivity of children to environmental noise and the requirement to maintain suitable internal and external acoustic conditions for learning, rest and play activities. In addition, external amenity areas associated with the development, including private gardens, balconies, communal open spaces, public open spaces, and the crèche outdoor play area, are also considered sensitive to environmental noise. The acoustic quality of these areas is an important consideration in ensuring an acceptable residential environment and maintaining the usability of outdoor spaces. The identification of these receptors forms the basis for the assessment of potential operational and construction noise impacts associated with the proposed development.

#### 3.3 Background Noise Survey

A baseline noise survey was undertaken at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996:2017 *Acoustics – Description, Measurement and Assessment of Environmental Noise* and followed the methodology contained within EPA NG4. The Noise Monitoring Locations (NMLs) are shown in Figure 5 below.

**Figure 5: Monitoring Locations**

Two long-term noise meters were set to monitor the noise levels continuously at NML1 & 2 from Thursday 23<sup>rd</sup> April – Thursday 30<sup>th</sup> April 2026 inclusive. The weather conditions were dry and calm throughout. All measurements were conducted at 1.50m above ground level.

### 3.3.1 Personnel and Instrumentation

Nevin Traynor of Traynor Environmental installed and removed the monitoring equipment. Class 1 Sound Level Meters were used throughout the survey and were calibrated prior to deployment. Instrument sensitivity was checked following completion of the survey, and no significant calibration drift was identified. Weather conditions were suitable for environmental noise monitoring throughout the survey period. The measurements were conducted using Class 1 Sound Level Meters. The microphones were fitted with 90 mm diameter windshields and were field calibrated before and after the monitoring period using a Class 1 acoustic calibrator. No significant calibration drift was observed. The calibration certificates for the sound level meter and acoustic calibrator are provided in Appendix C of this document.

### 3.3.2 Measurement Parameters

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

- $L_{Aeq}$ : is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
- $L_{A90}$ : is the sound level that exceeds 90% of the sample period. It is typically used as a descriptor for background noise.
- $L_{A10}$ : is the sound level that exceeds 10% of the sample period. It is typically used as a descriptor for traffic noise.
- $L_{AFMax}$ : is the maximum sound pressure level recorded during the sample period.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

### 3.3.3 Long Term Survey Results

The noise data were analysed and compiled into average daytime and night-time values for Day (07:00- 23:00) and Night (23:00-07:00) periods which are used in the Good Acoustic Design of the development. The full sets of monitoring results are presented in Appendices E and F for NML1 and NML2, respectively. The  $L_{den}$  value is used to assess the Noise Action Plan criteria. The results are given in Tables 6 & 7 below.

**Table 6: Summary of unattended noise monitoring results for NML1**

| Location                                    | $LA_{eq}$ (dB) | $LAF_{max}$ (dB) | $LA_{10}$ (dB) | $LA_{90}$ (dB) | Period    |
|---------------------------------------------|----------------|------------------|----------------|----------------|-----------|
| NML1 From the<br>23/04/2026 -<br>24/04/2026 | 58             | 68               | 60             | 56             | Daytime   |
|                                             | 54             | 65               | 57             | 50             | Nighttime |
| NML1 From the<br>24/04/2026 -<br>25/04/2026 | 57             | 66               | 58             | 55             | Daytime   |
|                                             | 52             | 63               | 55             | 48             | Nighttime |
| NML1 From the<br>25/04/2026 -<br>26/04/2026 | 58             | 66               | 59             | 56             | Daytime   |
|                                             | 55             | 62               | 56             | 53             | Nighttime |
| NML1 From the<br>26/04/2026 -<br>27/04/2026 | 57             | 67               | 58             | 55             | Daytime   |
|                                             | 55             | 62               | 56             | 53             | Nighttime |
| NML1 From the<br>27/04/2026 -<br>28/04/2026 | 56             | 69               | 58             | 54             | Daytime   |
|                                             | 55             | 66               | 57             | 52             | Nighttime |
| NML1 From the<br>28/04/2026 -<br>29/04/2026 | 57             | 68               | 59             | 55             | Daytime   |
|                                             | 54             | 64               | 56             | 51             | Nighttime |
| NML1 From the<br>29/04/2026 -<br>30/04/2026 | 56             | 66               | 57             | 54             | Daytime   |
|                                             | 50             | 61               | 53             | 45             | Nighttime |
| NML1 Average                                | 57             | 67               | 58             | 55             | Daytime   |
|                                             | 54             | 63               | 56             | 50             | Nighttime |

**Table 7: Summary of unattended noise monitoring results for NML2**

| Location                                    | LA <sub>eq</sub> (dB) | LA <sub>Fmax</sub> (dB) | LA <sub>10</sub> (dB) | LA <sub>90</sub> (dB) | Period    |
|---------------------------------------------|-----------------------|-------------------------|-----------------------|-----------------------|-----------|
| NML2 From the<br>23/04/2026 -<br>24/04/2026 | 58                    | 64                      | 59                    | 55                    | Daytime   |
|                                             | 56                    | 64                      | 58                    | 51                    | Nighttime |
| NML2 From the<br>24/04/2026 -<br>25/04/2026 | 58                    | 65                      | 59                    | 56                    | Daytime   |
|                                             | 55                    | 63                      | 57                    | 50                    | Nighttime |
| NML2 From the<br>25/04/2026 -<br>26/04/2026 | 58                    | 66                      | 59                    | 56                    | Daytime   |
|                                             | 53                    | 61                      | 55                    | 48                    | Nighttime |
| NML2 From the<br>26/04/2026 -<br>27/04/2026 | 57                    | 65                      | 58                    | 55                    | Daytime   |
|                                             | 52                    | 61                      | 55                    | 45                    | Nighttime |
| NML2 From the<br>27/04/2026 -<br>28/04/2026 | 57                    | 65                      | 59                    | 55                    | Daytime   |
|                                             | 54                    | 62                      | 57                    | 48                    | Nighttime |
| NML2 From the<br>28/04/2026 -<br>29/04/2026 | 58                    | 66                      | 60                    | 56                    | Daytime   |
|                                             | 53                    | 61                      | 57                    | 47                    | Nighttime |
| NML2 From the<br>29/04/2026 -<br>30/04/2026 | 58                    | 65                      | 59                    | 56                    | Daytime   |
|                                             | 54                    | 63                      | 56                    | 46                    | Nighttime |
| NML2 Average                                | 58                    | 65                      | 59                    | 56                    | Daytime   |
|                                             | 54                    | 62                      | 56                    | 48                    | Nighttime |

### 3.3.4 Summary of Baseline Environment

The baseline environmental noise survey confirms that road traffic associated with the surrounding road network principally the N11/M11 corridor and associated local road network, including Old Connaught Avenue, is the dominant source of environmental noise affecting the proposed development site.

Average daytime noise levels (LA<sub>eq,T</sub>) recorded during the unattended monitoring survey ranged from 57 dB(A) at monitoring location NML1 to 58 dB(A) at monitoring location NML2. Average night-time noise levels ranged from 54 dB(A) at NML1 to 54 dB(A) at NML2. The highest average daytime noise levels were recorded at NML2, where an average daytime LA<sub>eq,T</sub> of 58 dB(A) and an average night-time LA<sub>eq,T</sub> of 54 dB(A) were measured.

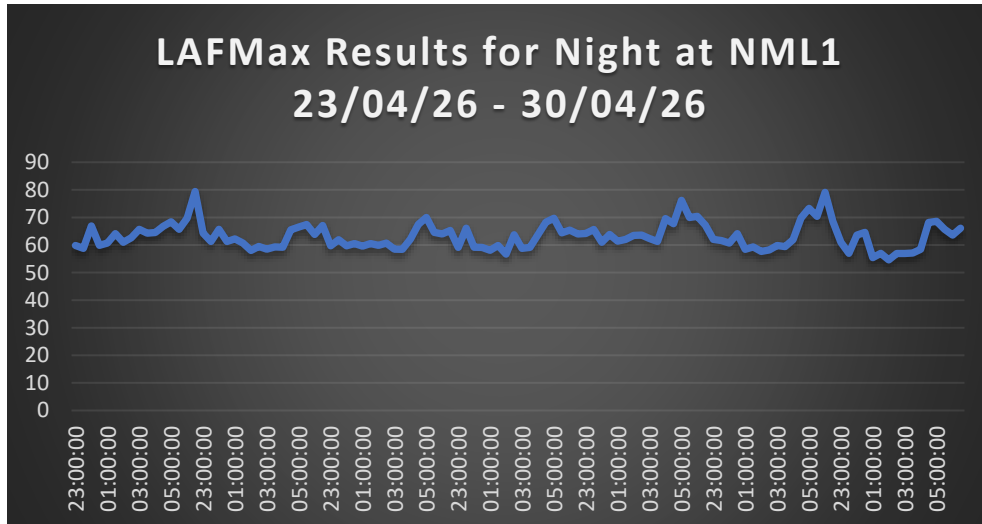
Average daytime LA<sub>10,T</sub> levels ranged from 58 dB(A) to 59 dB(A), while average daytime LA<sub>90,T</sub> levels ranged from 55 dB(A) to 56 dB(A). The relatively small difference between the LA<sub>10,T</sub> and LA<sub>90,T</sub> values indicate a consistent traffic-dominated acoustic environment with limited influence from intermittent noise sources.

Night-time maximum noise levels (LA<sub>Fmax</sub>) averaged 63 dB(A) at NML1 and 62 dB(A) at NML2 over the survey period. The measured night-time maximum noise events are primarily associated with passing road traffic on the surrounding road

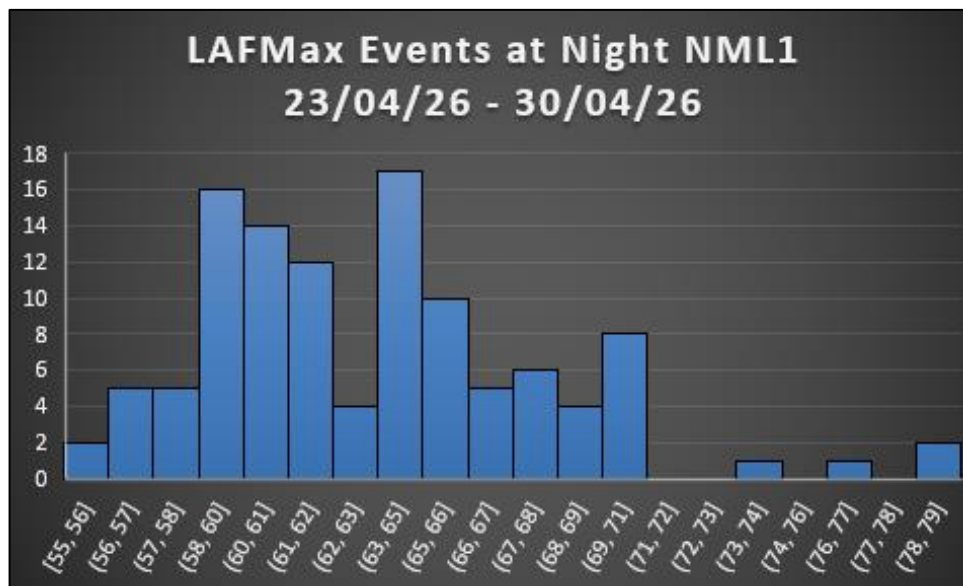
network. The frequency and magnitude of these events have been considered in the assessment of potential sleep disturbance effects and in the determination of façade sound insulation requirements for the proposed development.

Overall, the monitoring results indicate a relatively uniform acoustic environment across the site, characterised by moderate road traffic noise levels during both daytime and night-time periods. Road traffic noise therefore represents the principal acoustic consideration for the proposed development and forms the basis of the operational noise assessment presented in this report.

**Figure 6: LAF<sub>max</sub> Monitoring Data for NML1**



**Figure 7: Distribution of the magnitude of LAF<sub>max</sub> events for NML1**



### LAFMax Monitoring Results at Night

#### NML2

23/04/26 - 30/04/26

The graph displays a blue line representing the LAFMax monitoring results over a 72-hour period. The Y-axis is labeled from 0 to 80 in increments of 10. The X-axis shows time in 2-hour increments, starting from 23:00:00 on 23/04/26 and ending at 05:00:00 on 30/04/26. The line shows significant fluctuations, with peaks around 70-75 and troughs around 55-60.

| Time     | Value |
|----------|-------|
| 23:00:00 | 60    |
| 01:00:00 | 60    |
| 03:00:00 | 62    |
| 05:00:00 | 72    |
| 07:00:00 | 60    |
| 09:00:00 | 62    |
| 11:00:00 | 58    |
| 13:00:00 | 58    |
| 15:00:00 | 65    |
| 17:00:00 | 70    |
| 19:00:00 | 65    |
| 21:00:00 | 72    |
| 23:00:00 | 58    |
| 01:00:00 | 58    |
| 03:00:00 | 55    |
| 05:00:00 | 55    |
| 07:00:00 | 65    |
| 09:00:00 | 70    |
| 11:00:00 | 60    |
| 13:00:00 | 55    |
| 15:00:00 | 55    |
| 17:00:00 | 65    |
| 19:00:00 | 70    |
| 21:00:00 | 65    |
| 23:00:00 | 60    |
| 01:00:00 | 58    |
| 03:00:00 | 58    |
| 05:00:00 | 68    |
| 07:00:00 | 70    |
| 09:00:00 | 60    |
| 11:00:00 | 58    |
| 13:00:00 | 58    |
| 15:00:00 | 55    |
| 17:00:00 | 55    |
| 19:00:00 | 65    |
| 21:00:00 | 70    |
| 23:00:00 | 60    |
| 01:00:00 | 58    |
| 03:00:00 | 60    |
| 05:00:00 | 65    |
| 07:00:00 | 72    |
| 09:00:00 | 70    |

### LAFMax Events at Night NML2 23/04/26 - 30/04/26

| Age Range | Frequency |
|-----------|-----------|
| [55, 55]  | 5         |
| [55, 56]  | 5         |
| [56, 57]  | 4         |
| [57, 58]  | 7         |
| [58, 59]  | 14        |
| [59, 60]  | 8         |
| [60, 61]  | 10        |
| [61, 61]  | 5         |
| [61, 62]  | 7         |
| [62, 63]  | 2         |
| [63, 64]  | 8         |
| [64, 65]  | 3         |
| [65, 66]  | 4         |
| [66, 67]  | 5         |
| [67, 67]  | 5         |
| [67, 68]  | 0         |
| [68, 69]  | 2         |
| [69, 70]  | 1         |
| [70, 71]  | 8         |
| [71, 72]  | 9         |

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#### 4.0 IMPACT ASSESSMENT

The potential noise and vibration effects associated with the proposed development have been assessed for both the construction and operational phases. The assessment has been undertaken with reference to the existing acoustic environment, the characteristics of the surrounding receiving environment, the nature of the proposed development and the relevant national and international standards and guidance documents.

The assessment considers the potential effects on existing noise-sensitive receptors surrounding the site during construction, together with the suitability of the proposed residential development and associated amenity areas during the operational phase. Where potential impacts have been identified, appropriate mitigation measures have been developed in accordance with the principles of Best Practicable Means and Good Acoustic Design.

##### 4.1 Dublin Agglomeration Noise Action Plan 2024–2028

The proposed development is located within the Dublin Agglomeration and therefore falls within the area covered by the Dublin Agglomeration Noise Action Plan 2024–2028. The purpose of the Noise Action Plan is to identify locations where strategic environmental noise from major transport sources may require long-term management and to establish priorities for reducing population exposure to environmental noise.

The Action Plan adopts the following strategic environmental noise action thresholds:

- $L_{den} = 70 \text{ dB(A)}$
- $L_{night} = 57 \text{ dB(A)}$

These values are intended to identify locations that may warrant strategic noise management at an agglomeration level and should not be interpreted as planning design criteria for new residential development. Consequently, they have been considered for contextual purposes only.

The assessment of the proposed development has instead been undertaken using the more detailed guidance contained within BS 8233:2014, ProPG: Planning & Noise (2017) and relevant EPA guidance, which provide appropriate criteria for assessing residential amenity, internal living conditions and external amenity spaces.

The baseline monitoring survey and predictive noise modelling indicate that the proposed development is influenced primarily by road traffic on the adjacent N11/M11 corridor and the surrounding local road network. While these transportation sources define the existing acoustic environment, the assessment demonstrates that appropriate acoustic design measures can be incorporated within the proposed development to provide suitable internal and external residential amenity.

##### 4.2 Construction Phase

Construction activities have the potential to generate temporary increases in environmental noise and vibration at nearby noise-sensitive receptors. As detailed construction methodologies and contractor-specific information are not available at the planning stage, the assessment has been undertaken using a reasonable worst-case approach based on representative construction activities and plant identified within BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014.

The assessment considers the principal stages of construction likely to be associated with the proposed development, including site establishment, earthworks, foundation construction, structural works, road construction and landscaping. Representative construction plants have been selected for each phase to enable a robust assessment of likely construction noise and vibration emissions.

Construction works are anticipated to be undertaken during normal daytime working hours. Any work required outside these hours would be subject to appropriate management procedures, advance notification where necessary and compliance with any planning conditions attached to a future planning permission.

Given the temporary and progressive nature of construction activities, potential impacts will vary throughout the construction programme as work fronts move across the site. The highest potential impacts are expected during earthworks and foundation construction, when the greatest concentration of heavy construction plants is likely to be operating.

#### **4.2.1 Construction Receptors**

The construction assessment has considered the nearest existing noise-sensitive receptors surrounding the proposed development. These comprise:

- Existing residential properties located along Old Connaught Avenue;
- Existing residential properties adjoining the northern and western site boundaries;
- Educational and childcare facilities within the surrounding area; and
- Existing residential properties are located between the development site and the N11/M11 corridor.

These receptors represent the locations most likely to experience temporary construction noise and vibration during the development works.

Construction activities including site clearance, excavation, foundation construction, structural works, road construction and associated plant movements have the potential to generate elevated short-term noise levels. Due to the established urban setting and the proximity of existing residential properties, appropriate management of construction activities will be required throughout the construction programme.

The highest construction noise levels are anticipated during the groundwork and substructure phases, when excavation plant and heavy construction equipment are operating simultaneously. However, these activities will be temporary, localised and progressive in nature and will be managed through the implementation of the mitigation measures described in Sections 4.3.5 and 6.1 of this report.

#### **4.2.2 Rock Breaking Assessment**

During the LRD Opinion process, the Planning Authority requested that the assessment specifically consider the potential noise and vibration effects associated with rock breaking activities.

Earthworks information prepared for the proposed development indicates that the construction works will be predominantly fill-led, with only limited excavation of in-situ material anticipated. The estimated volume of excavation across all construction phases is approximately 48 m<sup>3</sup>, while approximately 24,124 m<sup>3</sup> of imported fill will be required to achieve the proposed site levels. Consequently, extensive rock excavation is not anticipated as part of the proposed development.

Nevertheless, a precautionary assessment has been undertaken to consider the potential requirement for localised rock breaking should isolated areas of competent rock be encountered during excavation or foundation construction.

Hydraulic rock breakers are recognised as one of the higher noise-generating items of construction plant and can produce elevated short-term noise levels together with perceptible ground-borne vibration. Representative source noise levels adopted within this assessment have been derived from BS 5228-1:2009+A1:2014, providing a robust basis for the prediction of worst-case construction noise.

Given the limited extent of excavation anticipated, any rock breaking activities are expected to be localised, intermittent and of relatively short duration. Significant vibration impacts or structural damage to nearby properties are therefore not anticipated.

Where rock breaking is required, the following mitigation measures shall be implemented:

- Restriction of rock breaking activities to approved daytime construction working hours;
- Advance notification to nearby residents prior to commencement of particularly noisy activities, where appropriate;

- Use of modern, well-maintained plant fitted with effective exhaust silencers and acoustic attenuation measures;
- Adoption of good site management practices, including minimising unnecessary plant idling;
- Programming of rock breaking activities to minimise their duration wherever reasonably practicable;
- Noise and vibration monitoring during rock breaking works were considered necessary; and
- Implementation of the construction noise and vibration mitigation measures outlined in Section 6.1 of this report.

The appointed Contractor shall prepare and implement a Construction Environmental Management Plan (CEMP) incorporating procedures for the management of construction noise and vibration throughout the construction programme. The CEMP shall be prepared in accordance with the recommendations of BS 5228 and shall include procedures for community liaison, complaint management, construction monitoring and the implementation of corrective measures where necessary.

#### 4.3 Construction Noise Criteria at Noise-Sensitive Receptors

The assessment of construction noise has been undertaken in accordance with BS 5228-1:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise. The guidance contained within BS 5228 provides a methodology for assessing the significance of construction noise at nearby noise-sensitive receptors using the ABC Method, which relates acceptable construction noise levels to the existing ambient noise environment.

The daytime ambient noise levels measured during the baseline survey have been reviewed to establish appropriate construction noise criteria for the nearest noise-sensitive receptors surrounding the proposed development. In order to provide a consistent and precautionary basis for assessment, a daytime construction noise criterion of 65 dB LAeq,T has been adopted for all identified receptors. This criterion is consistent with the Category A threshold defined within BS 5228-1 and represents the level above which significant construction noise effects may begin to occur.

The adopted construction noise criteria for the representative monitoring locations are presented in Table 8.

**Table 8: Construction Noise Threshold Values**

| Survey Location | Ambient Noise Level<br>Rounded to Nearest 5dB<br>LAeq | BS 5228-1 Category | Construction Noise Threshold Value (LAeq,T) |
|-----------------|-------------------------------------------------------|--------------------|---------------------------------------------|
| NML1            | 60dB                                                  | A                  | 65dB                                        |
| NML2            | 70dB                                                  | A                  | 65dB                                        |

The construction noise criteria presented in Table 8 are intended as assessment and management criteria rather than absolute limits. Short-term exceedances may occur during particular construction activities, such as demolition, excavation or localised rock breaking; however, these activities are temporary in nature and will be managed through the implementation of Best Practicable Means (BPM) in accordance with BS 5228 together with the mitigation measures described in Sections 4.3.5 and 6.1 of this report.

Throughout the construction programme, the appointed Contractor shall implement Best Practicable Means to minimise noise emissions, maintain effective communication with nearby residents and ensure that construction noise is managed in accordance with recognised industry best practice.

##### 4.3.1 Construction Plant & Site Noise Limits

Representative construction plant has been selected with reference to BS 5228-1:2009+A1:2014 to reflect the principal activities anticipated during the construction phase of the proposed development. The plant noise levels presented in Table 9 are representative source levels at a reference distance of 10 m and have been logarithmically combined to provide a conservative indication of the noise-generating potential associated with each principal phase of construction.

For the purposes of the assessment, the construction programme has been divided into the following representative phases:

- Site preparation and enabling works;
- General construction activities;
- Road construction and landscaping; and
- Groundworks, including excavation, localised rock breaking where required, and foundation construction.

At this stage, detailed contractor-specific information regarding the operating duration and utilisation of individual items of construction plant is not available. Accordingly, no blanket activity or utilisation correction has been applied to the combined plant noise levels presented in Table 9. The calculated levels therefore conservatively assume simultaneous operation of the identified plant and provide an upper-bound representation of construction noise at the reference distance.

**Table 9: Representative Construction Plant Noise Levels at 10 m**

| Activity                                   | Item of Plant (BS5228 Ref)                    | Qty | Total Noise Level<br>@ 10m |
|--------------------------------------------|-----------------------------------------------|-----|----------------------------|
| <b>Site Preparation<br/>(Phase 1)</b>      | Wheeled Loader – 52kW (D3.3)                  | 1   | 74                         |
|                                            | Tracked Loader – 56kW (D3.17)                 | 1   | 85                         |
|                                            | Dozer – 239kW (D3.27)                         | 1   | 81                         |
|                                            | Grader – 168kW (D3.75)                        | 1   | 84                         |
|                                            | Tipper Lorry – 75kW (D3.112)                  | 1   | 85                         |
|                                            | <b>Combined uncorrected level</b>             |     | <b>90.1</b>                |
| <b>General Construction<br/>(Phase 2)</b>  | Dump Truck – 29t (C2.30)                      | 1   | 79                         |
|                                            | Tracked excavator – 22t (C2.21)               | 1   | 71                         |
|                                            | Compressor (D7.08)                            | 1   | 70                         |
|                                            | Telescopic Handler – 4t (C4.54)               | 1   | 79                         |
|                                            | Diesel Generator                              | 1   | 61                         |
|                                            | <b>Combined uncorrected level</b>             |     | <b>82.6</b>                |
| <b>Roadworks/Landscaping<br/>(Phase 3)</b> | Asphalt Paver & Tipping Lorry – 112kW (C5.30) | 1   | 75                         |
|                                            | Electric Water Pump – 15 KW (C5.20)           | 1   | 68                         |
|                                            | Vibratory Roller – 89kW (C5.20)               | 1   | 75                         |
|                                            | <b>Combined uncorrected level</b>             |     | <b>78.4</b>                |
| dB re. 2x10 <sup>-5</sup> Pa               |                                               |     |                            |

The combined plant noise levels presented in Table 9 represent conservative source levels at a reference distance of 10 m. Site preparation and enabling works represent the highest routine construction noise source, with an uncorrected combined level of approximately 90 dB LAeq,T at 10 m. General construction activities and roadworks/landscaping have corresponding combined levels of approximately 83 dB LAeq,T and 78 dB LAeq,T at 10 m, respectively.

These reference levels should not be directly compared with the 65 dB LAeq,T daytime construction noise criterion adopted for residential receptors, as the criterion applies at the noise-sensitive receptor rather than at the 10 m source reference distance. Construction noise levels experienced at individual receptors will reduce with increasing separation distance and will also be influenced by screening, plant operating duration, construction sequencing and the location of individual activities within the site.

A conservative receptor-level assessment has therefore been undertaken for the principal routine construction phases using the combined source levels presented in Table 9 and the representative separation distances between the construction works and NSL1–NSL6. The calculation applies geometric distance attenuation from the 10 m reference distance and does not include additional attenuation associated with temporary screening, intervening structures, actual plant

utilisation or construction sequencing. The resulting levels therefore represent conservative receptor-level estimates based on simultaneous operation of the identified plant.

**Table 10: Conservative Construction Noise Levels at Representative Noise-Sensitive Receptors**

| Receptor | Distance | Site Preparation 90.1 dB | General Construction 82.6 dB | Roads/Landscaping 78.4 dB |
|----------|----------|--------------------------|------------------------------|---------------------------|
| NSL1     | 51 m     | 75.9                     | 68.4                         | 64.2                      |
| NSL2     | 88 m     | 71.2                     | 63.7                         | 59.5                      |
| NSL3     | 124 m    | 68.2                     | 60.7                         | 56.5                      |
| NSL4     | 127 m    | 68.0                     | 60.5                         | 56.3                      |
| NSL5     | 130 m    | 67.8                     | 60.3                         | 56.1                      |
| NSL6     | 132 m    | 67.7                     | 60.2                         | 56.0                      |

*Note: The above calculations include geometric distance attenuation only and do not include additional attenuation associated with acoustic screening, intervening structures, plant utilisation or construction sequencing.*

The assessment indicates that road construction and landscaping activities are predicted to comply with the adopted 65 dB LAeq,T daytime construction criterion at all representative receptors on the basis of distance attenuation alone. General construction activities are also predicted to comply at NSL2–NSL6, while the calculated level at the closest receptor, NSL1, is approximately 68 dB LAeq,T under the conservative simultaneous-operation scenario.

Site preparation and enabling works represent the principal potential routine construction noise constraint, with calculated levels above the adopted 65 dB LAeq,T criterion at the representative receptors where no allowance is made for screening, plant utilisation or construction sequencing. These calculations represent a deliberately conservative assessment and assume that all identified plant operates simultaneously at the stated source levels and at the representative minimum separation distance.

In practice, individual items of construction plant will operate at different locations and for varying periods throughout the construction programme and would not normally operate continuously and simultaneously at their closest position to a receptor throughout the full assessment period. Nevertheless, the assessment identifies the activities and locations where additional construction noise controls may be required.

Accordingly, where higher-noise site preparation or general construction activities are undertaken in proximity to existing noise-sensitive receptors, Best Practicable Means (BPM) shall be implemented in accordance with BS 5228-1:2009+A1:2014 and the construction noise mitigation measures identified in Section 6.1 of this report. Measures shall include, where appropriate:

- selection of suitably quiet plant and equipment;
- regular maintenance of construction plant and effective exhaust silencers;
- appropriate positioning of stationary plant to maximise separation and screening from nearby receptors;
- use of temporary solid hoarding and/or localised acoustic screening where practicable;
- avoidance of unnecessary simultaneous operation of high-noise plant in proximity to sensitive receptors;
- switching off plant when not in use;
- appropriate management and sequencing of plant operating periods; and
- construction noise monitoring where required to verify the effectiveness of the adopted mitigation measures.

Where detailed plant schedules and operating periods become available prior to or during construction, construction noise levels may be further assessed using documented plant operating periods and the calculation methodology set out in BS 5228-1:2009+A1:2014.

Actual construction noise levels experienced at nearby noise-sensitive receptors will depend upon a number of factors, including the separation distance between individual construction activities and receptors, the duration and utilisation of

individual items of plant, the location and movement of construction plant within the site, screening provided by existing and proposed buildings, temporary site hoarding and local topography, the sequencing and phasing of construction activities, and the construction methodology adopted by the appointed Contractor.

The highest potential construction noise effects are expected to occur during the early stages of the construction programme when relatively noisy plant is operating within portions of the site closest to existing noise-sensitive receptors. Such circumstances will generally be temporary and progressive as construction activities move through the site.

Localised rock breaking, should it be required, has the potential to generate higher short-term noise and vibration levels than routine construction activities and has therefore been assessed separately within this report, together with specific mitigation and monitoring measures.

### **General Construction Activities**

Following completion of the initial groundworks and foundation construction, the majority of construction activities will comprise structural works, external envelope construction, internal fit-out, landscaping and associated finishing works. These activities generally involve lower noise emissions than the early construction phases and, accordingly, are expected to result in lower noise levels at nearby noise-sensitive receptors.

### **Discussion**

The assessment identifies site preparation and enabling works as the principal potential source of routine construction noise, particularly where activities are undertaken within the portions of the site closest to existing residential receptors. The conservative receptor calculations demonstrate the need for appropriate construction noise management and mitigation during these works.

Subject to the implementation of Best Practicable Means, including appropriate plant selection and positioning, construction sequencing, temporary acoustic screening where required and construction noise monitoring where appropriate, construction activities can be effectively managed to minimise noise impacts at nearby noise-sensitive receptors.

The highest construction noise levels are expected to be associated with the early stages of the construction programme, including site preparation, excavation, foundation works and any localised rock breaking that may be required. These activities will be temporary, progressive and limited in duration.

Having regard to the existing acoustic environment, the temporary nature of the construction works, the separation distances to nearby receptors and the implementation of the mitigation measures identified within this assessment, the overall construction noise impact is assessed as temporary, slight adverse and not significant.

#### **4.3.2 Construction Phase – Vibration**

Construction activities have the potential to generate temporary ground-borne vibration at nearby sensitive receptors, particularly during earthworks, excavation, localised rock breaking and the operation of heavy construction plant. As detailed construction methodologies are not available at this stage of the project, the assessment has been undertaken using representative vibration levels presented in BS 5228-2:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration.

The assessment has considered the construction activities with the greatest potential to generate vibration and has adopted a precautionary approach based on representative worst-case plant and construction methods. This provides a robust assessment of the likely vibration environment during the construction phase.

The vibration assessment criteria adopted for this assessment are presented in Table 2 (Human Response to Vibration) and Table 3 (Cosmetic Damage Criteria). The adopted criteria comprise:

- 0.14 mm/s PPV for the onset of perceptible vibration under the most sensitive conditions; and

- 15 mm/s PPV for the prevention of cosmetic damage to residential buildings.

These values are widely adopted within Ireland and the UK for the assessment of construction vibration and provide an appropriate basis for assessing both human response and the potential for structural effects.

#### Discussion

The principal sources of vibration during the construction phase are expected to comprise excavation works, the movement of heavy construction plant and any localised rock breaking that may be required. Based on the earthworks information available, extensive rock excavation is not anticipated and therefore any vibration-generating activities are expected to be temporary, intermittent and localised.

Although vibration may be perceptible at the nearest residential properties during particular construction activities, predicted vibration levels are expected to remain substantially below the accepted threshold for cosmetic damage to buildings. Consequently, structural impacts are not anticipated.

Subject to implementation of the vibration management measures described in Section 6.1, together with the application of Best Practicable Means throughout the construction programme, the overall construction vibration impact is assessed as temporary, slight adverse and not significant.

#### 4.3.3 Construction Phase - Traffic Noise

In addition to construction activities within the site boundary, consideration has been given to noise arising from construction traffic accessing and egressing the site. Construction traffic will comprise deliveries of construction materials, plant and equipment, concrete deliveries, removal of surplus material and general contractor vehicle movements.

Construction traffic will utilise the existing road network serving the development and will be managed in accordance with the Construction Traffic Management Plan (CTMP) prepared for the project. The assessment has considered the anticipated vehicle movements associated with the principal phases of construction together with the prevailing traffic environment surrounding the site.

Predicted construction traffic movements during the principal phases of the development are summarised in Table 11.

**Table 11: Predicted Construction Traffic Noise Levels**

| Construction Phase              | No. of Trucks/peak hour | Calculated Noise at edge of road<br>(5m), dB LAeq, 1hr |
|---------------------------------|-------------------------|--------------------------------------------------------|
| Site Preparation (Stage 1)      | 2                       | 51                                                     |
| General Construction (Stage 2)  | 4                       | 56                                                     |
| Roadworks/Landscaping (Stage 3) | 2                       | 51                                                     |

The predicted construction traffic noise levels range from 51 dB LAeq,1hr during the site preparation and roadworks phases to 56 dB LAeq,1hr during the main construction phase. These values remain below the adopted daytime construction noise criterion of 65 dB LAeq,T.

The assessment has adopted a conservative approach by assuming that a significant proportion of daily construction traffic movements occur within a single representative peak hour.

#### Discussion

The existing acoustic environment surrounding the proposed development is already influenced by traffic on the N11/M11 corridor together with local traffic movements on the surrounding road network. Against this existing background, the additional contribution from construction traffic is predicted to be relatively small.

Given the temporary nature of construction traffic, the relatively low number of anticipated heavy vehicle movements and the existing traffic-dominated environment, construction traffic is not expected to materially alter the prevailing acoustic character of the area.

Accordingly, the construction traffic noise impact is assessed as imperceptible to slight adverse and not significant.

#### **4.3.4 Construction Noise and Vibration Mitigation**

The mitigation measures applicable to the construction phase are described in detail in Section 6.1 of this report. These measures have been developed in accordance with the principles of Best Practicable Means contained within BS 5228 and are intended to minimise noise and vibration impacts at nearby noise-sensitive receptors throughout the construction programme.

The appointed Contractor shall prepare and implement a Construction Environmental Management Plan (CEMP) incorporating a dedicated Noise and Vibration Management Plan (NVMP). The NVMP shall establish the procedures for managing construction noise and vibration, including monitoring requirements, community liaison procedures, complaint management, reporting arrangements and corrective actions where required.

The NVMP shall also include construction method statements for the principal phases of the works, identifying the specific mitigation measures to be implemented to minimise noise and vibration emissions so far as reasonably practicable. The plan shall be reviewed throughout the construction programme and updated where necessary to reflect changes in construction methodology or programme sequencing.

Effective communication with nearby residents and other sensitive receptors will form an integral part of the construction management process. Advance notification shall be provided prior to commencement of particularly noisy activities where appropriate, together with regular updates on construction progress and the anticipated duration of significant works.

Construction noise mitigation shall include, where appropriate:

- selection of suitably quiet plant and equipment;
- regular maintenance of construction plant;
- installation of effective exhaust silencers and acoustic enclosures where practicable;
- appropriate positioning of static plant to maximise screening from nearby receptors;
- use of temporary site hoarding and localised acoustic screening where beneficial;
- restriction of particularly noisy activities to approved daytime working hours;
- implementation of construction noise and vibration monitoring where required; and
- ongoing review of construction methodologies to ensure that Best Practicable Means continues to be applied throughout the works.

Where practicable, a continuous site hoarding shall be maintained around the active construction areas to provide visual screening and contribute to the reduction of construction noise at the nearest residential properties.

#### **4.4 Operational Phase**

The operational noise assessment considers all significant noise sources associated with the complete development. These include transportation noise from the surrounding road network, the proposed internal road network, fixed building services plant, residential activity and the proposed crèche facility. In addition, the assessment has considered the operation of external air source heat pumps serving the proposed houses together with the mechanical ventilation systems serving the residential development. The assessment has been undertaken with reference to BS 8233:2014, ProPG: Planning & Noise (2017) and, where appropriate, BS 4142:2014+A1:2019 for fixed building services plant.

The operational assessment has been undertaken with reference to the following principal receptors and assessment topics:

- Internal residential noise levels;
- External residential amenity areas;
- The proposed crèche facility;
- Building services, plant and mechanical equipment; and
- Transportation noise associated with the surrounding road network and future transport infrastructure.

There is currently no specific Irish planning standard establishing environmental noise limits for new residential developments. Consequently, the assessment has been undertaken with reference to BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings, ProPG: Planning & Noise (2017), relevant EPA guidance and, where applicable, BS 4142:2014+A1:2019 for fixed mechanical plant.

In addition, the assessment has considered the issues identified during the Planning Authority's LRD Opinion process, including the site's proximity to the safeguarded N11/M11 Junction 4 to Junction 14 Improvement Scheme, the Indicative Luas Reservation, the provision of suitable external residential amenity and the potential effects of operational building services plant.

The assessment has been undertaken using the principles of Good Acoustic Design, whereby the site layout, building orientation, façade design, ventilation strategy and provision of external amenity areas have been developed to minimise environmental noise impacts and provide an appropriate residential environment.

#### **4.4.1 Operational Noise Sources**

The principal source of environmental noise affecting the proposed development during the operational phase is transportation noise associated with the existing N11/M11 corridor and the surrounding road network. Road traffic therefore represents the dominant environmental noise source across the site.

The environmental noise model also includes the following operational noise sources associated with the proposed development:

- Traffic on the proposed internal road network;
- Representative operational noise from the proposed future Luas corridor;
- External air source heat pumps serving the proposed houses;
- Mechanical ventilation systems associated with the apartment buildings and crèche;
- Residential activity within the development;
- Servicing and maintenance activities; and
- Other ancillary building services plant.

Representative sound power levels have been adopted for the fixed plant items to provide a robust assessment of the completed development. The contribution from these sources is localised in nature and does not alter the overall acoustic character of the site, which remains dominated by transportation noise.

#### **4.4.2 Traffic-Related Noise Assessment**

The principal operational noise source affecting the proposed development is existing traffic on the surrounding road network rather than traffic generated by the development itself. Although the completed development will introduce additional vehicle movements, these represent a relatively small proportion of the existing traffic using the surrounding strategic and local road network and are not expected to materially alter the prevailing acoustic environment.

Traffic information used within the assessment has been obtained from the project Transport Assessment. The forecast traffic data has been reviewed to provide context regarding future traffic growth within the surrounding road network and to inform the operational noise assessment.

**Table 12: Summary of Baseline and Forecast Traffic Flows on the Surrounding Road Network**

| Road Link                          | Direction  | 2025 AADT | 2028 AADT<br>(Development) | 2043 AADT<br>(Development) |
|------------------------------------|------------|-----------|----------------------------|----------------------------|
| Ferndale Road                      | Northbound | 1,391     | 1,423                      | 1,585                      |
| Ferndale Road                      | Southbound | 1,897     | 1,942                      | 2,163                      |
| Ballyman Road                      | Eastbound  | 1,226     | 1,254                      | 1,397                      |
| Ballyman Road                      | Westbound  | 1,427     | 1,460                      | 1,626                      |
| Thornhill Road                     | Northbound | 5,901     | 6,039                      | 8,071                      |
| Thornhill Road                     | Southbound | 6,697     | 6,854                      | 11,311                     |
| Old Connaught Avenue (West of N11) | Eastbound  | 1,835     | 2,618*                     | 2,092**                    |
| Old Connaught Avenue (West of N11) | Westbound  | 2,864     | 3,458*                     | 5,498**                    |

The forecast traffic information indicates gradual increases in traffic volumes on a number of surrounding road links over the assessment period. Notwithstanding these increases, the existing N11/M11 corridor remains the dominant transportation noise source affecting the proposed development.

Transport Infrastructure Ireland has identified lands adjoining the proposed development for the future N11/M11 Junction 4 to Junction 14 Improvement Scheme. At the time of undertaking this assessment, detailed information regarding the final road alignment, vertical geometry, operational characteristics and associated traffic flows was not available. Consequently, the predictive noise model has been based on the existing road network together with the measured baseline environmental noise environment.

The recommended façade sound insulation, glazing and ventilation strategy has been developed having regard to the measured and predicted transportation noise environment. This provides a robust acoustic design solution capable of achieving the recommended internal noise criteria while also providing an appropriate level of resilience to potential future changes in the surrounding transport infrastructure.

Accordingly, no significant operational traffic noise impacts are predicted as a consequence of development-generated traffic, and the proposed development is considered capable of providing an acceptable residential acoustic environment subject to implementation of the recommended mitigation measures.

#### 4.4.3 Sleep Disturbance Assessment

Night-time transportation noise has been assessed with reference to the guidance contained within BS 8233:2014, which recommends that individual night-time noise events should not normally exceed 45 dB LAFmax within bedrooms if sleep disturbance is to be minimised.

The baseline monitoring survey indicates that night-time maximum noise events are principally associated with traffic movements on the surrounding road network. Average external night-time LAFmax values of approximately 62–63 dB(A) were recorded during the monitoring period at the representative monitoring locations.

The inward noise assessment demonstrates that bedrooms located at the most exposed façades require enhanced façade sound insulation together with an appropriate ventilation strategy to achieve the recommended internal ambient noise criteria. The glazing specifications, façade construction and ventilation measures presented in Appendix B have

been developed on the basis of the measured baseline environment and the predictive façade assessment undertaken for this development.

Subject to implementation of the recommended façade specifications, the proposed residential accommodation is capable of achieving the recommended internal night-time acoustic criteria contained within BS 8233:2014.

#### **4.4.4 Childcare Facility Assessment**

The proposed crèche represents one of the most sensitive daytime receptors within the development and has therefore been specifically considered as part of the operational assessment.

The facility is located within Block 3, where it benefits from the acoustic screening provided by the surrounding development and the separation distance from the principal transportation noise sources. This arrangement forms part of the overall Good Acoustic Design strategy adopted for the proposed development.

The predictive assessment indicates that suitable internal acoustic conditions can be achieved within activity rooms, sleep rooms and other occupied areas of the crèche through implementation of the recommended building envelope specification. The proposed outdoor play area also benefits from the screening provided by the surrounding buildings and is expected to provide an acceptable acoustic environment for children's play and outdoor activities.

Accordingly, no significant adverse operational noise impacts are predicted for the proposed crèche, and the proposed facility is considered suitable from an environmental noise perspective.

#### **4.4.5 Future N11/M11 Improvement Scheme**

The proposed development is located adjacent to lands safeguarded for the future N11/M11 Junction 4 to Junction 14 Improvement Scheme. During the LRD Opinion process, Transport Infrastructure Ireland (TII) requested that the potential interaction between the proposed residential development and the future strategic road scheme be considered as part of the environmental noise assessment.

The existing N11/M11 corridor currently represents the dominant source of environmental noise affecting the proposed development. Consequently, the acoustic design of the scheme has been developed having regard to the prevailing transportation noise environment together with the safeguarded road reservation adjoining the site.

At the time this assessment was undertaken, detailed information relating to the proposed road scheme, including the final horizontal and vertical alignment, operational traffic flows, road surface specification and associated mitigation measures, was not available. Accordingly, it has not been possible to undertake a quantitative assessment of the future scheme.

The environmental noise model has therefore been based on the measured baseline noise environment together with the existing operational road network. This represents the current environmental conditions experienced at the site and provides an appropriate basis for determining the façade sound insulation, glazing and ventilation requirements of the proposed development.

The assessment demonstrates that the recommended building envelope specifications are capable of achieving the internal ambient noise criteria contained within BS 8233:2014. Consequently, the proposed development has been designed using a robust acoustic strategy that provides an appropriate level of protection for future occupants while recognising the potential for future changes to the surrounding transportation infrastructure.

Should the N11/M11 Improvement Scheme progress, a separate Environmental Impact Assessment and detailed operational noise assessment will be undertaken as part of that project. Any additional mitigation measures associated with the future road scheme would therefore be considered during its own statutory planning process.

#### **4.4.6 Future Luas Corridor**

The Draft Old Connaught Local Area Plan identifies an Indicative Luas Reservation passing through the wider development area to facilitate the potential future extension of the Luas Green Line. During the planning process, consideration was given to the potential influence of this future transportation corridor on the proposed residential development.

At the time of undertaking this assessment, the proposed Luas extension remains at a strategic planning stage. Detailed information regarding the final alignment, track form, operational speed, service frequency, rolling stock specification and operational mitigation measures has not yet been published. Consequently, representative operational assumptions have been adopted within the environmental noise model to provide a precautionary assessment of the potential influence of the future Luas corridor.

Unlike the existing N11/M11 corridor, which currently dominates the environmental noise environment, the Indicative Luas Reservation represents a future transport proposal that has not yet progressed to detailed design. The assessment has therefore considered the potential contribution of light rail operations alongside the measured baseline transportation noise environment.

The predictive assessment indicates that the inclusion of the Indicative Luas Reservation does not alter the overall acoustic design strategy adopted for the proposed development. The recommended façade sound insulation, glazing specifications and ventilation strategy remain sufficient to achieve the internal ambient noise criteria contained within BS 8233:2014.

The assessment has also had regard to the potential for future operational mitigation measures to be incorporated within the Luas scheme, including low-noise track form, resilient rail support systems, routine rail maintenance and operational speed management through residential sections of the alignment. Such measures would further reduce operational noise emissions; however, responsibility for their implementation rests with the future transport project.

Accordingly, the proposed development is considered capable of providing an acceptable residential acoustic environment while also accommodating the strategic transport objectives identified for the area.

#### **4.4.7 Building Services Plant**

Operational building services plant associated with the proposed development includes external air source heat pumps serving the proposed houses, internal mechanical ventilation and heat-pump equipment serving the apartment buildings and crèche, together with 5no. ESB substations and associated electrical infrastructure.

The apartment ventilation and heat-pump equipment will be located internally within the respective buildings and is therefore not expected to give rise to significant environmental noise at nearby noise-sensitive receptors. External air source heat pumps serving the proposed houses have been specifically considered within the environmental noise model using representative manufacturer sound power data.

The proposed ESB substations will comprise fixed electrical infrastructure associated with the development. Detailed transformer equipment selections and associated acoustic data are not available at the planning stage. Accordingly, final plant and transformer equipment shall be selected, installed and, where necessary, acoustically treated to ensure that operational noise does not give rise to adverse effects at nearby existing or proposed noise-sensitive receptors.

All fixed plant associated with the proposed development shall be designed and selected having regard to BS 4142:2014+A1:2019 and any conditions imposed by the Planning Authority. Appropriate mitigation measures may include

suitable plant siting, proprietary acoustic enclosures, attenuators, vibration isolation and other manufacturer-specified acoustic treatments where required.

#### **4.4.8 Proposed Wastewater Pumping Station**

The proposed development includes a wastewater pumping station and associated single-storey building to facilitate the transfer of foul wastewater to the existing public sewer network. The pumping station will comprise below-ground wet wells containing submersible pumps together with associated mechanical and electrical infrastructure, including control equipment, odour control equipment, valve and flow meter chambers, chemical dosing equipment and ancillary plant.

The principal potential operational noise sources will arise from the above-ground mechanical and electrical equipment associated with the pumping station, including odour control and ventilation equipment, control plant and any standby power generation equipment, where provided. The wastewater pumps will be located below ground within reinforced concrete wet wells and will operate while submerged. As a result, airborne noise emissions from the pumping equipment are expected to benefit from substantial attenuation provided by the below-ground installation and surrounding structure. The pumping station will operate automatically in response to incoming wastewater flows. Modern pumping equipment and variable-speed operation, where incorporated within the detailed design, will assist in reducing rapid pump starts, hydraulic transients and associated vibration. Significant operational vibration effects are therefore not anticipated.

Detailed equipment selections and associated sound emission data for the pumping station plant are not available at the planning stage. Accordingly, the final mechanical and electrical plant shall be selected and installed during detailed design to ensure that operational noise remains acceptable at the nearest existing and proposed noise-sensitive receptors. Where required, appropriate acoustic mitigation measures may include proprietary acoustic enclosures, attenuators, silencers, acoustic louvres and vibration isolation measures.

Where a standby generator is provided, it shall be located within an appropriately acoustically treated enclosure and fitted with suitable intake, exhaust and ventilation attenuation. Routine testing, where required, should be undertaken during normal daytime hours and limited to the minimum duration necessary for maintenance and operational requirements.

Having regard to the predominantly below-ground arrangement of the principal pumping equipment, the separation from residential receptors and the ability to incorporate appropriate acoustic treatment into the final plant design, operational noise from the wastewater pumping station is not expected to materially alter the acoustic environment of the proposed development. Transportation noise associated with the N11/M11 corridor and the surrounding road network is expected to remain the dominant environmental noise source.

As part of the detailed design process, all fixed mechanical and electrical plant associated with the wastewater pumping station and associated single-storey building shall be selected, installed and maintained having regard to BS 4142:2014+A1:2019 and any relevant planning conditions imposed by the Planning Authority. Subject to appropriate equipment selection and acoustic design, significant adverse operational noise impacts associated with the pumping station are not anticipated.

## **5.0 ACOUSTIC DESIGN STATEMENT AND BUILDING ENVELOPE SPECIFICATION**

The acoustic design of the proposed development has been informed by the measured baseline environmental noise survey, predictive environmental noise modelling and the recommendations contained within BS 8233:2014, ProPG: Planning & Noise (2017) and relevant EPA guidance.

The objective of the building envelope design is to provide an internal acoustic environment suitable for residential occupation while maintaining appropriate standards of ventilation, thermal comfort and residential amenity. The façade design has therefore been developed as one element of the wider acoustic design strategy, alongside site layout, building orientation, building massing and the provision of screened external amenity areas.

The acoustic performance of the building envelope is determined by the combined performance of glazing systems, external wall construction, ventilation systems and roof elements where applicable. These elements have been assessed collectively to establish the façade sound insulation requirements necessary to achieve the recommended internal ambient noise criteria contained within BS 8233:2014.

The recommended façade specifications presented within this report represent the minimum acoustic performance necessary to provide suitable internal living conditions under the predicted operational noise environment.

### **5.1 Acoustic Design Statement**

#### **5.1.1 Introduction**

ProPG: Planning & Noise (2017) recommends that environmental noise should be considered from the earliest stages of the planning and design process. Rather than relying solely on enhanced façade construction, the guidance promotes the application of Good Acoustic Design, whereby site planning, building layout, orientation and external amenity provision are integrated with the acoustic design process to minimise environmental noise impacts wherever reasonably practicable.

The proposed development has been assessed in accordance with these principles. The Acoustic Design Statement demonstrates how the design has responded to the prevailing transportation noise environment and identifies the measures incorporated within the development to provide an appropriate acoustic environment for future residents and users of the proposed crèche.

The assessment considers the measured baseline environmental noise survey, predictive noise modelling, the proposed site layout and the recommended façade and ventilation specifications.

#### **5.1.2 Existing Noise Environment**

The proposed development is located within an established suburban environment where transportation noise forms the principal component of the existing acoustic climate.

Baseline environmental noise monitoring together with predictive noise modelling confirms that road traffic on the N11/M11 corridor represents the dominant source of environmental noise affecting the site. Additional contributions arise from traffic on Old Connaught Avenue and the surrounding local road network.

The highest external noise levels occur along the eastern portion of the site adjacent to the N11/M11 corridor. Noise levels reduce progressively across the development as a result of increased separation distances together with acoustic screening provided by the proposed building arrangement.

The acoustic design strategy has therefore focused on minimising exposure at the most affected façades while creating quieter internal residential streets, communal open spaces and private amenity areas wherever reasonably practicable.

### 5.1.3 ProPG Stage 1 – Initial Noise Risk Assessment

**Table 13: ProPG Stage 1 Initial Noise Risk Assessment Summary**

| Development Area                                        | Principal Noise Source        | Typical Noise Exposure        | ProPG Risk Category |
|---------------------------------------------------------|-------------------------------|-------------------------------|---------------------|
| Eastern Site Boundary adjacent to N11/M11 Corridor      | Road Traffic                  | Highest site exposure         | Medium Risk         |
| Southern Site Boundary adjacent to Old Connaught Avenue | Road Traffic                  | Moderate to elevated exposure | Medium Risk         |
| Internal Residential Streets                            | Road Traffic                  | Moderate exposure             | Low Risk            |
| Internal Courtyard Areas                                | Screened Transportation Noise | Reduced exposure              | Low Risk            |
| Communal Open Space Areas                               | Screened Transportation Noise | Reduced exposure              | Low Risk            |
| Childcare Facility                                      | Road Traffic                  | Moderate exposure             | Low Risk            |
| Western Site Boundary                                   | Local Road Traffic            | Lower exposure                | Low Risk            |

The initial noise risk assessment demonstrates that the proposed development comprises areas of Low and Medium Noise Risk under the ProPG framework. No areas are considered to fall within the High Risk category.

The Medium Risk areas are confined principally to the façades closest to the N11/M11 corridor and Old Connaught Avenue where transportation noise exposure is greatest. Elsewhere, the site benefits from increased separation distances together with screening provided by the proposed building layout.

A Medium Risk classification does not preclude residential development. Rather, it requires that Good Acoustic Design principles are incorporated throughout the development and that suitable façade mitigation measures are implemented where necessary.

### 5.1.4 ProPG Stage 2 – Good Acoustic Design

Following completion of the Stage 1 assessment, the proposed development was reviewed against the principles of Good Acoustic Design contained within ProPG.

The acoustic design process sought to reduce environmental noise exposure through site planning before reliance was placed upon building envelope mitigation. This approach recognises that successful acoustic design is achieved through the integration of planning, architecture, urban design and engineering considerations.

The principal design measures incorporated within the development include:

- In accordance with ProPG, Good Acoustic Design has been incorporated into the proposed development at an early stage through consideration of site layout, building orientation, building massing, façade design, and ventilation strategy.
- Key Good Acoustic Design measures incorporated within the development include:
- Location of apartment blocks closest to the N11/M11 corridor to provide acoustic screening for internal areas of the development;
- Creation of screened communal open spaces and residential amenity areas within the interior of the development;
- Orientation of noise-sensitive residential accommodation away from the most exposed façades where practicable;
- Use of enhanced glazing and façade specifications at locations subject to elevated transportation noise levels;

- Provision of alternative means of ventilation, thereby avoiding reliance on open windows to achieve acceptable internal acoustic conditions; and
- Adoption of a site layout that balances acoustic considerations with wider planning, architectural, transport and placemaking objectives.

Collectively, these measures reduce the exposure of future residents to transportation noise while allowing the development to achieve an appropriate balance between acoustic performance, residential amenity, placemaking, daylight, urban design and transport objectives.

#### **5.1.5 Building Envelope Strategy**

Although the proposed site layout provides significant acoustic benefits, elevated transportation noise levels remain at a limited number of façades closest to the N11/M11 corridor. Consequently, façade sound insulation forms an integral component of the overall acoustic design strategy.

The recommended glazing specifications, façade constructions and ventilation systems have been developed using the predicted façade noise levels obtained from the environmental noise model. Together, these elements provide the level of sound insulation necessary to achieve the recommended internal ambient noise criteria contained within BS 8233:2014.

Where enhanced glazing is specified, alternative means of background ventilation have also been incorporated to enable suitable internal acoustic conditions to be maintained without reliance on opening windows.

#### **5.1.6 Internal Noise Environment**

The proposed residential accommodation and crèche facility have been assessed against the recommended internal ambient noise criteria contained within BS 8233:2014. The assessment has considered both daytime and night-time occupancy together with the predicted façade noise levels obtained from the environmental noise model.

The façade sound insulation requirements have been determined from the predicted external transportation noise levels. Appropriate glazing specifications, external wall constructions and ventilation strategies have been developed to ensure that suitable internal acoustic conditions can be achieved throughout the proposed development.

Subject to implementation of the recommended façade specifications and ventilation strategy, compliance with the internal ambient noise criteria contained within BS 8233:2014 can be achieved within all habitable rooms, bedrooms and occupied areas of the proposed crèche.

#### **5.1.7 External Amenity Areas**

External amenity areas have been assessed with reference to the recommendations contained within BS 8233:2014 and the principles of Good Acoustic Design promoted by ProPG.

The principal communal open spaces, landscaped amenity areas, private rear gardens and the proposed crèche outdoor play area have been located within portions of the development benefiting from acoustic screening provided by the proposed buildings.

**Table 14: External Amenity Area Assessment**

| Amenity Area                   | Predicted Daytime Noise Level LAeq,T (dB) | BS8233 / ProPG Assessment |
|--------------------------------|-------------------------------------------|---------------------------|
| Central Communal Open Space    | <50 dB LAeq                               | Compliant                 |
| Northern Communal Open Space   | <50 dB LAeq                               | Compliant                 |
| Childcare Outdoor Play Area    | <50 dB LAeq                               | Compliant                 |
| Private Rear Gardens (Typical) | <50 dB LAeq                               | Compliant                 |
| Public Open Space Areas        | <50 dB LAeq                               | Acceptable                |

The assessment indicates that the principal communal amenity areas, private rear gardens and the proposed outdoor play area achieve suitable environmental noise levels for their intended use. While some private balconies located closest to the N11/M11 corridor may experience higher transportation noise levels, BS 8233:2014 recognises that elevated external noise levels may be unavoidable within higher-density urban developments.

In such circumstances, the availability of alternative communal amenity spaces forms an important component of the overall acoustic design strategy. The proposed development incorporates substantial communal open spaces located within acoustically screened parts of the site, thereby ensuring that residents have access to quieter external amenity areas.

Accordingly, the external amenity strategy is considered consistent with the principles of Good Acoustic Design contained within ProPG.

#### 5.1.8 Childcare Facility

The proposed crèche has been assessed as a sensitive daytime receptor. The facility has been positioned within the development to benefit from the screening effects provided by the surrounding buildings and increased separation from the principal transportation noise sources.

The building envelope specification has been developed to provide suitable internal acoustic conditions within activity rooms, sleep rooms and other occupied areas. The associated outdoor play area also benefits from the overall site layout and is predicted to provide an appropriate acoustic environment for outdoor activities.

Subject to implementation of the recommended façade and ventilation specifications, suitable internal and external acoustic environments can be achieved for the proposed crèche.

#### 5.1.9 Acoustic Design Statement Summary

The proposed development has been designed in accordance with the principles of Good Acoustic Design contained within ProPG: Planning & Noise (2017). Acoustic considerations have informed the development from the earliest stages of the design process through the integration of site layout, building orientation, building massing, façade design, ventilation strategy and external amenity provision.

The initial ProPG assessment indicates that the proposed development comprises areas of Low and Medium Noise Risk, with no areas classified as High Risk. The Medium Risk areas are principally confined to façades closest to the N11/M11 corridor and are appropriately addressed through the recommended façade sound insulation and ventilation measures.

The assessment demonstrates that, subject to implementation of the recommendations contained within this report, the proposed residential accommodation and crèche facility are capable of achieving the internal ambient noise criteria contained within BS 8233:2014. External amenity areas have also been designed to provide suitable acoustic environments consistent with the recommendations of BS 8233:2014 and the principles of Good Acoustic Design.

Accordingly, the proposed development is considered capable of providing a high-quality residential acoustic environment and is acceptable from an environmental noise perspective.

## **5.2 Ventilation**

The ventilation strategy for the proposed development has been designed in accordance with the requirements of Part F of the Building Regulations and forms an integral component of the overall acoustic design strategy.

Mechanical ventilation systems will provide the required background and whole-dwelling ventilation rates without reliance on opening windows. This approach enables compliance with the internal ambient noise criteria contained within BS 8233:2014, particularly at façades exposed to the highest transportation noise levels.

The proposed systems will provide filtered and tempered fresh air to habitable rooms while continuously extracting air from kitchens, bathrooms and utility areas. The ventilation strategy has been developed to ensure that the required ventilation rates can be achieved without compromising the acoustic performance of the building envelope.

Although occupants may choose to open windows for purge ventilation or personal comfort, compliance with the recommended internal ambient noise criteria is based on operation of the mechanical ventilation system with windows closed.

Where acoustically attenuated ventilation components are required, these shall be selected to ensure that the overall façade sound insulation performance assumed within this assessment is maintained.

## **5.3 Open Window Assessment**

Opening windows reduces the acoustic performance of the building envelope and may result in increased internal noise levels. However, the ability to open windows remains an important aspect of residential amenity and may be used by occupants for purge ventilation and personal comfort.

The assessment indicates that internal noise levels may exceed the recommended BS 8233:2014 internal ambient noise criteria where windows are partially open at the façades most exposed to transportation noise from the N11/M11 corridor.

This outcome is typical for residential developments located adjacent to strategic transport corridors and is recognised within BS 8233:2014. The proposed mechanical ventilation strategy has therefore been designed to enable the recommended internal acoustic criteria to be achieved without reliance on open windows under normal operating conditions.

## **5.4 Windows Closed**

With windows closed, the acoustic performance of the building envelope is significantly improved. The recommended glazing specifications, external wall constructions and ventilation systems have been developed to ensure that compliance with the internal ambient noise criteria contained within BS 8233:2014 can be achieved throughout the proposed development.

The façade specifications have been derived from the predicted external transportation noise levels and represent the minimum acoustic performance necessary to provide suitable internal daytime and night-time acoustic conditions within all habitable rooms, bedrooms and the proposed crèche.

## **5.5 Façade assessment and recommendations**

The façade sound insulation requirements have been determined using the measured baseline environmental noise survey together with the predicted external noise levels obtained from the environmental noise model. The assessment identifies the minimum acoustic performance required to achieve the internal ambient noise criteria contained within BS 8233:2014.

The controlling design condition for the proposed development is the recommended night-time bedroom criterion of 30 dB LAeq,8hr. Consequently, façade sound insulation requirements have been determined using the highest predicted night-time façade noise levels across the development.

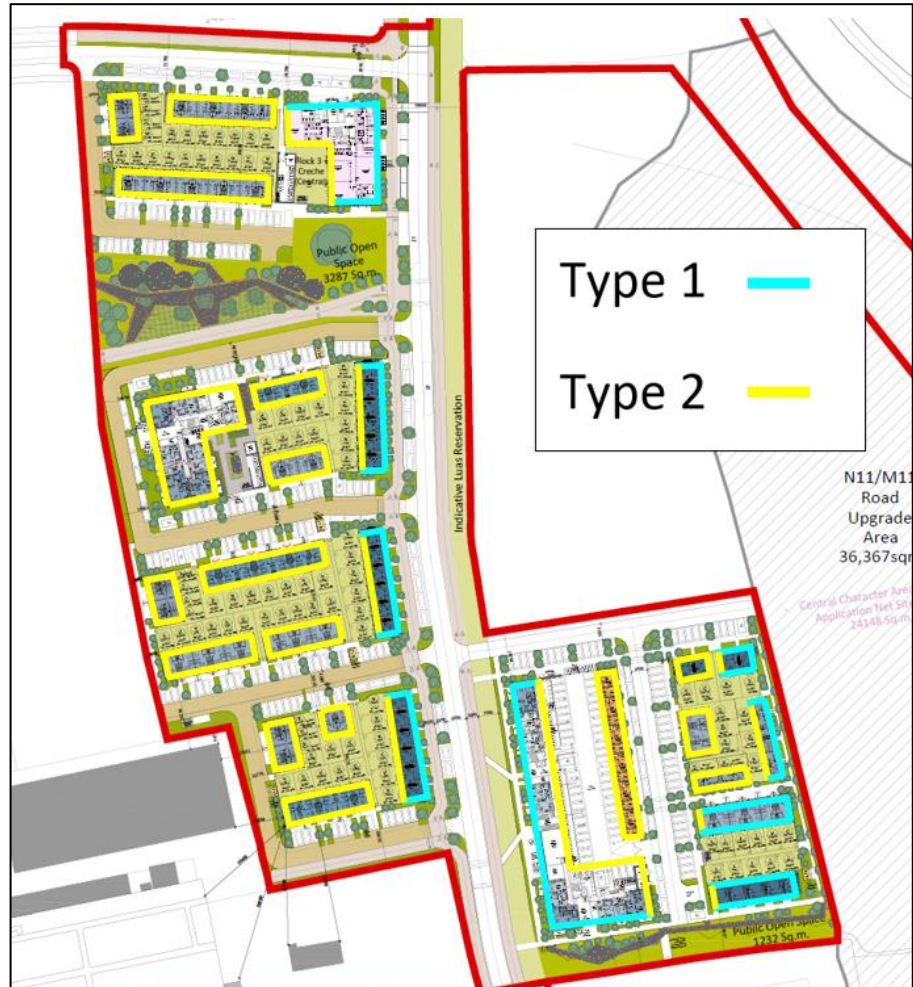
The acoustic performance of façade elements is expressed using the Weighted Sound Reduction Index (Rw). For transportation noise assessments, the Rw + Ctr parameter has been adopted as it provides a more representative measure of façade performance against the low-frequency characteristics associated with road traffic noise.

The assessment indicates that the majority of the proposed development can achieve the recommended internal ambient noise criteria using standard building construction. Enhanced acoustic glazing and acoustically attenuated ventilation are required only at façades exposed to the highest transportation noise levels adjoining the N11/M11 corridor and Old Connaught Avenue.

**Table 15: Façade Sound Insulation Requirements**

| <b>Façade Category</b>                | <b>Predicted External Noise Level</b> | <b>Minimum Glazing Performance</b>                                 |
|---------------------------------------|---------------------------------------|--------------------------------------------------------------------|
| Category 1 (Type1) Low Exposure       | ≤60 dB LAeq,16hr                      | Standard thermal double glazing                                    |
| Category 2 (Type 2) Moderate Exposure | 60–65 dB LAeq,16hr                    | Enhanced acoustic glazing (minimum 35 dB Rw+Ctr)                   |
| Category 3 (Type 3) Elevated Exposure | >65 dB LAeq,16hr                      | Enhanced acoustic glazing with acoustically attenuated ventilation |

The façade types illustrated in Figure 10 and detailed in Appendix B have been assigned according to the predicted external noise environment. These specifications represent the minimum acoustic performance necessary to achieve the internal acoustic design criteria contained within BS 8233:2014.

**Figure 10: Recommended Facades System**

Type 3 specification is retained as a contingency design standard for any façade requiring enhanced acoustic performance at detailed design stage. Based on the current environmental noise model and proposed development layout, no façades are presently identified as requiring the Type 3 specification.

### 5.6 Noise Model

Environmental noise predictions were undertaken using the proprietary environmental noise modelling software SoundPLAN. The model was developed using the Calculation of Road Traffic Noise (CoRTN) methodology together with the ISO 9613 sound propagation algorithms implemented within the software.

The environmental noise model incorporated the following information:

- Proposed site layout and building geometries;
- Existing buildings within the surrounding receiving environment;
- Ordnance Survey mapping of the surrounding area;
- Topographical survey information for the development site and surrounding lands;
- Traffic flow data for the existing N11/M11 corridor, Old Connaught Avenue and the surrounding local road network;
- Predicted traffic movements associated with the proposed internal road network;
- Representative operational assumptions for the Indicative Luas Reservation;
- External air source heat pumps serving the proposed houses, using representative manufacturer sound power data;
- Ground absorption characteristics and acoustic screening provided by existing and proposed buildings; and
- Baseline environmental noise monitoring undertaken at the site.

### N11/M11 Road Traffic Model Inputs

Road traffic associated with the N11/M11 corridor represents the dominant existing transportation noise source affecting the proposed development. Accordingly, the principal N11/M11 traffic parameters incorporated within the SoundPLAN environmental noise model are summarised in Table 16. The traffic inputs were modelled using the Calculation of Road Traffic Noise (CoRTN) methodology.

**Table 16: N11/M11 Road Traffic Noise Model Inputs**

| Road Link             | Traffic Flow (vehicles/hour) | % HGV | Speed    | Road Surface   | Assessment / Model Year |
|-----------------------|------------------------------|-------|----------|----------------|-------------------------|
| N11/M11 – North-bound | 1800                         | 16.7% | 100 km/h | Smooth Asphalt | 2026                    |
| N11/M11 – South-bound | 1800                         | 16.7% | 100 km/h | Smooth Asphalt | 2026                    |
| Old Connaught Avenue  | 1125                         | 8.2%  | 50 km/h  | Smooth Asphalt | 2026                    |

The traffic-flow values presented in Table 16 represent the hourly traffic flows adopted within the SoundPLAN environmental noise model and should not be interpreted as Annual Average Daily Traffic (AADT) values. The AADT data presented in Table 12 relate to daily traffic volumes and are therefore not directly comparable with the hourly model inputs.

The above traffic parameters represent the road traffic inputs used within the environmental noise model for the existing N11/M11 corridor. Road traffic noise emissions were calculated using the CoRTN methodology, with propagation between the road sources and receptors accounting for separation distance, topography, ground characteristics and screening provided by existing and proposed buildings.

The SoundPLAN model was validated against the measured baseline environmental noise levels at NML1 and NML2. The good agreement between measured and modelled levels provides confidence that the adopted road traffic inputs and model geometry provide an appropriate representation of the existing acoustic environment.

The model was used to predict daytime (L<sub>Aeq</sub>,16hr), night-time (L<sub>Aeq</sub>,8hr) and L<sub>den</sub> environmental noise levels throughout the proposed development. The modelling results informed the assessment of internal residential noise levels, façade sound insulation requirements, external amenity areas, balconies and the proposed crèche facility.

The SoundPLAN model therefore incorporates the principal existing and proposed transportation noise sources relevant to the development, including road traffic on the surrounding network, traffic movements on the proposed internal roads and representative operational noise associated with the future Luas corridor. External air source heat pumps serving the proposed houses have also been incorporated as fixed point sources using representative manufacturer acoustic data. The model geometry and acoustic screening assumptions have been developed having regard to the proposed site layout, building arrangement and topographical information available at the time of assessment. The modelling outputs have subsequently been used to inform the application of Good Acoustic Design principles and the façade and amenity assessments presented in this report.

The future N11/M11 Junction 4 to Junction 14 Improvement Scheme has not been incorporated within the environmental noise model. At the time of preparing this assessment, sufficient detailed information regarding the final road alignment, finished levels, future traffic flows, operational characteristics and associated mitigation measures was not available to enable a robust quantitative assessment. The implications of the safeguarded road corridor and the future road scheme are therefore considered separately in Section 5.7.

### 5.6.1 Model Validation

Noise levels measured during the baseline environmental noise survey were used to calibrate and validate the environmental noise model. Predicted noise levels were compared with measured noise levels at monitoring locations NML1 and NML2 for both daytime (07:00–23:00 hrs) and night-time (23:00–07:00 hrs) periods.

The results of the model validation are presented in Tables 17 and 18 below.

**Table 17: Daytime Modelled vs. Monitored Results  $L_{Aeq,T}$**

| Monitoring Position | Monitored $L_{Aeq}$ | Modelled $L_{Aeq}$ | Difference between modelled and measured noise level (dB) |
|---------------------|---------------------|--------------------|-----------------------------------------------------------|
| NML1                | 57                  | 58                 | +1                                                        |
| NML2                | 58                  | 55                 | -3                                                        |

All values are sound pressure levels in dB re:  $2 \times 10^{-5}$  Pa.

**Table 18: Nighttime Modelled vs. Monitored Results  $L_{Aeq,T}$**

| Monitoring Position | Monitored $L_{Aeq}$ | Modelled $L_{Aeq}$ | Difference between modelled and measured noise level (dB) |
|---------------------|---------------------|--------------------|-----------------------------------------------------------|
| NML1                | 54                  | 54                 | 0                                                         |
| NML2                | 54                  | 51                 | -3                                                        |

The comparison demonstrates good agreement between measured and predicted environmental noise levels. Differences between modelled and monitored results are within  $\pm 3$  dB, which is generally accepted as representing good agreement for environmental noise modelling of this nature.

Accordingly, the model is considered to provide an appropriate representation of the existing acoustic environment and is suitable for predicting environmental noise levels across the proposed development.

### 5.6.2 Noise contours

Daytime, night-time and  $L_{den}$  noise contour plots have been prepared to illustrate the predicted distribution of environmental noise across the proposed development.

The contour plots indicate that the highest environmental noise levels occur along the eastern portion of the site adjacent to the existing N11/M11 corridor. Noise levels reduce progressively across the development due to increased separation distance from the principal transportation corridor together with the acoustic screening provided by the proposed buildings.

The predicted noise contours also reflect the influence of surrounding local roads, the proposed internal estate roads and the representative operational assumptions adopted for the future Luas corridor. The contour plots have been used to inform the façade sound insulation assessment, allocation of façade types, external amenity assessment and the application of Good Acoustic Design principles throughout the development.

### 5.6.3 Noise Sources

The principal source of environmental noise affecting the proposed development is road traffic associated with the N11/M11 corridor and the surrounding local road network, including Old Connaught Avenue. Transportation noise remains the dominant contributor to the acoustic environment across the site.

The environmental noise model also includes the proposed internal road network, representative operational noise from the future Luas corridor and fixed building services plant associated with the development. In particular, external air source heat pumps serving the proposed houses have been included within the model using representative manufacturer sound power levels to assess their potential contribution to the operational noise environment.

Additional operational noise sources, including residential activity, servicing movements, communal amenity areas and the proposed crèche, are expected to be intermittent and of relatively low significance compared with the prevailing transportation noise environment. These sources are not considered to materially influence the overall acoustic design requirements for the development.

### 5.7 Future N11/M11 Improvement Scheme

Transport Infrastructure Ireland (TII), in its comments on the proposed development, identified the site's proximity to the proposed N11/M11 Junction 4 to Junction 14 Improvement Scheme and requested that the potential implications of the future road scheme be considered as part of the acoustic assessment.

At the time of preparing this assessment, sufficient detailed information relating to the final road alignment, finished levels, future traffic flows, operational characteristics and associated noise mitigation measures was not available to enable a robust quantitative assessment of the future scheme. Accordingly, the N11/M11 Improvement Scheme has not been explicitly incorporated within the environmental noise model. The acoustic assessment has instead been undertaken using the existing road network, which represents the current baseline transportation noise environment. This approach is consistent with the methodology described in Section 5.6.

The proposed development has nevertheless been designed having regard to its proximity to the existing N11/M11 corridor and the safeguarded transport corridor. The façade sound insulation, glazing specifications and ventilation strategy recommended within this report have been developed using measured baseline noise data together with the validated environmental noise model.

### Sensitivity Assessment

In order to test the robustness of the proposed acoustic design strategy to potential future changes in transportation noise, a sensitivity assessment has been undertaken for the most exposed façades located towards the eastern portion of the development.

For the purposes of this assessment, hypothetical increases of +3 dB and +5 dB have been applied to the predicted façade incident transportation noise levels. These increments are not predictions of the future operational noise impact of the N11/M11 Improvement Scheme. Rather, they represent precautionary sensitivity scenarios used to determine whether an appropriate acoustic design solution would remain available should future transportation noise levels increase above those assessed for the existing road network.

| Scenario                  | Increase Applied to Predicted Façade Noise Level | Acoustic Design Implication                                                                                                                                |
|---------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Current Assessed Scenario | 0 dB                                             | Façade, glazing and ventilation requirements as specified in Section 5.5 and Appendix B                                                                    |
| Sensitivity Scenario 1    | +3 dB                                            | Potential refinement of glazing and/or ventilation specification at the most exposed façades                                                               |
| Sensitivity Scenario 2    | +5 dB                                            | Higher-performance glazing and/or acoustically attenuated ventilation may be required at the most exposed façades, subject to detailed design verification |

The sensitivity assessment indicates that increases of +3 dB or +5 dB in façade incident transportation noise would not fundamentally alter the acoustic design strategy for the proposed development. Rather, any increase would principally affect the acoustic performance required from glazing and, where applicable, façade ventilation elements serving the most exposed dwellings.

The façade specifications identified within this assessment represent minimum planning-stage performance requirements. Where higher external noise levels arise, enhanced glazing and acoustically appropriate ventilation systems can be specified to provide additional façade attenuation while maintaining the internal ambient noise criteria adopted within this assessment. The final specification would be determined having regard to the external incident noise level, room use, glazing area, room volume and ventilation arrangement applicable to the individual dwelling.

Accordingly, the sensitivity assessment demonstrates that an available acoustic design pathway remains for increases of up to +5 dB above the currently predicted façade incident transportation noise levels, subject to appropriate detailed design of the affected façades. The sensitivity scenarios therefore do not alter the overall acoustic design principles or conclusions of this assessment.

Should the N11/M11 Improvement Scheme progress, assessment of its operational noise impacts and the identification of any scheme-specific mitigation measures will form part of that project's own statutory planning and environmental assessment process. The façade specifications for the proposed development should be reviewed at detailed design stage where sufficiently developed information for the future road scheme becomes available.

## **5.8 External Amenity areas**

External amenity areas have been assessed with reference to BS 8233:2014, which advises that external residential amenity areas should ideally achieve noise levels within the range 50–55 dB LAeq,16hr, where reasonably practicable.

The proposed development incorporates a range of external amenity spaces including private gardens, balconies, communal open spaces, public open spaces and the outdoor play area associated with the proposed crèche. These areas were assessed using the validated environmental noise model described in Section 5.6.

The assessment indicates that the highest external noise levels occur adjacent to the eastern boundary of the site closest to the existing N11/M11 corridor. Noise levels decrease progressively across the site with increasing distance from the road corridor, together with the screening provided by the proposed buildings.

The environmental noise model includes the existing strategic road network, surrounding local roads, the proposed internal road network and representative operational assumptions for the future Luas corridor. The layout of the development has been designed in accordance with the principles of Good Acoustic Design, with the principal communal open spaces and landscaped amenity areas positioned within acoustically screened parts of the site.

While some balconies and amenity areas closest to the N11/M11 corridor may experience environmental noise levels above the desirable guideline values identified in BS 8233:2014, this is typical of higher-density residential developments located adjacent to strategic transport infrastructure. Future residents will also benefit from access to extensive communal open spaces located within quieter parts of the development. Accordingly, the proposed development is considered capable of providing an appropriate standard of external residential amenity consistent with the recommendations of BS 8233:2014 and the principles of ProPG.

Figure 11: Operational Noise Levels on each floor

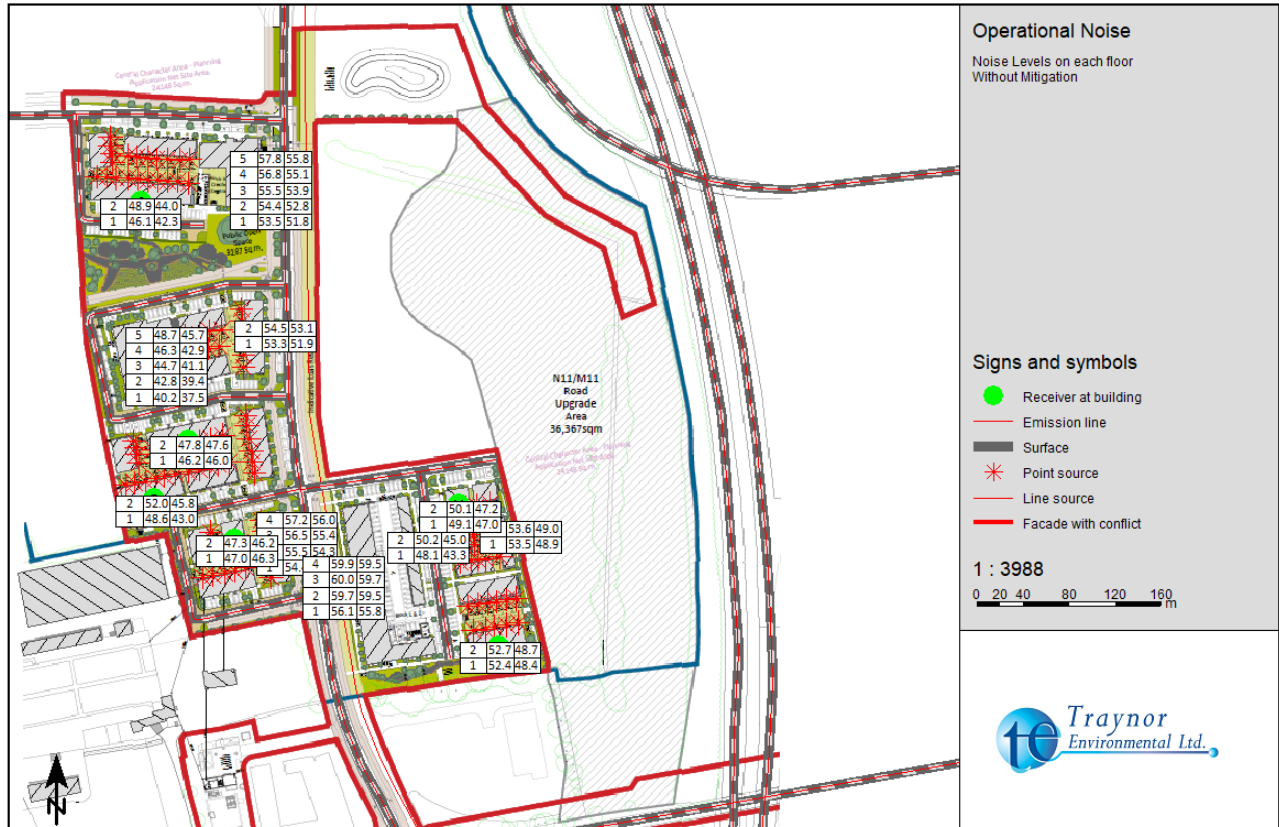
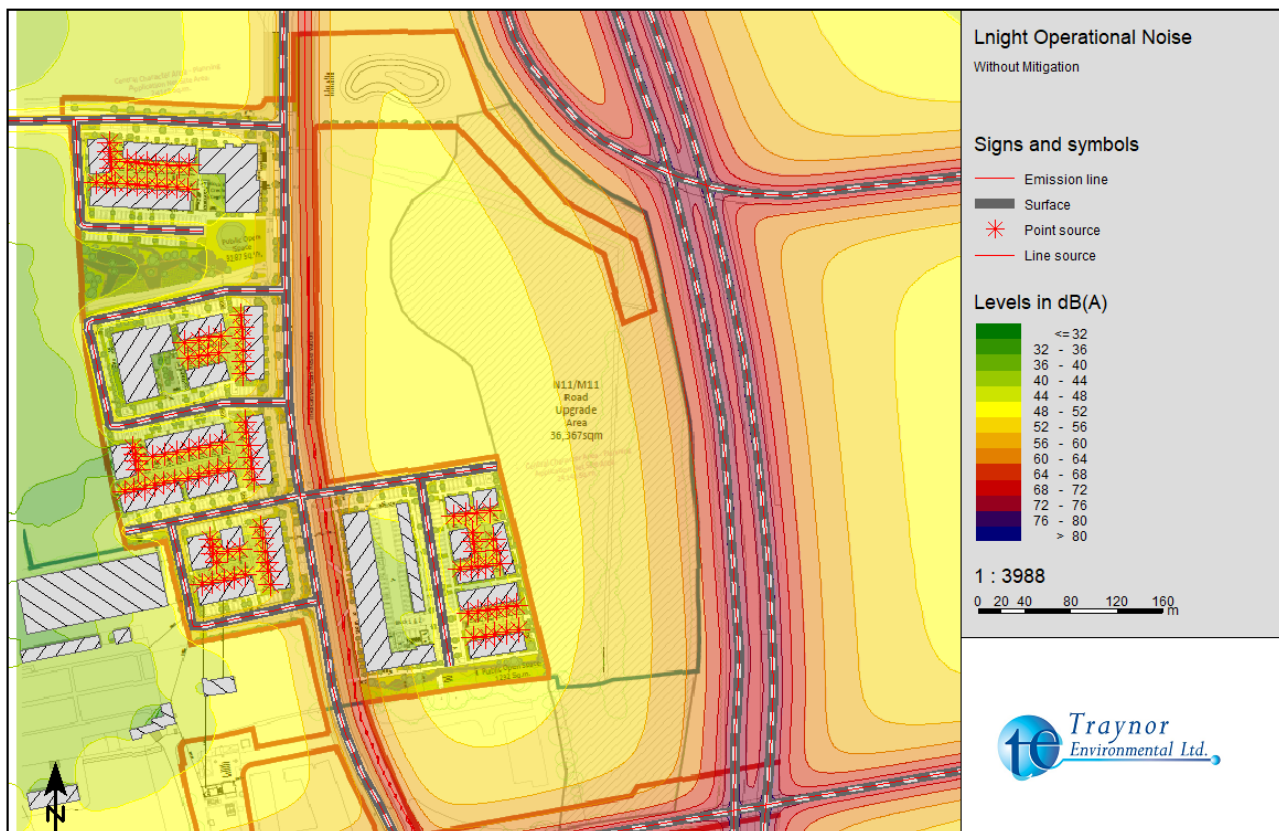
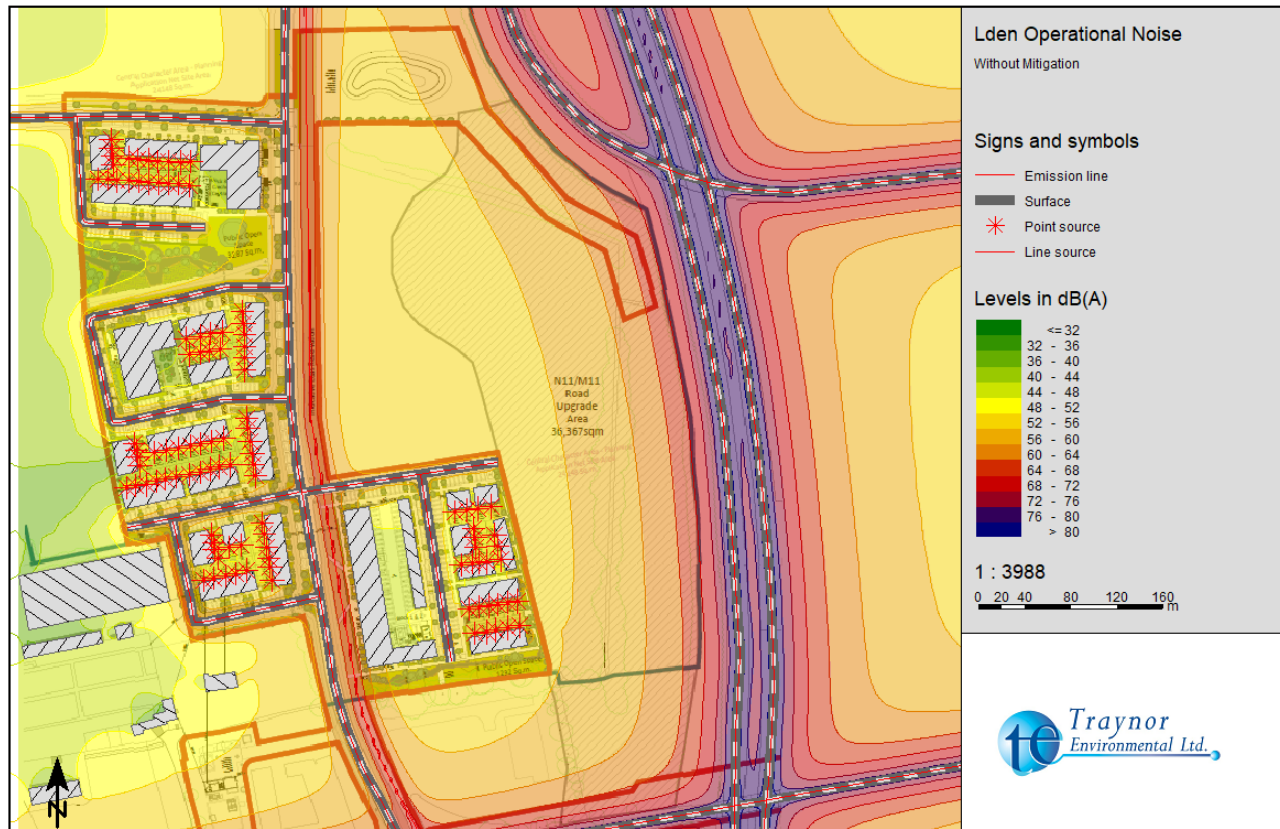


Figure 12: Night Operational Noise Levels



**Figure 13: L<sub>den</sub> Operational Noise Levels**

### 5.9 Future Luas Corridor and Balcony Amenity Assessment

During the LRD Opinion process, the Planning Authority identified the need to consider the potential noise effects associated with the Indicative Luas Reservation, particularly in relation to residential façades and the external amenity provided by balconies serving Apartment Blocks 1 and 2.

The Draft Old Connaught Local Area Plan identifies a safeguarded corridor for a potential future extension of the Luas Green Line through the wider development lands. At the time of preparing this assessment, the potential Luas extension remains at a strategic planning stage and detailed information regarding the final alignment, rolling stock, track form, operating speed, service frequency and associated mitigation measures is not available.

In the absence of sufficiently developed scheme information, it is not considered appropriate to undertake a detailed railway noise assessment based on assumed train frequencies, operating speeds or other operational characteristics that have not yet been established. Instead, the Indicative Luas Reservation has been represented within the SoundPLAN environmental noise model as a representative line noise source of 75 dB(A). The same representative source level has been applied during the daytime and night-time assessment periods to provide a precautionary planning-stage assessment of the potential influence of future Luas operations on the proposed development.

This approach is intended to test the acoustic robustness of the proposed development and, in particular, the potential exposure of residential façades, balconies and external amenity areas located closest to the safeguarded corridor. It is not intended to predict the final operational noise emissions associated with any future Luas scheme.

### Representative Luas Modelling Assumptions

The representative assumptions incorporated within the environmental noise model are summarised in Table 19.

**Table 19: Representative Indicative Luas Modelling Assumptions**

| Parameter             | Modelling Assumption                                                                                                      |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
| Indicative alignment  | Indicative Luas Reservation as identified on the proposed planning layout                                                 |
| Source representation | Representative railway line noise source incorporated within SoundPLAN                                                    |
| Source noise level    | 75 dB(A)                                                                                                                  |
| Daytime assessment    | 75 dB(A) representative line source                                                                                       |
| Night-time assessment | 75 dB(A) representative line source                                                                                       |
| Service frequency     | Not separately defined or modelled at planning stage                                                                      |
| Train movements       | Not separately defined or modelled as individual train movements                                                          |
| Operating speed       | Not separately defined or modelled at planning stage                                                                      |
| Track form            | Not defined at planning stage                                                                                             |
| Operating period      | Representative source included during both daytime and night-time assessment periods                                      |
| Modelling purpose     | Planning-stage assessment of potential future noise exposure at residential façades, balconies and external amenity areas |
| Modelling software    | SoundPLAN environmental noise model                                                                                       |

Note: The 75 dB(A) value represents the representative line-source input adopted within the SoundPLAN environmental noise model for the purposes of this planning-stage assessment. It does not represent a measured noise level at a specified receptor distance or a prediction of the final operational noise emission from a future Luas scheme. Final operational noise levels would depend on factors including the final alignment, rolling stock, train frequency, operating speed, track construction and any scheme-specific mitigation measures, none of which are currently defined.

The assumptions presented in Table 19 are therefore not intended to represent the final design or operational specification of a future Luas scheme. Rather, the representative line source has been incorporated as a precautionary planning-stage scenario to assess the potential influence of an additional transportation noise source along the safeguarded corridor and to determine whether an appropriate acoustic design response remains available for the proposed development.

The environmental noise modelling indicates that, under the representative scenario assessed, road traffic associated with the existing N11/M11 corridor remains the dominant transportation noise source affecting the proposed development. The inclusion of the representative Luas line source influences predicted transportation noise levels at the façades and balconies closest to the Indicative Luas Reservation but does not materially alter the overall acoustic design strategy, subject to implementation of the façade, ventilation and external amenity measures identified within this assessment.

#### **Apartment Blocks 1 and 2 and Balcony Amenity**

Apartment Blocks 1 and 2, comprising 95 apartments over five storeys, represent the residential elements located closest to the Indicative Luas Reservation. The private balconies associated with these apartments have therefore been specifically considered as part of the external amenity assessment. In addition to private balconies, the proposed development incorporates a range of external amenity spaces, including communal open spaces, landscaped amenity areas, private rear gardens and the outdoor play area associated with the proposed crèche. The development therefore provides future occupants with access to a variety of external amenity spaces with differing degrees of exposure to the principal transportation noise sources.

The proposed development has been designed having regard to the principles of Good Acoustic Design contained within ProPG: Planning & Noise (2017). The arrangement and orientation of buildings, separation distances, building massing and location of communal amenity areas have been considered to minimise transportation noise exposure where reasonably practicable. The apartment buildings located closest to the Indicative Luas Reservation also provide acoustic screening

to areas located further within the development, contributing to reduced transportation noise exposure within internal communal amenity areas.

Although balconies located closest to the Indicative Luas Reservation may experience higher transportation noise levels than more sheltered areas of the development, these balconies represent one component of the overall external residential amenity provision. Future occupants will also have access to communal and landscaped open spaces located within more acoustically screened portions of the site.

This approach has been developed having regard to the external amenity guidance contained within BS 8233:2014 and the principles of Good Acoustic Design contained within ProPG, whereby the overall acoustic environment and availability of appropriately located alternative amenity areas are considered as part of the development design.

### **Conclusion**

Based on the representative planning-stage Luas scenario assessed, together with the proposed façade sound insulation, ventilation strategy and external amenity design, the inclusion of the Indicative Luas Reservation does not materially alter the overall acoustic design strategy for the proposed development.

The assessment demonstrates that an appropriate internal and external acoustic environment can be provided through the application of the façade, ventilation and amenity measures identified within this report, while recognising that the representative Luas source adopted within the model is a planning-stage assumption rather than a prediction of the final operational Luas noise environment.

Should the future Luas extension progress and sufficiently detailed information regarding its alignment, rolling stock, track form, operating speed, service frequency and mitigation measures become available, the acoustic requirements applicable to the façades, balconies and external amenity areas closest to the corridor should be reviewed at detailed design stage.

## **6.0 MITIGATION MEASURES**

### **6.1 Construction Phase - Noise**

Construction activities have the potential to generate temporary noise impacts at nearby noise-sensitive receptors. The contractor shall implement Best Practicable Means in accordance with BS 5228-1:2009+A1:2014 to minimise construction noise emissions and disturbance to surrounding properties. The following mitigation measures shall be implemented throughout the construction phase.

#### **Selection of Quiet Plant**

All plant and equipment shall be selected with consideration given to noise emissions. Where practicable, the quietest suitable plant shall be used. Static plant such as compressors, pumps and generators shall be fitted with proprietary acoustic enclosures or equivalent noise control measures. Plant and equipment shall be maintained in good working order throughout the construction programme to prevent unnecessary increases in noise emissions.

#### **Noise Control at Source**

Where replacement with quieter equipment is not practicable, noise control measures shall be implemented at source. Such measures may include:

- Acoustic enclosures.
- Exhaust silencers.
- Acoustic lagging.
- Damping treatments.
- Resilient mountings.
- Reduction of impulsive noise sources.

Mobile plant shall not be left idling when not in use and enclosure panels shall remain closed during operation where practicable.

#### **Site Management**

Construction activities shall be planned and managed to minimise unnecessary noise generation.

Measures shall include:

- Avoiding dropping materials from excessive heights.
- Use of resilient materials within chutes, skips and dump trucks where practicable.
- Restricting particularly noisy activities to normal daytime working hours.
- Coordinating works to avoid unnecessary cumulative noise impacts.
- Locating static plant and site compounds as far as reasonably practicable from nearby sensitive receptors.

#### **Screening and Hoarding**

A continuous solid site hoarding shall be erected around the site boundary where practicable and maintained throughout the construction phase.

The hoarding will provide visual screening and contribute to the reduction of construction noise impacts at nearby sensitive receptors. Additional localised acoustic screening shall be implemented where required during particularly noisy construction activities.

#### **Liaison with the Public**

A Community Liaison Officer shall be appointed for the duration of the construction works.

Any complaints relating to construction noise shall be recorded, investigated and responded to in a timely manner. Advance notification shall be provided to nearby residents and other sensitive receptors prior to commencement of particularly noisy activities.

### Noise Monitoring

Construction noise monitoring shall be undertaken during key phases of the works, including earthworks, excavation, foundation construction, structural construction and any other activities identified as having the potential to generate elevated noise levels, at representative noise-sensitive receptor locations nearest to the development.

Monitoring shall be undertaken in accordance with ISO 1996:2017 and used to verify compliance with the adopted construction noise criteria.

Should elevated noise levels be identified, the construction methodology shall be reviewed and additional mitigation measures implemented where necessary.

### Groundworks and Foundations

Groundworks and foundation construction activities have the potential to generate temporary noise and vibration impacts at nearby noise-sensitive receptors. Based on the current engineering design and earthworks information, the proposed development is predominantly fill-led, with only limited excavation of in-situ material anticipated during the construction phase. Consequently, extensive rock excavation or other high-vibration construction activities are not expected.

The Contractor shall ensure that all plant and equipment used during excavation, foundation construction and associated earthworks is properly maintained and operated in accordance with the manufacturers' recommendations. Where reasonably practicable, lower-noise construction plant and working methods shall be employed to minimise disturbance to nearby residential properties and other noise-sensitive receptors.

Construction activities shall be undertaken in accordance with the principles of Best Practicable Means, as described in BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014. Noise monitoring shall be undertaken during key phases of the groundworks and foundation construction works where considered necessary by the Project Environmental Manager. Monitoring results shall be reviewed regularly and, where elevated noise levels are identified, construction methodologies shall be reviewed and additional mitigation measures implemented as appropriate.

Based on the available design information, piling works are not anticipated as part of the proposed development. Accordingly, significant vibration impacts associated with foundation construction are not predicted.

### Rock Breaking and High Impact Construction Activities

During the LRD Opinion process, the Planning Authority requested that the potential noise and vibration impacts associated with rock breaking activities be considered as part of the construction phase assessment.

The earthworks strategy indicates that only limited excavation of in-situ material will be required. Nevertheless, localised rock excavation and hydraulic rock breaking may be required where isolated areas of competent rock are encountered during foundation or infrastructure works. Such activities have the potential to generate elevated short-term noise levels and perceptible vibration at nearby noise-sensitive receptors. Blasting is not proposed.

Where rock breaking is required, the following mitigation measures shall be implemented:

- Restriction of rock breaking activities to normal daytime construction working hours;
- Advance notification to nearby residents prior to commencement of significant rock excavation activities, where appropriate;
- Use of modern, well-maintained plant fitted with effective acoustic attenuation measures and exhaust silencers;
- Programming of rock breaking activities to minimise their duration wherever reasonably practicable;
- Avoidance of the simultaneous operation of multiple high-noise items of plant where practicable;
- Implementation of construction noise and vibration monitoring where required; and
- Regular maintenance of all construction plant and equipment in accordance with manufacturers' recommendations.

Rock excavation activities shall be undertaken in accordance with the Construction Environmental Management Plan (CEMP), which shall include procedures for community liaison, complaint management and implementation of corrective measures where necessary. Subject to implementation of the mitigation measures identified in this report, significant adverse noise or vibration impacts associated with localised rock breaking activities are not anticipated.

### **Controls and Mitigation Measures Specific to the Rock Extraction**

Earthworks information prepared for the proposed development indicates that the site will be predominantly fill-led, with only limited excavation of in-situ material anticipated during the construction phase. Consequently, extensive rock excavation is not expected. However, localised rock excavation and hydraulic rock breaking may be required in isolated areas and have therefore been assessed on a precautionary basis.

Rock excavation and hydraulic rock breaking activities have the potential to generate temporary airborne noise and ground-borne vibration at nearby noise-sensitive receptors. While vibration associated with such works may be perceptible at neighbouring properties, vibration levels capable of causing cosmetic or structural damage are typically significantly higher than those associated with human perception.

The assessment of construction noise and vibration associated with potential rock excavation has been undertaken with reference to the following standards and guidance documents:

- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- BS 7385-1:1990 Evaluation and Measurement for Vibration in Buildings – Guide for Measurement of Vibrations and Evaluation of Their Effects on Buildings;
- BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings – Guide to Damage Levels from Ground-Borne Vibration; and
- NRA Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2004).
- Should localised rock excavation be required, the following mitigation measures shall be implemented:
- Rock excavation methodologies shall be selected to minimise noise and vibration generation as far as reasonably practicable;
- Hydraulic rock breaking equipment shall be appropriately sized for the works being undertaken;
- Plant and equipment shall be maintained in good working order and operated in accordance with manufacturers' recommendations;
- Rock breaking activities shall be restricted to approved daytime construction working hours;
- Nearby residents shall be notified in advance of particularly noisy rock excavation activities where appropriate;
- Construction noise and vibration monitoring shall be undertaken where considered necessary by the Project Environmental Manager; and
- A complaints management procedure shall be maintained throughout the construction phase.

Where vibration monitoring is required, monitoring locations shall be selected having regard to the location of nearby residential properties and other vibration-sensitive receptors. Monitoring shall be undertaken in accordance with the relevant standards and reviewed throughout the duration of the works.

The vibration criteria adopted for the prevention of cosmetic damage to buildings are based on BS 7385-2:1993 and BS 5228-2:2009+A1:2014. For residential and light commercial buildings, the relevant guide values are 15 mm/s peak particle velocity (PPV) at 4 Hz, increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These values relate to cosmetic damage and are significantly higher than vibration levels at which vibration may become perceptible to occupants.

Should measured vibration levels approach the adopted trigger thresholds, the construction methodology shall be reviewed and modified as necessary to ensure continued compliance with the adopted criteria.

Subject to implementation of the mitigation measures outlined above, significant vibration impacts or cosmetic damage to nearby structures are not anticipated during the construction phase.

#### Construction Noise Levels with Mitigation Measures

Construction noise associated with potential rock excavation has been assessed using representative source noise levels for hydraulic rock breaking equipment operating in conjunction with ancillary construction plant. The assessment assumes that the mitigation measures described in Section 5.6.1 are implemented throughout the construction phase.

**Table 20: Construction Noise Levels with Mitigation Measures at NSLs**

| Description of Noise Source                                                                                                                                                 | Calculated noise levels at varying distances (dB LAeq,T) |      |      |      |      |      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------|------|------|------|------|
|                                                                                                                                                                             | NSL 1                                                    | NSL2 | NSL3 | NSL4 | NSL5 | NSL6 |
|                                                                                                                                                                             | 51m                                                      | 88m  | 124m | 127m | 130m | 132m |
|                                                                                                                                                                             | dB                                                       | dB   | dB   | dB   | dB   | dB   |
| 3 no. items each with SPL of 81 dB at 10 m operating simultaneously or 1 no. 4-5 tonne rock hammer attached to a 40-50 tonne hydraulic excavator (With Mitigation Measures) | 64                                                       | 59   | 56   | 56   | 55   | 55   |
| <b>Limit (dB)</b>                                                                                                                                                           | 65                                                       | 65   | 65   | 65   | 65   | 65   |
| <b>Within Limit</b>                                                                                                                                                         | ✓                                                        | ✓    | ✓    | ✓    | ✓    | ✓    |

Table 20 demonstrates that, following implementation of the recommended mitigation measures, predicted construction noise levels associated with localised rock excavation activities are expected to comply with the adopted daytime construction noise criterion of 65 dB LAeq,T at all identified noise-sensitive receptors. Construction noise impacts associated with these activities will be temporary and localised, and significant adverse effects are not anticipated.

#### Construction Traffic

Construction traffic movements shall be managed in accordance with the Construction Traffic Management Plan (CTMP) prepared for the development. The temporary nature of construction traffic, combined with the existing traffic volumes on the surrounding road network, is such that significant construction traffic noise impacts are not predicted.

#### Construction Programme

The construction programme shall be planned and managed to minimise potential noise impacts at nearby sensitive receptors. Where practicable, particularly noisy activities shall be scheduled during normal daytime working hours and coordinated to avoid unnecessary cumulative effects. Construction methodologies and sequencing shall be reviewed throughout the project to ensure that noise impacts remain as low as reasonably practicable.

## 6.2 Operational Phase

The following mitigation measures are required during the operational phase of the development.

### Building Envelope and Glazing

The acoustic design of the building envelope has been developed with reference to the measured baseline noise environment, the proximity of the site to the N11/M11 corridor and the requirements of BS 8233:2014. Appropriate glazing, façade constructions and ventilation measures have been specified to ensure compliance with the recommended internal ambient noise criteria for residential dwellings and the proposed childcare facility.

Enhanced acoustic glazing and façade constructions shall be provided where required at façades exposed to the highest levels of transportation noise. Enhanced acoustic glazing and façade constructions shall be provided where required at façades exposed to the highest levels of transportation noise. The minimum acoustic performance requirements for glazing systems are detailed in Table 15, with the distribution of façade types illustrated in Figure 10 and Appendix B.

The façade specifications have been developed having regard to both the existing transportation noise environment and the proximity of the site to the proposed N11/M11 Improvement Scheme and the Indicative Luas Reservation. The proposed glazing, façade construction and ventilation strategy have been developed to ensure compliance with the internal ambient noise criteria contained within BS 8233:2014 for residential accommodation and the proposed childcare facility.

### Ventilation

Appropriate background ventilation shall be provided throughout the development in accordance with the requirements of Part F of the Building Regulations.

Where required, acoustically attenuated ventilation systems shall be provided to ensure compliance with the internal ambient noise criteria contained within BS 8233:2014 without reliance on opening windows at the most acoustically exposed façades.

### External Amenity Areas

The layout and design of external amenity spaces, including communal open spaces and private balconies, have been informed by the principles of Good Acoustic Design. Amenity areas have been located and designed to maximise residential amenity and minimise exposure to transportation noise sources where practicable, consistent with the principles of Good Acoustic Design contained within ProPG. Apartment Blocks 1 and 2, which are located closest to the Indicative Luas Reservation, have been considered as part of the assessment of external residential amenity and balcony noise exposure.

Public open spaces and communal amenity areas have been positioned within the interior of the development and benefit from screening provided by the proposed building arrangement. This layout reduces direct exposure to transportation noise and contributes to an appropriate acoustic environment for recreational and residential amenity.

### Building Services Plant

All fixed mechanical and electrical plant associated with the proposed development, including heat pumps, ventilation equipment and associated services, shall be selected and designed such that operational noise emissions do not adversely affect nearby noise-sensitive receptors.

Noise emissions from fixed plant shall be designed to achieve a rating level no greater than the representative background sound level (LA90,T) at the nearest noise-sensitive receptor when assessed in accordance with BS 4142:2014+A1:2019.

### **Cumulative Operational Noise**

Potential operational noise sources associated with the development include road traffic, residential activity, building services plant, mechanical ventilation systems, car parking activity, waste collection activities and the proposed childcare facility.

The existing acoustic environment is dominated by road traffic noise associated with the N11/M11 corridor and the surrounding local road network. The assessment indicates that the cumulative contribution from operational activities associated with the proposed development will be low in comparison with the prevailing traffic-dominated acoustic environment and is not predicted to result in significant adverse acoustic effects. The assessment has also considered the potential influence of future transportation infrastructure identified within the Planning Authority's LRD Opinion. The proposed building layout, façade specifications and ventilation strategy ensure that an appropriate standard of residential amenity can be achieved having regard to both existing and future transportation noise sources.

Subject to implementation of the mitigation measures identified within this report, the operational phase of the proposed development is predicted to comply with the recommendations of BS 8233:2014, the principles of Good Acoustic Design contained within ProPG: Planning and Noise (2017) and relevant planning policy objectives.

The assessment demonstrates that acceptable internal and external acoustic environments can be achieved for future residents and childcare users through the combined application of site layout, building orientation, acoustic screening, façade design and ventilation measures. No significant adverse operational noise effects are predicted.

## 7.0 SUMMARY OF INTERNAL NOISE COMPLIANCE

Table 21 provides a summary of the predicted internal noise levels at the most exposed façades within the proposed development.

**Table 21: Summary of the predicted internal noise levels**

| Receptor           | Façade Specification | Predicted Internal Daytime Noise Level | Predicted Internal Night-time Noise Level | BS 8233 Compliance |
|--------------------|----------------------|----------------------------------------|-------------------------------------------|--------------------|
| Childcare Facility | Appendix B           | ≤35 dB LA <sub>eq</sub> , T            | N/A                                       | Yes                |
| Apartments         | Appendix B           | ≤35 dB LA <sub>eq</sub> , 16hr         | ≤30 dB LA <sub>eq</sub> , 8hr             | Yes                |
| Houses             | Appendix B           | ≤35 dB LA <sub>eq</sub> , 16hr         | ≤30 dB LA <sub>eq</sub> , 8hr             | Yes                |

The childcare facility located within Block 3 has been assessed as a noise-sensitive receptor. The proposed façade, glazing and ventilation specifications have been developed having regard to the external transportation noise environment affecting the site and demonstrate that suitable internal acoustic conditions can be achieved within activity rooms, sleeping/rest areas and other occupied childcare spaces. The façade specifications outlined in Appendix B have been developed based on the highest predicted external noise levels across the proposed development. The assessment demonstrates that compliance with the internal ambient noise criteria contained within BS 8233:2014 can be achieved throughout the proposed residential accommodation and childcare facility through implementation of the specified façade sound insulation and ventilation strategy.

**Table 22: Significance of Effects**

| Impact                                                  | Duration  | Magnitude                   | Significance                    |
|---------------------------------------------------------|-----------|-----------------------------|---------------------------------|
| Construction Noise                                      | Temporary | Moderate                    | Slight Adverse                  |
| Construction Vibration                                  | Temporary | Low                         | Imperceptible to Slight Adverse |
| Operational Traffic Noise                               | Long Term | Low                         | Not Significant                 |
| Building Services Plant<br>(subject to detailed design) | Long Term | Negligible                  | Not Significant                 |
| Internal Residential Noise Environment                  | Long Term | Compliant with BS 8233:2014 | Neutral to Positive             |
| Overall Operational Impact                              | Long Term | Low                         | Not Significant                 |

The assessment demonstrates that, following implementation of the mitigation measures identified within this report, the proposed development will not give rise to significant adverse noise or vibration effects. Internal noise environments are predicted to comply with the recommendations of BS 8233:2014, while external amenity areas have been designed in accordance with the principles of Good Acoustic Design and ProPG guidance to provide an appropriate acoustic environment for future residents. Having regard to the Planning Authority's LRD Opinion, the proximity of the site to the N11/M11 corridor and the Indicative Luas Reservation, the proposed development is considered capable of providing an acceptable standard of residential and childcare amenity from an environmental noise perspective.

## 8.0 CONCLUSION

A comprehensive Environmental Noise and Vibration Impact Assessment has been undertaken in support of the proposed Large-Scale Residential Development (LRD) at lands north of Old Connaught Avenue, Old Connaught, Co. Dublin.

The assessment has been prepared in accordance with BS 8233:2014, ProPG: Planning & Noise (2017), BS 5228-1:2009+A1:2014, BS 5228-2:2009+A1:2014, relevant EPA guidance, the WHO Environmental Noise Guidelines for the European Region (2018), and applicable national and local planning policy.

Baseline environmental noise monitoring, comprising long-term unattended surveys, confirms that road traffic associated with the N11/M11 corridor and the surrounding road network is the dominant source of environmental noise affecting the site. These measured data were used to develop and validate the SoundPLAN environmental noise model, which formed the basis of the operational assessment and determination of façade sound insulation requirements.

The assessment has considered the potential noise and vibration effects associated with both the construction and operational phases of the proposed development. Construction activities will result in temporary and localised increases in noise and vibration. As construction progresses across the site, impacts at individual receptors will be transient in nature and will diminish as works move away from each work area. Through implementation of Best Practicable Means in accordance with BS 5228, together with the mitigation measures identified in this report and the Construction Environmental Management Plan (CEMP), significant residual construction noise and vibration effects are not predicted.

The operational assessment demonstrates that transportation noise from the N11/M11 corridor will remain the dominant environmental noise source affecting the development. Representative operational noise associated with the safeguarded Indicative Luas Reservation, external air source heat pumps serving the proposed houses and the proposed wastewater pumping station has also been considered as part of the assessment. These sources do not materially alter the overall acoustic design strategy for the development.

The proposed development has been designed in accordance with the principles of Good Acoustic Design. Site layout, building orientation, building massing, façade specification, ventilation strategy and the arrangement of communal and private amenity areas have all been integrated to minimise transportation noise exposure where reasonably practicable. The recommended façade sound insulation and ventilation strategy is capable of achieving the internal ambient noise criteria contained within BS 8233:2014 for the proposed dwellings and the childcare facility without reliance on opening windows at the most acoustically exposed façades.

External amenity spaces, including private gardens, balconies, communal open spaces and the outdoor play area serving the childcare facility, have been assessed with reference to BS 8233:2014 and ProPG. While some areas closest to the strategic transport corridors experience elevated transportation noise levels, the development incorporates appropriate acoustic screening, quieter communal amenity areas and a range of external amenity spaces that collectively provide an appropriate standard of residential amenity consistent with the principles of Good Acoustic Design.

The assessment has also considered the safeguarded lands associated with the proposed N11/M11 Junction 4 to Junction 14 Improvement Scheme and the Indicative Luas Reservation identified within the Draft Old Connaught Local Area Plan. As these transport schemes remain at a strategic planning stage, detailed operational information is not currently available. Nevertheless, the proposed acoustic design has been developed using a precautionary approach and provides a robust acoustic response based on the existing transportation noise environment.

The assessment demonstrates that:

- The proposed development falls within areas of Low and Medium Noise Risk under the ProPG framework, with no areas classified as High Risk.

- Good Acoustic Design principles have been incorporated throughout the development from the earliest stages of the design process.
- The recommended façade sound insulation and ventilation strategy will achieve the internal ambient noise criteria contained within BS 8233:2014.
- External air source heat pumps, the proposed wastewater pumping station and associated single-storey building, the proposed ESB substations and other fixed building services plant can be appropriately controlled through equipment selection and acoustic design and are not expected to give rise to significant adverse operational noise effects.
- Appropriate private and communal external amenity areas can be provided for future residents and users of the childcare facility.
- Construction phase noise and vibration can be effectively managed through implementation of the recommended mitigation measures and Best Practicable Means.
- No significant adverse environmental noise or vibration impacts are predicted during either the construction or operational phases of the proposed development.

Having regard to the measured baseline noise environment, the predictive environmental noise modelling, the proposed mitigation measures and the application of Good Acoustic Design principles, it is concluded that the proposed development is capable of providing a high standard of residential amenity and an appropriate acoustic environment for future occupants.

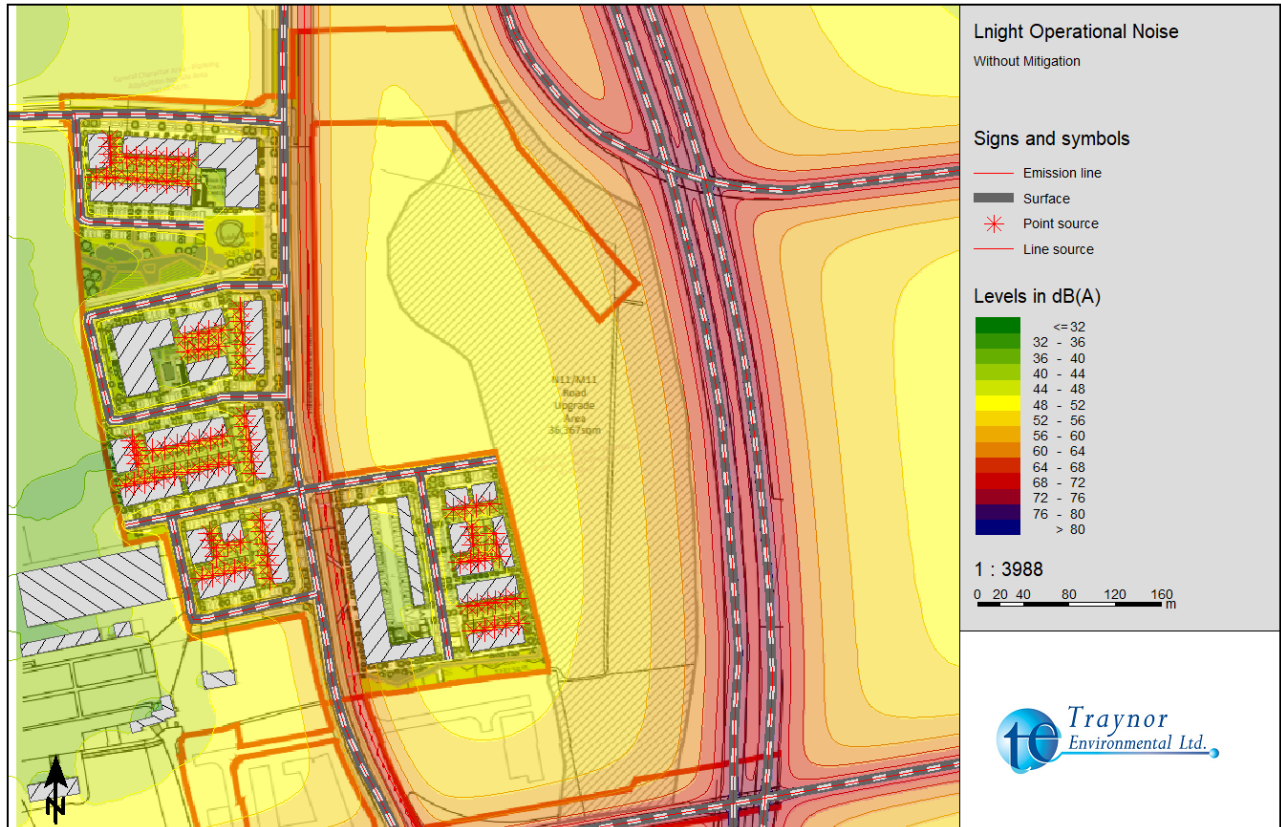
Accordingly, subject to implementation of the mitigation measures, façade specifications and recommendations contained within this report, the proposed Large-Scale Residential Development is considered acceptable from an environmental noise and vibration perspective. The proposed development is capable of providing an appropriate and sustainable acoustic environment for future residents in accordance with BS 8233:2014, ProPG: Planning & Noise (2017), the WHO Environmental Noise Guidelines for the European Region (2018), relevant EPA guidance and the objectives of the Dún Laoghaire–Rathdown County Development Plan.

ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
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LANDS NORTH OF OLD CONNAUGHT AVENUE, OLD CONNAUGHT, CO. DUBLIN  
COMPLETED  
BY  
TRAYNOR ENVIRONMENTAL LTD

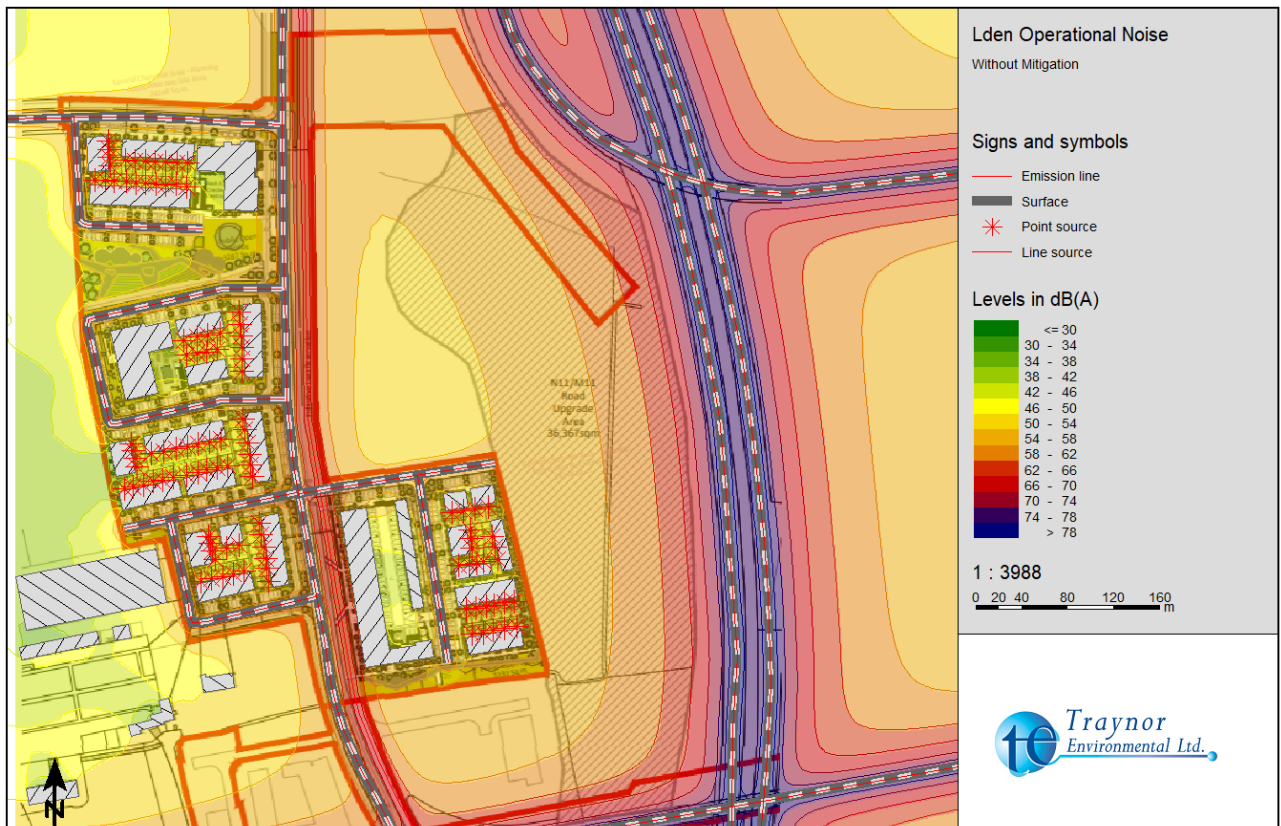
**APPENDIX A –  $L_{DEN}$  &  $L_{NIGHT}$  FOR THE PROPOSED DEVELOPMENT**



**Figure 12: L<sub>night</sub> Operational Noise Levels**



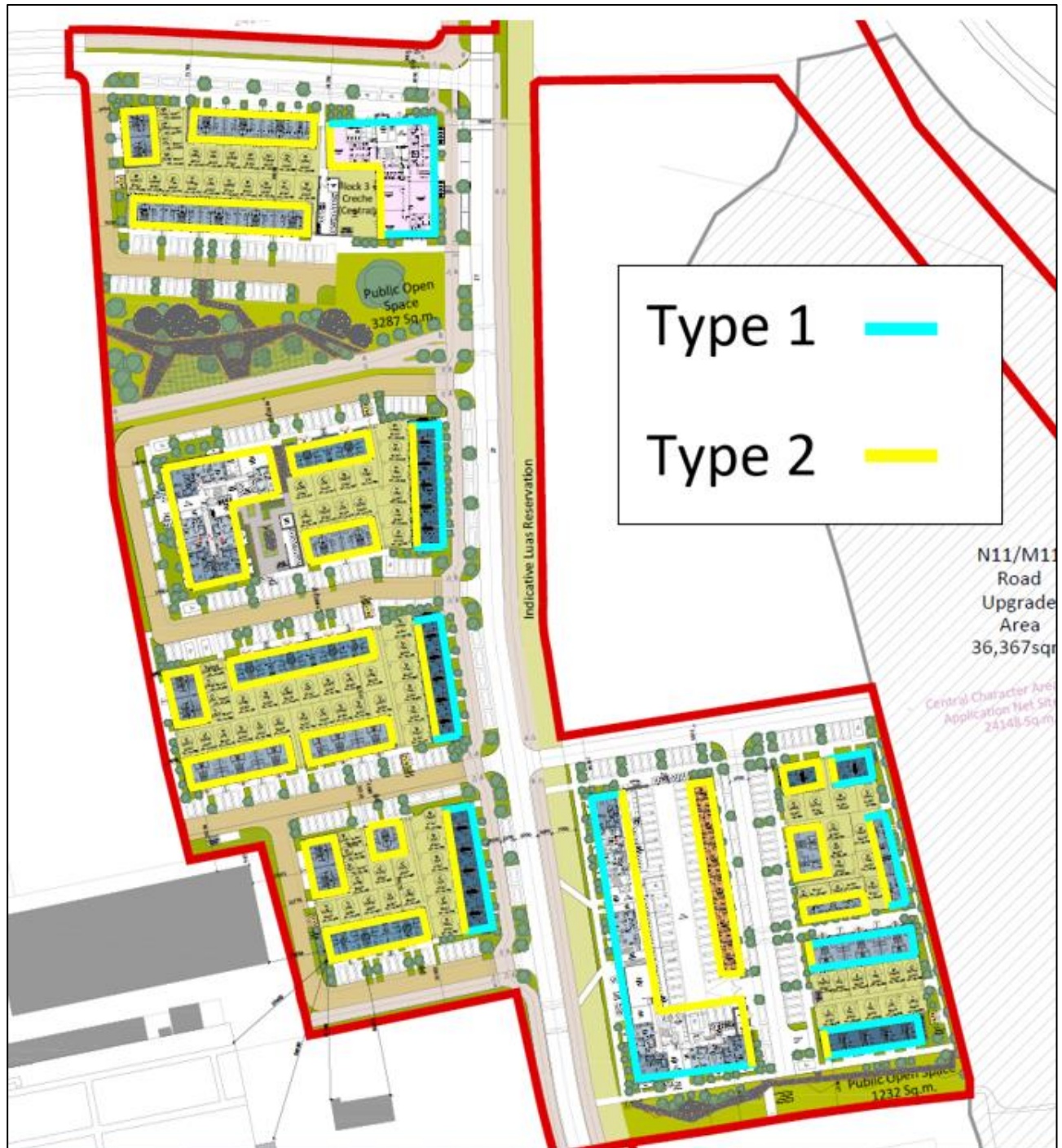
**Figure 13: L<sub>den</sub> Operational Noise Levels**



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**APPENDIX B – ACOUSTIC SPECIFICATION FOR FACADES SYSTEM**





The façade specifications presented below define the minimum acoustic performance requirements for glazing, ventilation and opaque façade elements associated with each façade category identified in Figure 10. The specifications have been developed having regard to the predicted external transportation noise environment and the internal ambient noise criteria adopted for the proposed development.

The performance requirements apply to the complete installed building elements. Final glazing configurations, frame systems, ventilation products and construction build-ups shall be selected to achieve or exceed the stated acoustic performance. Manufacturer's laboratory test data should be provided at detailed design stage to demonstrate compliance with the specified requirements.

| Façade Type                | Typical External Noise Exposure | Minimum Glazing Performance | Minimum Ventilation Acoustic Performance*                                                                                                                                                                        | External Wall / Opaque Façade | Internal Design Criteria                                                                     |
|----------------------------|---------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------|
| Type 1 – Low Exposure      | ≤60 dB LAeq,16hr                | ≥30 dB Rw+Ctr               | No additional acoustic attenuation required where ventilation is provided mechanically without a direct external air path. Any external ventilator to be selected so that façade performance is not compromised. | ≥45 dB Rw+Ctr                 | Living rooms: 35 dB LAeq,16hr;<br>Dining rooms: 40 dB LAeq,16hr;<br>Bedrooms: 30 dB LAeq,8hr |
| Type 2 – Moderate Exposure | 60–65 dB LAeq,16hr              | ≥35 dB Rw+Ctr               | ≥40 dB Dn,e,w+Ctr where a direct external ventilation opening is provided                                                                                                                                        | ≥45 dB Rw+Ctr                 | Living rooms: 35 dB LAeq,16hr;<br>Dining rooms: 40 dB LAeq,16hr;<br>Bedrooms: 30 dB LAeq,8hr |
| Type 3 – Elevated Exposure | >65 dB LAeq,16hr                | ≥40 dB Rw+Ctr               | ≥45 dB Dn,e,w+Ctr where a direct external ventilation opening is provided                                                                                                                                        | ≥50 dB Rw+Ctr                 | Living rooms: 35 dB LAeq,16hr;<br>Dining rooms: 40 dB LAeq,16hr;<br>Bedrooms: 30 dB LAeq,8hr |

\* The stated ventilator performance is an indicative minimum planning-stage specification. Final Dn,e,w+Ctr requirements shall be confirmed having regard to room volume, number and size of ventilation openings, façade area and the external incident noise level applicable to the individual room.

Night-time maximum noise events: In addition to the BS 8233:2014 LAeq internal ambient noise criteria, an internal design objective of 45 dB LAFmax has been adopted for individual night-time noise events within bedrooms, having regard to WHO guidance and established acoustic practice.

Glazing: Acoustic performance values relate to the complete installed glazing system, including the glass configuration, frame, seals and associated junctions. Glazing products shall be selected on the basis of laboratory test data demonstrating compliance with the stated  $R_w+C_{tr}$  requirement.

Ventilation: Where mechanical ventilation is provided without a direct open-air path through the façade, the system shall be designed so that the acoustic performance of the building envelope is maintained. Where trickle vents, acoustic ventilators, louvres or similar façade penetrations are proposed, the complete installed element shall achieve the minimum  $D_{n,e,w}+C_{tr}$  performance specified above.

Opaque façade elements: External wall, roof and other opaque building-envelope constructions shall provide sound insulation performance sufficient to ensure that glazing and ventilation elements remain the acoustically controlling components of the façade.

Final acoustic performance requirements should be reviewed during detailed design where changes occur to room dimensions, glazing areas, ventilation strategy or predicted façade incident noise levels.

ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
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APPENDIX C – NOISE METER CALIBRATION  
CERTIFICATES OF CALIBRATION



## Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

No pattern approval is available for this sound level meter configuration.

### Sound Level Meter

|                        |           |     |              |
|------------------------|-----------|-----|--------------|
| Manufacturer           | NTi Audio |     |              |
| Type                   | XL3       | S/N | A3A-01334-F0 |
| Firmware               | V1.42     |     |              |
| Microphone Model       | M2230     |     |              |
| Preamplifier           | MA220     | S/N | 14806        |
| Microphone Capsule     | MC230A    | S/N | A30074       |
| Performance class      | Class 1   |     |              |
| Customer Inventory Nr. |           |     |              |

### Customer

Traynor Environmental Ltd  
Belturbet Business Park  
Creeny  
Belturbet  
Cavan

**Date** 29 November 2024

**Certificate** UK-24-120

**Results** **PASSED**  
(for detailed report see next pages)

**Operator**

  
David Young

NTi Audio UK Ltd • Office 33C Julians Road • Stevenage  
Hertfordshire, SG1 3ES, UK • uk@nti-audio.com

# Calibration Certificate

**Certificate Number** 2024017206

**Customer:**

**Environmental Measurement**  
**Unit 12 Tallaght Business Centre**  
**Whitestown Business Park**  
**Dublin, 24 Ireland**

**Model Number** PRM821

**Serial Number** 001939

**Test Results** Pass

**Initial Condition** As Manufactured

**Description** Larson Davis 1/2" Preamplifier for 821 Class 1

**Procedure Number** D0001.8383

**Technician** Jacob Cannon

**Calibration Date** 2024-11-25

**Calibration Due**

**Temperature** 23.56 °C ± 0.01 °C

**Humidity** 51.2 %RH ± 0.5 %RH

**Static Pressure** 86.76 kPa ± 0.03 kPa

**Evaluation Method** Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance.  
Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level. Tests are considered to pass when the measured value is within the acceptance limits, which are derived from industry standards.

Simple acceptance criteria is used with an expanded uncertainty not to exceed 0.20 dB for all measurements below 100 kHz and 0.50 dB for measurements above 100 kHz.

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| Standards Used                                     |            |            |              |
|----------------------------------------------------|------------|------------|--------------|
| Description                                        | Cal Date   | Cal Due    | Cal Standard |
| Larson Davis Model 2900 Real Time Analyzer         | 2024-09-16 | 2025-09-16 | 001150       |
| Hart Scientific 2626-S Humidity/Temperature Sensor | 2024-05-07 | 2025-11-07 | 006943       |
| SRS DS360 Ultra Low Distortion Generator           | 2024-03-26 | 2025-03-26 | 007635       |

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Provo, UT 84601 United States  
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D0001.8412 Rev I

# Calibration Certificate

**Certificate Number** 2024017793

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24 Ireland

**Model Number** SoundExpert 821

**Serial Number** 40503

**Test Results** Pass

**Initial Condition** As Manufactured

**Description** SoundExpert 821  
Class 1 Sound Level Meter  
Firmware Revision: 1.400R52

**Procedure Number** D0001.8466

**Technician** Jacob Cannon

**Calibration Date** 2024-12-05

**Calibration Due**

**Temperature** 23,7 °C ± 0,25 °C

**Humidity** 49.8 %RH ± 2.0 %RH

**Static Pressure** 86.92 kPa ± 0,13 kPa

**Evaluation Method**

**Tested with:**

TMS 9917C. S/N 219  
Larson Davis CAL200. S/N 9079  
Larson Davis PRM821. S/N 001939  
PCB 377B02. S/N 362428

**Data reported in dB re 20 µPa.**

**Compliance Standards**

Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8467:

|                        |                           |
|------------------------|---------------------------|
| IEC 60651:2001 Type 1  | ANSI S1.4-2014 Class 1    |
| IEC 60804:2000 Type 1  | ANSI S1.4 (R2006) Type 1  |
| IEC 61260:2014 Class 1 | ANSI S1.11-2014 Class 1   |
| IEC 61672:2013 Class 1 | ANSI S1.43 (R2007) Type 1 |

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

**Test points marked with a ± in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis SoundExpert 721/821 Manual, J821.01 Rev B

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to 1/2" adaptor is used with the preamplifier.

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D0001.8468 Rev E

# Calibration Certificate

**Certificate Number** 2024017785

**Customer:**

Environmental Measurement  
Unit 12 Tallaght Business Centre  
Whitestown Business Park  
Dublin, 24 Ireland

**Model Number** SoundExpert 821

**Serial Number** 40503

**Test Results** Pass

**Initial Condition** As Manufactured

**Description** SoundExpert 821  
Class 1 Sound Level Meter  
Firmware Revision: 1.400R52

**Procedure Number** D0001.8465

**Technician** Jacob Cannon

**Calibration Date** 2024-12-05

**Calibration Due**

**Temperature** 23.69 °C ± 0.25 °C

**Humidity** 50 %RH ± 2.0 %RH

**Static Pressure** 86.98 kPa ± 0.13 kPa

**Evaluation Method** Tested electrically using Larson Davis PRM821 S/N 001939 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

**Compliance Standards** Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8468:

IEC 60651:2001 Type 1

IEC 60804:2000 Type 1

IEC 61252:2002

IEC 61672:2013 Class 1

ANSI S1.4-2014 Class 1

ANSI S1.4 (R2006) Type 1

ANSI S1.25 (R2007)

ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). The results documented in this certificate relate only to the item(s) calibrated or tested. It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis SoundExpert 721/821 Manual, I821.01 Rev B

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

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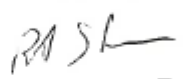
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D0001.8467 Rev F

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|------------------------|--------------|-----------------------------------|----------------------------------------|---------------------------------|----------------|-----------|----------------------------------------|-------------------------------------|-------------|----------|----------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>MTS Calibration Ltd,</b><br><b>The Grange Business Centre,</b><br><b>Belasis Avenue,</b><br><b>Billingham TS23 1LG,</b><br><b>England</b><br><b>Telephone: 01642 876 410</b> |                                                                      |  | <b>0607</b>              |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>CERTIFICATE OF CALIBRATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                 | <b>Page 1 of 1</b><br>Approved Signatory:<br><br><b>Tony Sherris</b> |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Issued by:</b> MTS Calibration Ltd<br><b>Performed by:</b> Tony Sherris<br><b>Date of issue:</b> 14 November 2024 <b>Certificate Number:</b> 40247U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Sound Calibrator</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Client:</b> Environmental Measurements<br>Unit 12, Tallaght Business Centre<br>Whitestown Business Park<br>Co.Dublin 24, Ireland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>The Device calibrated was:</b><br><div style="display: flex; justify-content: space-around; align-items: center;"> <span><b>Cirrus</b></span> <span><b>Model CR:515</b></span> <span><b>Serial Number 44501</b></span> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <i>The measurements were performed at Elvington Close, Billingham, TS23 3YS and the measured values were as follows:</i> <table border="1" style="width: 100%; margin-top: 5px;"> <tr> <td style="text-align: left;"><b>Output Level 1:</b></td> <td style="text-align: center;"><b>94.25</b></td> <td style="text-align: center;"><b>dB re 20<math>\mu</math>Pa</b></td> <td style="text-align: center;"><b><math>\pm 0.14</math> dB (k= 2)</b></td> </tr> <tr> <td style="text-align: left;"><b>Fundamental Frequency 1:</b></td> <td style="text-align: center;"><b>1000.04</b></td> <td style="text-align: center;"><b>Hz</b></td> <td style="text-align: center;"><b><math>\pm 0.11</math> Hz (k= 2)</b></td> </tr> <tr> <td style="text-align: left;"><b>Total Harmonic Distortion 1:</b></td> <td style="text-align: center;"><b>0.12</b></td> <td style="text-align: center;"><b>%</b></td> <td style="text-align: center;"><b><math>\pm 0.004</math> % (k= 2)</b></td> </tr> </table> |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          | <b>Output Level 1:</b> | <b>94.25</b> | <b>dB re 20<math>\mu</math>Pa</b> | <b><math>\pm 0.14</math> dB (k= 2)</b> | <b>Fundamental Frequency 1:</b> | <b>1000.04</b> | <b>Hz</b> | <b><math>\pm 0.11</math> Hz (k= 2)</b> | <b>Total Harmonic Distortion 1:</b> | <b>0.12</b> | <b>%</b> | <b><math>\pm 0.004</math> % (k= 2)</b> |
| <b>Output Level 1:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>94.25</b>                                                                                                                                                                    | <b>dB re 20<math>\mu</math>Pa</b>                                                                                                                       | <b><math>\pm 0.14</math> dB (k= 2)</b>                                              |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Fundamental Frequency 1:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>1000.04</b>                                                                                                                                                                  | <b>Hz</b>                                                                                                                                               | <b><math>\pm 0.11</math> Hz (k= 2)</b>                                              |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Total Harmonic Distortion 1:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>0.12</b>                                                                                                                                                                     | <b>%</b>                                                                                                                                                | <b><math>\pm 0.004</math> % (k= 2)</b>                                              |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| This measurement is valid only for the above device configured for calibration of a WS-2 microphone under the stated environmental conditions. For deviation of prevailing conditions, the manufacturer's literature for the calibrator should be referred to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Date of Measurements:</b> 14 November 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                 | <b>Date of Receipt:</b> 11 November 2024                                                                                                                |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Method of calibration</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                 | MTS Calibration Ltd work procedure WP01 issue U3-1                                                                                                      |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| A Reference Calibrator was used to establish the sensitivity of the measurement chain. The same measurement chain is then used to determine the output level of the Object Calibrator by the difference between its output and that of the nominated Reference Calibrator. Four independent measurements of the third-octave band sound pressure levels produced by the Reference Calibrators and the Object Calibrator are averaged to minimise uncertainties of the calibration. The measurement chain consists of a calibrated, Reference Microphone, Reference Preamplifier and Reference Analyser.                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| As well as providing a traceable measurement of the sound pressure level in the cavity of the Object Calibrator, the Calibrator's frequency and total harmonic distortion are also measured. Frequency is determined from the average of four independent measurements using a multimeter. The total harmonic distortion is measured from the average of three independent measurements by third octave analysis, subtracting the level of the fundamental frequency from the sum of the combined harmonics in the frequency band to 20kHz. The complete procedure is detailed in the MTS Calibration Ltd work procedure WP01.                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| The sound pressure level generated by the calibrator in its WS2 configuration was measured by reference to the reference Sound Calibrator as shown in the Test Equipment section below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k (Individually calculated as above), providing a coverage probability of approximately 95%. The uncertainty evaluation has been calculated in accordance with the current version of UKAS publication M3003. The uncertainty quoted for the Distortion Measurement is the Distortion Percentage as measured, multiplied by our Uncertainty as calculated for the individual measurement or our CMC, whichever is the larger.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Measurement Conditions:</b> <table style="width: 100%; margin-top: 5px;"> <tr> <td style="text-align: right;">Temperature</td> <td style="text-align: center;">22</td> <td style="text-align: center;">°C</td> <td style="text-align: center;"><math>\pm 1</math> °C</td> </tr> <tr> <td style="text-align: right;">Atmospheric Pressure</td> <td style="text-align: center;">1029</td> <td style="text-align: center;">mBar</td> <td style="text-align: center;"><math>\pm 2</math> mBar</td> </tr> <tr> <td style="text-align: right;">Relative Humidity</td> <td style="text-align: center;">46</td> <td style="text-align: center;">%</td> <td style="text-align: center;"><math>\pm 5</math> %</td> </tr> </table>                                                                                                                                                                                                                                                                     |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          | Temperature            | 22           | °C                                | $\pm 1$ °C                             | Atmospheric Pressure            | 1029           | mBar      | $\pm 2$ mBar                           | Relative Humidity                   | 46          | %        | $\pm 5$ %                              |
| Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 22                                                                                                                                                                              | °C                                                                                                                                                      | $\pm 1$ °C                                                                          |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Atmospheric Pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1029                                                                                                                                                                            | mBar                                                                                                                                                    | $\pm 2$ mBar                                                                        |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 46                                                                                                                                                                              | %                                                                                                                                                       | $\pm 5$ %                                                                           |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Test Equipment used during this calibration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| <b>Equipment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Manufacturer</b>                                                                                                                                                             | <b>Model</b>                                                                                                                                            | <b>Serial No.</b>                                                                   | <b>Traceability Ref.</b> | <b>Calibration Due</b> |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Reference Calibrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Brüel & Kjær                                                                                                                                                                    | 4231                                                                                                                                                    | 2343058                                                                             | TE 132                   | Jun-26                 |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Multimeter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | HP                                                                                                                                                                              | 34401A                                                                                                                                                  | 36146A63804                                                                         | TE 105                   | Dec-24                 |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Microphone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | B&K                                                                                                                                                                             | 4133                                                                                                                                                    | 810486                                                                              | TE 155                   | Oct-25                 |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| Real-Time Analyser (set 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Larson Davis                                                                                                                                                                    | 2900                                                                                                                                                    | 0492                                                                                | TE 108                   | Sep-25                 |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |
| End of Certificate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                 |                                                                                                                                                         |                                                                                     |                          |                        |              |                                   |                                        |                                 |                |           |                                        |                                     |             |          |                                        |

ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
CASTLETHORN OLD CONNA ULC  
LANDS NORTH OF OLD CONNAUGHT AVENUE, OLD CONNAUGHT, CO. DUBLIN  
COMPLETED  
BY  
TRAYNOR ENVIRONMENTAL LTD

APPENDIX D – COMPETENCY CERTIFICATE FROM INSTITUTE OF ACOUSTICS





# *Certificate of Competence in Environmental Noise Measurement*

*This is to certify that*

*Nevin Traynor*

*has completed a course of instruction approved by the  
Institute of Acoustics and designed to enable the candidate  
to undertake environmental noise measurements in a  
competent manner and has achieved a satisfactory  
performance in the written and practical examinations  
thereof and that this fact has been recorded in a  
Register kept by the Institute for this purpose.*

  
*Education Committee Chairman*

  
*Institute Secretary*

*Date 11/10/2019*

*Centre Moloney & Associates*

*Reference Number MC111*

*For the purposes of Credit Transfer or Professional Development this Certificate  
may be considered to be equivalent to 25 points on basis*

The Institute of Acoustics Limited, Tisbury Court, 408 Selwyn Boulevard, Milton Keynes MK9 2JF  
T: +44 (0)1908 989 5875 E: [info@ioa.org.uk](mailto:info@ioa.org.uk) W: [ioa.org.uk](http://ioa.org.uk)

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ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
CASTLETHORN OLD CONNA ULC  
LANDS NORTH OF OLD CONNAUGHT AVENUE, OLD CONNAUGHT, CO. DUBLIN  
COMPLETED  
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TRAYNOR ENVIRONMENTAL LTD

## APPENDIX E – FULL SET OF NOISE RESULTS FOR NML1



**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 23/04/2026     | 09:18:31 | 62               | 73                | 63               | 60               |
| 23/04/2026     | 09:30:00 | 61               | 66                | 63               | 60               |
| 23/04/2026     | 10:00:00 | 62               | 70                | 63               | 60               |
| 23/04/2026     | 10:30:00 | 61               | 69                | 63               | 59               |
| 23/04/2026     | 11:00:00 | 63               | 75                | 65               | 60               |
| 23/04/2026     | 11:30:00 | 62               | 72                | 63               | 59               |
| 23/04/2026     | 12:00:00 | 62               | 69                | 64               | 59               |
| 23/04/2026     | 12:30:00 | 60               | 68                | 62               | 57               |
| 23/04/2026     | 13:00:00 | 61               | 69                | 62               | 59               |
| 23/04/2026     | 13:30:00 | 59               | 66                | 61               | 58               |
| 23/04/2026     | 14:00:00 | 58               | 71                | 60               | 57               |
| 23/04/2026     | 14:30:00 | 59               | 74                | 60               | 56               |
| 23/04/2026     | 15:00:00 | 57               | 71                | 58               | 55               |
| 23/04/2026     | 15:30:00 | 57               | 65                | 58               | 55               |
| 23/04/2026     | 16:00:00 | 56               | 67                | 58               | 55               |
| 23/04/2026     | 16:30:00 | 57               | 69                | 58               | 55               |
| 23/04/2026     | 17:00:00 | 57               | 66                | 58               | 55               |
| 23/04/2026     | 17:30:00 | 56               | 67                | 58               | 54               |
| 23/04/2026     | 18:00:00 | 56               | 67                | 58               | 54               |
| 23/04/2026     | 18:30:00 | 55               | 64                | 57               | 54               |
| 23/04/2026     | 19:00:00 | 56               | 62                | 58               | 54               |
| 23/04/2026     | 19:30:00 | 58               | 70                | 60               | 56               |
| 23/04/2026     | 20:00:00 | 58               | 71                | 59               | 55               |
| 23/04/2026     | 20:30:00 | 56               | 61                | 58               | 54               |
| 23/04/2026     | 21:00:00 | 56               | 62                | 58               | 54               |
| 23/04/2026     | 21:30:00 | 57               | 65                | 59               | 55               |
| 23/04/2026     | 22:00:00 | 56               | 62                | 58               | 54               |
| 23/04/2026     | 22:30:00 | 56               | 61                | 58               | 54               |
| <b>Average</b> |          | <b>58</b>        | <b>68</b>         | <b>60</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 23/04/2026     | 23:00:00 | 54               | 60                | 56               | 52               |
| 23/04/2026     | 23:30:00 | 53               | 59                | 55               | 51               |
| 24/04/2026     | 00:00:00 | 53               | 67                | 55               | 50               |
| 24/04/2026     | 00:30:00 | 51               | 60                | 54               | 46               |
| 24/04/2026     | 01:00:00 | 50               | 61                | 53               | 43               |
| 24/04/2026     | 01:30:00 | 50               | 64                | 53               | 43               |
| 24/04/2026     | 02:00:00 | 50               | 61                | 53               | 42               |
| 24/04/2026     | 02:30:00 | 51               | 63                | 54               | 43               |
| 24/04/2026     | 03:00:00 | 52               | 66                | 56               | 44               |
| 24/04/2026     | 03:30:00 | 53               | 64                | 56               | 48               |
| 24/04/2026     | 04:00:00 | 54               | 65                | 57               | 49               |
| 24/04/2026     | 04:30:00 | 56               | 67                | 58               | 53               |
| 24/04/2026     | 05:00:00 | 59               | 68                | 61               | 55               |
| 24/04/2026     | 05:30:00 | 60               | 66                | 62               | 58               |
| 24/04/2026     | 06:00:00 | 62               | 70                | 64               | 61               |
| 24/04/2026     | 06:30:00 | 63               | 79                | 64               | 62               |
| <b>Average</b> |          | <b>54</b>        | <b>65</b>         | <b>57</b>        | <b>50</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 24/04/2026     | 07:00:00 | 64               | 69                | 65               | 63               |
| 24/04/2026     | 07:30:00 | 63               | 75                | 64               | 61               |
| 24/04/2026     | 08:00:00 | 61               | 68                | 62               | 59               |
| 24/04/2026     | 08:30:00 | 58               | 69                | 59               | 55               |
| 24/04/2026     | 09:00:00 | 56               | 66                | 57               | 54               |
| 24/04/2026     | 09:30:00 | 56               | 72                | 57               | 54               |
| 24/04/2026     | 10:00:00 | 55               | 65                | 56               | 53               |
| 24/04/2026     | 10:30:00 | 55               | 64                | 56               | 53               |
| 24/04/2026     | 11:00:00 | 55               | 64                | 56               | 53               |
| 24/04/2026     | 11:30:00 | 55               | 64                | 56               | 53               |
| 24/04/2026     | 12:00:00 | 55               | 60                | 56               | 53               |
| 24/04/2026     | 12:30:00 | 55               | 64                | 56               | 53               |
| 24/04/2026     | 13:00:00 | 54               | 61                | 56               | 53               |
| 24/04/2026     | 13:30:00 | 56               | 66                | 57               | 53               |
| 24/04/2026     | 14:00:00 | 56               | 67                | 57               | 54               |
| 24/04/2026     | 14:30:00 | 55               | 70                | 57               | 54               |
| 24/04/2026     | 15:00:00 | 55               | 69                | 57               | 53               |
| 24/04/2026     | 15:30:00 | 55               | 65                | 57               | 53               |
| 24/04/2026     | 16:00:00 | 55               | 62                | 56               | 53               |
| 24/04/2026     | 16:30:00 | 55               | 72                | 56               | 53               |
| 24/04/2026     | 17:00:00 | 55               | 65                | 57               | 54               |
| 24/04/2026     | 17:30:00 | 55               | 64                | 57               | 53               |
| 24/04/2026     | 18:00:00 | 56               | 72                | 57               | 54               |
| 24/04/2026     | 18:30:00 | 56               | 64                | 57               | 54               |
| 24/04/2026     | 19:00:00 | 57               | 68                | 58               | 55               |
| 24/04/2026     | 19:30:00 | 58               | 68                | 60               | 55               |
| 24/04/2026     | 20:00:00 | 58               | 69                | 60               | 56               |
| 24/04/2026     | 20:30:00 | 58               | 64                | 60               | 56               |
| 24/04/2026     | 21:00:00 | 59               | 69                | 60               | 57               |
| 24/04/2026     | 21:30:00 | 57               | 63                | 59               | 54               |
| 24/04/2026     | 22:00:00 | 57               | 64                | 59               | 55               |
| 24/04/2026     | 22:30:00 | 56               | 62                | 58               | 53               |
| <b>Average</b> |          | <b>57</b>        | <b>66</b>         | <b>58</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 24/04/2026     | 23:00:00 | 54               | 64                | 56               | 52               |
| 24/04/2026     | 23:30:00 | 54               | 61                | 56               | 51               |
| 25/04/2026     | 00:00:00 | 54               | 66                | 56               | 50               |
| 25/04/2026     | 00:30:00 | 53               | 61                | 56               | 49               |
| 25/04/2026     | 01:00:00 | 51               | 62                | 54               | 45               |
| 25/04/2026     | 01:30:00 | 50               | 61                | 53               | 45               |
| 25/04/2026     | 02:00:00 | 50               | 58                | 52               | 46               |
| 25/04/2026     | 02:30:00 | 49               | 60                | 52               | 43               |
| 25/04/2026     | 03:00:00 | 49               | 59                | 51               | 43               |
| 25/04/2026     | 03:30:00 | 50               | 59                | 53               | 45               |
| 25/04/2026     | 04:00:00 | 52               | 59                | 54               | 48               |
| 25/04/2026     | 04:30:00 | 53               | 66                | 56               | 48               |
| 25/04/2026     | 05:00:00 | 55               | 67                | 58               | 49               |
| 25/04/2026     | 05:30:00 | 53               | 67                | 56               | 49               |
| 25/04/2026     | 06:00:00 | 55               | 64                | 58               | 52               |
| 25/04/2026     | 06:30:00 | 58               | 67                | 59               | 56               |
| <b>Average</b> |          | <b>52</b>        | <b>63</b>         | <b>55</b>        | <b>48</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 25/04/2026     | 07:00:00 | 58               | 65                | 59               | 56               |
| 25/04/2026     | 07:30:00 | 57               | 63                | 59               | 54               |
| 25/04/2026     | 08:00:00 | 55               | 64                | 56               | 53               |
| 25/04/2026     | 08:30:00 | 56               | 60                | 57               | 54               |
| 25/04/2026     | 09:00:00 | 56               | 72                | 58               | 55               |
| 25/04/2026     | 09:30:00 | 56               | 64                | 58               | 55               |
| 25/04/2026     | 10:00:00 | 57               | 64                | 58               | 56               |
| 25/04/2026     | 10:30:00 | 57               | 64                | 58               | 56               |
| 25/04/2026     | 11:00:00 | 56               | 64                | 57               | 55               |
| 25/04/2026     | 11:30:00 | 56               | 70                | 57               | 55               |
| 25/04/2026     | 12:00:00 | 56               | 66                | 57               | 55               |
| 25/04/2026     | 12:30:00 | 56               | 66                | 57               | 55               |
| 25/04/2026     | 13:00:00 | 57               | 64                | 59               | 54               |
| 25/04/2026     | 13:30:00 | 60               | 68                | 61               | 58               |
| 25/04/2026     | 14:00:00 | 59               | 65                | 60               | 57               |
| 25/04/2026     | 14:30:00 | 59               | 68                | 61               | 57               |
| 25/04/2026     | 15:00:00 | 59               | 72                | 61               | 57               |
| 25/04/2026     | 15:30:00 | 59               | 66                | 61               | 57               |
| 25/04/2026     | 16:00:00 | 60               | 71                | 61               | 57               |
| 25/04/2026     | 16:30:00 | 59               | 75                | 61               | 56               |
| 25/04/2026     | 17:00:00 | 60               | 67                | 62               | 58               |
| 25/04/2026     | 17:30:00 | 61               | 67                | 62               | 59               |
| 25/04/2026     | 18:00:00 | 61               | 68                | 62               | 59               |
| 25/04/2026     | 18:30:00 | 60               | 67                | 61               | 58               |
| 25/04/2026     | 19:00:00 | 58               | 67                | 60               | 57               |
| 25/04/2026     | 19:30:00 | 59               | 66                | 60               | 57               |
| 25/04/2026     | 20:00:00 | 59               | 70                | 60               | 57               |
| 25/04/2026     | 20:30:00 | 58               | 65                | 60               | 56               |
| 25/04/2026     | 21:00:00 | 58               | 70                | 60               | 56               |
| 25/04/2026     | 21:30:00 | 56               | 61                | 58               | 54               |
| 25/04/2026     | 22:00:00 | 56               | 60                | 58               | 55               |
| 25/04/2026     | 22:30:00 | 56               | 67                | 57               | 54               |
| <b>Average</b> |          | <b>58</b>        | <b>66</b>         | <b>59</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 25/04/2026     | 23:00:00 | 56               | 60                | 57               | 54               |
| 25/04/2026     | 23:30:00 | 56               | 62                | 57               | 54               |
| 26/04/2026     | 00:00:00 | 55               | 60                | 57               | 54               |
| 26/04/2026     | 00:30:00 | 55               | 61                | 56               | 53               |
| 26/04/2026     | 01:00:00 | 54               | 60                | 56               | 53               |
| 26/04/2026     | 01:30:00 | 54               | 61                | 55               | 52               |
| 26/04/2026     | 02:00:00 | 54               | 60                | 55               | 53               |
| 26/04/2026     | 02:30:00 | 56               | 61                | 57               | 55               |
| 26/04/2026     | 03:00:00 | 55               | 59                | 56               | 54               |
| 26/04/2026     | 03:30:00 | 54               | 58                | 55               | 53               |
| 26/04/2026     | 04:00:00 | 55               | 62                | 56               | 54               |
| 26/04/2026     | 04:30:00 | 55               | 68                | 56               | 53               |
| 26/04/2026     | 05:00:00 | 57               | 70                | 59               | 53               |
| 26/04/2026     | 05:30:00 | 55               | 65                | 56               | 53               |
| 26/04/2026     | 06:00:00 | 56               | 64                | 57               | 54               |
| 26/04/2026     | 06:30:00 | 56               | 65                | 57               | 54               |
| <b>Average</b> |          | <b>55</b>        | <b>62</b>         | <b>56</b>        | <b>53</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 26/04/2026     | 07:00:00 | 57               | 70                | 58               | 55               |
| 26/04/2026     | 07:30:00 | 59               | 64                | 60               | 58               |
| 26/04/2026     | 08:00:00 | 58               | 67                | 60               | 54               |
| 26/04/2026     | 08:30:00 | 56               | 64                | 57               | 54               |
| 26/04/2026     | 09:00:00 | 57               | 68                | 59               | 55               |
| 26/04/2026     | 09:30:00 | 57               | 62                | 58               | 56               |
| 26/04/2026     | 10:00:00 | 57               | 64                | 58               | 55               |
| 26/04/2026     | 10:30:00 | 57               | 64                | 58               | 55               |
| 26/04/2026     | 11:00:00 | 57               | 65                | 58               | 55               |
| 26/04/2026     | 11:30:00 | 57               | 64                | 58               | 56               |
| 26/04/2026     | 12:00:00 | 58               | 70                | 59               | 56               |
| 26/04/2026     | 12:30:00 | 58               | 68                | 59               | 56               |
| 26/04/2026     | 13:00:00 | 57               | 63                | 58               | 56               |
| 26/04/2026     | 13:30:00 | 57               | 66                | 58               | 56               |
| 26/04/2026     | 14:00:00 | 57               | 70                | 58               | 55               |
| 26/04/2026     | 14:30:00 | 57               | 65                | 58               | 55               |
| 26/04/2026     | 15:00:00 | 57               | 67                | 58               | 55               |
| 26/04/2026     | 15:30:00 | 57               | 67                | 58               | 56               |
| 26/04/2026     | 16:00:00 | 58               | 81                | 59               | 56               |
| 26/04/2026     | 16:30:00 | 57               | 69                | 58               | 56               |
| 26/04/2026     | 17:00:00 | 57               | 69                | 58               | 55               |
| 26/04/2026     | 17:30:00 | 58               | 69                | 60               | 56               |
| 26/04/2026     | 18:00:00 | 57               | 70                | 59               | 56               |
| 26/04/2026     | 18:30:00 | 57               | 71                | 58               | 55               |
| 26/04/2026     | 19:00:00 | 56               | 68                | 57               | 55               |
| 26/04/2026     | 19:30:00 | 56               | 64                | 57               | 55               |
| 26/04/2026     | 20:00:00 | 56               | 64                | 57               | 55               |
| 26/04/2026     | 20:30:00 | 56               | 65                | 58               | 55               |
| 26/04/2026     | 21:00:00 | 57               | 67                | 58               | 55               |
| 26/04/2026     | 21:30:00 | 56               | 61                | 58               | 55               |
| 26/04/2026     | 22:00:00 | 56               | 66                | 58               | 54               |
| 26/04/2026     | 22:30:00 | 55               | 63                | 57               | 53               |
| <b>Average</b> |          | <b>57</b>        | <b>67</b>         | <b>58</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 26/04/2026     | 23:00:00 | 55               | 59                | 56               | 54               |
| 26/04/2026     | 23:30:00 | 56               | 66                | 57               | 56               |
| 27/04/2026     | 00:00:00 | 56               | 59                | 56               | 55               |
| 27/04/2026     | 00:30:00 | 54               | 59                | 55               | 53               |
| 27/04/2026     | 01:00:00 | 54               | 58                | 55               | 53               |
| 27/04/2026     | 01:30:00 | 53               | 60                | 54               | 52               |
| 27/04/2026     | 02:00:00 | 52               | 57                | 54               | 51               |
| 27/04/2026     | 02:30:00 | 52               | 64                | 53               | 50               |
| 27/04/2026     | 03:00:00 | 52               | 59                | 53               | 50               |
| 27/04/2026     | 03:30:00 | 52               | 59                | 53               | 50               |
| 27/04/2026     | 04:00:00 | 53               | 64                | 55               | 51               |
| 27/04/2026     | 04:30:00 | 56               | 68                | 58               | 52               |
| 27/04/2026     | 05:00:00 | 57               | 70                | 59               | 54               |
| 27/04/2026     | 05:30:00 | 58               | 64                | 59               | 55               |
| 27/04/2026     | 06:00:00 | 60               | 65                | 62               | 59               |
| 27/04/2026     | 06:30:00 | 58               | 64                | 60               | 57               |
| <b>Average</b> |          | <b>55</b>        | <b>62</b>         | <b>56</b>        | <b>53</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 27/04/2026     | 07:00:00 | 58               | 62                | 59               | 57               |
| 27/04/2026     | 07:30:00 | 57               | 74                | 57               | 55               |
| 27/04/2026     | 08:00:00 | 57               | 68                | 58               | 56               |
| 27/04/2026     | 08:30:00 | 56               | 66                | 57               | 55               |
| 27/04/2026     | 09:00:00 | 57               | 66                | 58               | 55               |
| 27/04/2026     | 09:30:00 | 56               | 65                | 58               | 54               |
| 27/04/2026     | 10:00:00 | 56               | 72                | 57               | 54               |
| 27/04/2026     | 10:30:00 | 56               | 69                | 57               | 54               |
| 27/04/2026     | 11:00:00 | 56               | 64                | 58               | 55               |
| 27/04/2026     | 11:30:00 | 57               | 68                | 58               | 55               |
| 27/04/2026     | 12:00:00 | 58               | 70                | 60               | 56               |
| 27/04/2026     | 12:30:00 | 58               | 69                | 59               | 56               |
| 27/04/2026     | 13:00:00 | 58               | 68                | 59               | 56               |
| 27/04/2026     | 13:30:00 | 58               | 76                | 59               | 56               |
| 27/04/2026     | 14:00:00 | 57               | 68                | 58               | 55               |
| 27/04/2026     | 14:30:00 | 57               | 67                | 58               | 55               |
| 27/04/2026     | 15:00:00 | 57               | 72                | 59               | 55               |
| 27/04/2026     | 15:30:00 | 56               | 68                | 57               | 54               |
| 27/04/2026     | 16:00:00 | 57               | 72                | 59               | 53               |
| 27/04/2026     | 16:30:00 | 54               | 68                | 56               | 52               |
| 27/04/2026     | 17:00:00 | 55               | 77                | 57               | 52               |
| 27/04/2026     | 17:30:00 | 56               | 79                | 58               | 52               |
| 27/04/2026     | 18:00:00 | 55               | 67                | 56               | 52               |
| 27/04/2026     | 18:30:00 | 55               | 69                | 57               | 53               |
| 27/04/2026     | 19:00:00 | 54               | 67                | 56               | 52               |
| 27/04/2026     | 19:30:00 | 54               | 70                | 56               | 51               |
| 27/04/2026     | 20:00:00 | 56               | 70                | 57               | 54               |
| 27/04/2026     | 20:30:00 | 57               | 66                | 58               | 55               |
| 27/04/2026     | 21:00:00 | 58               | 69                | 59               | 55               |
| 27/04/2026     | 21:30:00 | 57               | 66                | 59               | 55               |
| 27/04/2026     | 22:00:00 | 57               | 63                | 59               | 55               |
| 27/04/2026     | 22:30:00 | 57               | 63                | 58               | 54               |
| <b>Average</b> |          | <b>56</b>        | <b>69</b>         | <b>58</b>        | <b>54</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 27/04/2026     | 23:00:00 | 56               | 64                | 58               | 53               |
| 27/04/2026     | 23:30:00 | 55               | 66                | 58               | 52               |
| 28/04/2026     | 00:00:00 | 54               | 61                | 56               | 51               |
| 28/04/2026     | 00:30:00 | 54               | 64                | 56               | 50               |
| 28/04/2026     | 01:00:00 | 52               | 61                | 54               | 49               |
| 28/04/2026     | 01:30:00 | 52               | 62                | 54               | 49               |
| 28/04/2026     | 02:00:00 | 52               | 64                | 55               | 49               |
| 28/04/2026     | 02:30:00 | 53               | 64                | 55               | 49               |
| 28/04/2026     | 03:00:00 | 53               | 62                | 56               | 49               |
| 28/04/2026     | 03:30:00 | 53               | 61                | 55               | 50               |
| 28/04/2026     | 04:00:00 | 56               | 70                | 58               | 51               |
| 28/04/2026     | 04:30:00 | 56               | 68                | 59               | 53               |
| 28/04/2026     | 05:00:00 | 58               | 76                | 60               | 55               |
| 28/04/2026     | 05:30:00 | 60               | 70                | 62               | 57               |
| 28/04/2026     | 06:00:00 | 61               | 70                | 63               | 59               |
| 28/04/2026     | 06:30:00 | 59               | 67                | 60               | 57               |
| <b>Average</b> |          | <b>55</b>        | <b>66</b>         | <b>57</b>        | <b>52</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 28/04/2026     | 07:00:00 | 58               | 63                | 59               | 56               |
| 28/04/2026     | 07:30:00 | 57               | 69                | 59               | 55               |
| 28/04/2026     | 08:00:00 | 59               | 74                | 60               | 58               |
| 28/04/2026     | 08:30:00 | 59               | 73                | 60               | 57               |
| 28/04/2026     | 09:00:00 | 58               | 68                | 59               | 57               |
| 28/04/2026     | 09:30:00 | 59               | 70                | 60               | 57               |
| 28/04/2026     | 10:00:00 | 58               | 70                | 59               | 56               |
| 28/04/2026     | 10:30:00 | 58               | 69                | 59               | 56               |
| 28/04/2026     | 11:00:00 | 58               | 65                | 59               | 56               |
| 28/04/2026     | 11:30:00 | 57               | 64                | 58               | 56               |
| 28/04/2026     | 12:00:00 | 57               | 68                | 59               | 55               |
| 28/04/2026     | 12:30:00 | 57               | 66                | 58               | 55               |
| 28/04/2026     | 13:00:00 | 56               | 68                | 57               | 54               |
| 28/04/2026     | 13:30:00 | 57               | 71                | 58               | 54               |
| 28/04/2026     | 14:00:00 | 56               | 68                | 57               | 54               |
| 28/04/2026     | 14:30:00 | 56               | 62                | 58               | 54               |
| 28/04/2026     | 15:00:00 | 57               | 71                | 58               | 55               |
| 28/04/2026     | 15:30:00 | 56               | 66                | 58               | 54               |
| 28/04/2026     | 16:00:00 | 55               | 68                | 57               | 53               |
| 28/04/2026     | 16:30:00 | 55               | 68                | 57               | 53               |
| 28/04/2026     | 17:00:00 | 56               | 65                | 58               | 54               |
| 28/04/2026     | 17:30:00 | 58               | 64                | 59               | 56               |
| 28/04/2026     | 18:00:00 | 57               | 70                | 59               | 55               |
| 28/04/2026     | 18:30:00 | 58               | 71                | 59               | 56               |
| 28/04/2026     | 19:00:00 | 58               | 70                | 60               | 56               |
| 28/04/2026     | 19:30:00 | 59               | 65                | 60               | 57               |
| 28/04/2026     | 20:00:00 | 59               | 69                | 61               | 57               |
| 28/04/2026     | 20:30:00 | 57               | 68                | 59               | 55               |
| 28/04/2026     | 21:00:00 | 58               | 72                | 59               | 55               |
| 28/04/2026     | 21:30:00 | 57               | 73                | 58               | 54               |
| 28/04/2026     | 22:00:00 | 57               | 63                | 59               | 55               |
| 28/04/2026     | 22:30:00 | 55               | 64                | 57               | 53               |
| <b>Average</b> |          | <b>57</b>        | <b>68</b>         | <b>59</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 28/04/2026     | 23:00:00 | 55               | 62                | 57               | 53               |
| 28/04/2026     | 23:30:00 | 54               | 62                | 56               | 51               |
| 29/04/2026     | 00:00:00 | 53               | 61                | 55               | 51               |
| 29/04/2026     | 00:30:00 | 52               | 64                | 54               | 50               |
| 29/04/2026     | 01:00:00 | 51               | 58                | 53               | 49               |
| 29/04/2026     | 01:30:00 | 52               | 59                | 54               | 49               |
| 29/04/2026     | 02:00:00 | 51               | 58                | 53               | 49               |
| 29/04/2026     | 02:30:00 | 50               | 58                | 52               | 48               |
| 29/04/2026     | 03:00:00 | 52               | 60                | 54               | 49               |
| 29/04/2026     | 03:30:00 | 52               | 59                | 54               | 49               |
| 29/04/2026     | 04:00:00 | 52               | 62                | 54               | 49               |
| 29/04/2026     | 04:30:00 | 56               | 70                | 58               | 51               |
| 29/04/2026     | 05:00:00 | 57               | 73                | 60               | 52               |
| 29/04/2026     | 05:30:00 | 58               | 70                | 60               | 55               |
| 29/04/2026     | 06:00:00 | 60               | 79                | 62               | 58               |
| 29/04/2026     | 06:30:00 | 61               | 69                | 62               | 60               |
| <b>Average</b> |          | <b>54</b>        | <b>64</b>         | <b>56</b>        | <b>51</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 29/04/2026     | 07:00:00 | 61               | 65                | 61               | 60               |
| 29/04/2026     | 07:30:00 | 62               | 72                | 63               | 60               |
| 29/04/2026     | 08:00:00 | 60               | 66                | 61               | 58               |
| 29/04/2026     | 08:30:00 | 58               | 65                | 59               | 57               |
| 29/04/2026     | 09:00:00 | 58               | 64                | 60               | 56               |
| 29/04/2026     | 09:30:00 | 56               | 60                | 57               | 55               |
| 29/04/2026     | 10:00:00 | 56               | 67                | 57               | 54               |
| 29/04/2026     | 10:30:00 | 56               | 68                | 57               | 54               |
| 29/04/2026     | 11:00:00 | 56               | 63                | 57               | 54               |
| 29/04/2026     | 11:30:00 | 56               | 64                | 58               | 55               |
| 29/04/2026     | 12:00:00 | 56               | 64                | 58               | 55               |
| 29/04/2026     | 12:30:00 | 56               | 64                | 58               | 55               |
| 29/04/2026     | 13:00:00 | 57               | 68                | 59               | 55               |
| 29/04/2026     | 13:30:00 | 57               | 65                | 59               | 55               |
| 29/04/2026     | 14:00:00 | 56               | 69                | 58               | 55               |
| 29/04/2026     | 14:30:00 | 57               | 78                | 58               | 54               |
| 29/04/2026     | 15:00:00 | 55               | 66                | 57               | 53               |
| 29/04/2026     | 15:30:00 | 54               | 65                | 55               | 52               |
| 29/04/2026     | 16:00:00 | 54               | 62                | 55               | 51               |
| 29/04/2026     | 16:30:00 | 54               | 64                | 56               | 52               |
| 29/04/2026     | 17:00:00 | 55               | 66                | 57               | 53               |
| 29/04/2026     | 17:30:00 | 56               | 67                | 58               | 52               |
| 29/04/2026     | 18:00:00 | 55               | 65                | 57               | 52               |
| 29/04/2026     | 18:30:00 | 55               | 68                | 58               | 51               |
| 29/04/2026     | 19:00:00 | 54               | 66                | 56               | 52               |
| 29/04/2026     | 19:30:00 | 55               | 70                | 56               | 52               |
| 29/04/2026     | 20:00:00 | 54               | 68                | 56               | 52               |
| 29/04/2026     | 20:30:00 | 55               | 68                | 57               | 53               |
| 29/04/2026     | 21:00:00 | 54               | 66                | 56               | 52               |
| 29/04/2026     | 21:30:00 | 54               | 76                | 56               | 51               |
| 29/04/2026     | 22:00:00 | 52               | 59                | 53               | 49               |
| 29/04/2026     | 22:30:00 | 52               | 59                | 54               | 48               |
| <b>Average</b> |          | <b>56</b>        | <b>66</b>         | <b>57</b>        | <b>54</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 29/04/2026     | 23:00:00 | 51               | 61                | 53               | 48               |
| 29/04/2026     | 23:30:00 | 50               | 57                | 52               | 46               |
| 30/04/2026     | 00:00:00 | 50               | 64                | 52               | 44               |
| 30/04/2026     | 00:30:00 | 48               | 65                | 50               | 42               |
| 30/04/2026     | 01:00:00 | 47               | 55                | 50               | 41               |
| 30/04/2026     | 01:30:00 | 45               | 57                | 49               | 37               |
| 30/04/2026     | 02:00:00 | 46               | 55                | 49               | 40               |
| 30/04/2026     | 02:30:00 | 46               | 57                | 49               | 38               |
| 30/04/2026     | 03:00:00 | 47               | 57                | 50               | 39               |
| 30/04/2026     | 03:30:00 | 48               | 57                | 51               | 41               |
| 30/04/2026     | 04:00:00 | 49               | 58                | 52               | 43               |
| 30/04/2026     | 04:30:00 | 54               | 68                | 58               | 47               |
| 30/04/2026     | 05:00:00 | 55               | 69                | 58               | 50               |
| 30/04/2026     | 05:30:00 | 55               | 66                | 57               | 52               |
| 30/04/2026     | 06:00:00 | 57               | 64                | 58               | 56               |
| 30/04/2026     | 06:30:00 | 57               | 66                | 58               | 56               |
| <b>Average</b> |          | <b>50</b>        | <b>61</b>         | <b>53</b>        | <b>45</b>        |

ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
CASTLETHORN OLD CONNA ULC  
LANDS NORTH OF OLD CONNAUGHT AVENUE, OLD CONNAUGHT, CO. DUBLIN  
COMPLETED  
BY  
TRAYNOR ENVIRONMENTAL LTD

APPENDIX F – FULL SET OF NOISE RESULTS FOR NML2



**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 23/04/2026     | 09:00:16 | 60               | 70                | 61               | 58               |
| 23/04/2026     | 09:30:00 | 59               | 63                | 60               | 58               |
| 23/04/2026     | 10:00:00 | 59               | 62                | 60               | 58               |
| 23/04/2026     | 10:30:00 | 59               | 65                | 61               | 58               |
| 23/04/2026     | 11:00:00 | 59               | 64                | 60               | 58               |
| 23/04/2026     | 11:30:00 | 59               | 66                | 61               | 58               |
| 23/04/2026     | 12:00:00 | 59               | 64                | 61               | 58               |
| 23/04/2026     | 12:30:00 | 59               | 63                | 60               | 57               |
| 23/04/2026     | 13:00:00 | 59               | 65                | 60               | 57               |
| 23/04/2026     | 13:30:00 | 58               | 65                | 59               | 56               |
| 23/04/2026     | 14:00:00 | 58               | 63                | 60               | 57               |
| 23/04/2026     | 14:30:00 | 58               | 66                | 59               | 55               |
| 23/04/2026     | 15:00:00 | 56               | 60                | 57               | 54               |
| 23/04/2026     | 15:30:00 | 56               | 62                | 57               | 53               |
| 23/04/2026     | 16:00:00 | 56               | 64                | 58               | 54               |
| 23/04/2026     | 16:30:00 | 57               | 70                | 59               | 54               |
| 23/04/2026     | 17:00:00 | 56               | 61                | 57               | 54               |
| 23/04/2026     | 17:30:00 | 57               | 65                | 59               | 54               |
| 23/04/2026     | 18:00:00 | 56               | 62                | 58               | 54               |
| 23/04/2026     | 18:30:00 | 56               | 61                | 57               | 53               |
| 23/04/2026     | 19:00:00 | 57               | 64                | 59               | 54               |
| 23/04/2026     | 19:30:00 | 58               | 72                | 59               | 55               |
| 23/04/2026     | 20:00:00 | 59               | 63                | 60               | 56               |
| 23/04/2026     | 20:30:00 | 58               | 64                | 60               | 56               |
| 23/04/2026     | 21:00:00 | 58               | 66                | 59               | 55               |
| 23/04/2026     | 21:30:00 | 56               | 61                | 58               | 54               |
| 23/04/2026     | 22:00:00 | 56               | 60                | 58               | 54               |
| 23/04/2026     | 22:30:00 | 56               | 62                | 57               | 53               |
| <b>Average</b> |          | <b>58</b>        | <b>64</b>         | <b>59</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 23/04/2026     | 23:00:00 | 54               | 60                | 56               | 52               |
| 23/04/2026     | 23:30:00 | 54               | 62                | 56               | 51               |
| 24/04/2026     | 00:00:00 | 53               | 60                | 56               | 50               |
| 24/04/2026     | 00:30:00 | 52               | 61                | 55               | 47               |
| 24/04/2026     | 01:00:00 | 51               | 58                | 54               | 43               |
| 24/04/2026     | 01:30:00 | 51               | 60                | 55               | 43               |
| 24/04/2026     | 02:00:00 | 52               | 62                | 55               | 43               |
| 24/04/2026     | 02:30:00 | 51               | 59                | 54               | 42               |
| 24/04/2026     | 03:00:00 | 53               | 63                | 56               | 46               |
| 24/04/2026     | 03:30:00 | 55               | 64                | 57               | 50               |
| 24/04/2026     | 04:00:00 | 55               | 64                | 58               | 50               |
| 24/04/2026     | 04:30:00 | 60               | 70                | 62               | 55               |
| 24/04/2026     | 05:00:00 | 61               | 72                | 63               | 57               |
| 24/04/2026     | 05:30:00 | 62               | 71                | 63               | 60               |
| 24/04/2026     | 06:00:00 | 65               | 72                | 66               | 63               |
| 24/04/2026     | 06:30:00 | 64               | 67                | 65               | 63               |
| <b>Average</b> |          | <b>56</b>        | <b>64</b>         | <b>58</b>        | <b>51</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 24/04/2026     | 07:00:00 | 63               | 67                | 64               | 62               |
| 24/04/2026     | 07:30:00 | 62               | 67                | 63               | 60               |
| 24/04/2026     | 08:00:00 | 60               | 67                | 61               | 59               |
| 24/04/2026     | 08:30:00 | 59               | 65                | 59               | 58               |
| 24/04/2026     | 09:00:00 | 59               | 63                | 60               | 57               |
| 24/04/2026     | 09:30:00 | 58               | 65                | 59               | 56               |
| 24/04/2026     | 10:00:00 | 58               | 63                | 59               | 55               |
| 24/04/2026     | 10:30:00 | 58               | 66                | 59               | 56               |
| 24/04/2026     | 11:00:00 | 58               | 65                | 59               | 56               |
| 24/04/2026     | 11:30:00 | 58               | 65                | 60               | 56               |
| 24/04/2026     | 12:00:00 | 58               | 67                | 59               | 56               |
| 24/04/2026     | 12:30:00 | 58               | 65                | 59               | 56               |
| 24/04/2026     | 13:00:00 | 57               | 65                | 58               | 55               |
| 24/04/2026     | 13:30:00 | 56               | 65                | 58               | 54               |
| 24/04/2026     | 14:00:00 | 57               | 70                | 58               | 54               |
| 24/04/2026     | 14:30:00 | 57               | 65                | 58               | 54               |
| 24/04/2026     | 15:00:00 | 57               | 65                | 58               | 54               |
| 24/04/2026     | 15:30:00 | 57               | 66                | 59               | 54               |
| 24/04/2026     | 16:00:00 | 56               | 62                | 58               | 54               |
| 24/04/2026     | 16:30:00 | 56               | 65                | 58               | 54               |
| 24/04/2026     | 17:00:00 | 57               | 67                | 58               | 54               |
| 24/04/2026     | 17:30:00 | 57               | 70                | 59               | 54               |
| 24/04/2026     | 18:00:00 | 57               | 64                | 58               | 54               |
| 24/04/2026     | 18:30:00 | 56               | 64                | 58               | 54               |
| 24/04/2026     | 19:00:00 | 58               | 66                | 59               | 55               |
| 24/04/2026     | 19:30:00 | 58               | 64                | 60               | 56               |
| 24/04/2026     | 20:00:00 | 60               | 67                | 61               | 57               |
| 24/04/2026     | 20:30:00 | 58               | 64                | 60               | 57               |
| 24/04/2026     | 21:00:00 | 59               | 65                | 60               | 57               |
| 24/04/2026     | 21:30:00 | 57               | 61                | 58               | 54               |
| 24/04/2026     | 22:00:00 | 57               | 63                | 59               | 54               |
| 24/04/2026     | 22:30:00 | 56               | 61                | 58               | 53               |
| <b>Average</b> |          | <b>58</b>        | <b>65</b>         | <b>59</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 24/04/2026     | 23:00:00 | 56               | 61                | 57               | 53               |
| 24/04/2026     | 23:30:00 | 56               | 61                | 58               | 53               |
| 25/04/2026     | 00:00:00 | 56               | 63                | 58               | 52               |
| 25/04/2026     | 00:30:00 | 55               | 61                | 57               | 51               |
| 25/04/2026     | 01:00:00 | 53               | 61                | 56               | 47               |
| 25/04/2026     | 01:30:00 | 53               | 60                | 56               | 47               |
| 25/04/2026     | 02:00:00 | 51               | 58                | 53               | 46               |
| 25/04/2026     | 02:30:00 | 50               | 58                | 53               | 44               |
| 25/04/2026     | 03:00:00 | 50               | 58                | 53               | 43               |
| 25/04/2026     | 03:30:00 | 53               | 62                | 56               | 46               |
| 25/04/2026     | 04:00:00 | 56               | 64                | 59               | 52               |
| 25/04/2026     | 04:30:00 | 59               | 70                | 63               | 54               |
| 25/04/2026     | 05:00:00 | 58               | 66                | 60               | 54               |
| 25/04/2026     | 05:30:00 | 58               | 66                | 60               | 54               |
| 25/04/2026     | 06:00:00 | 59               | 72                | 60               | 55               |
| 25/04/2026     | 06:30:00 | 59               | 71                | 60               | 56               |
| <b>Average</b> |          | <b>52</b>        | <b>63</b>         | <b>55</b>        | <b>48</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 25/04/2026     | 07:00:00 | 59               | 66                | 61               | 57               |
| 25/04/2026     | 07:30:00 | 57               | 63                | 59               | 54               |
| 25/04/2026     | 08:00:00 | 57               | 70                | 59               | 55               |
| 25/04/2026     | 08:30:00 | 58               | 63                | 59               | 55               |
| 25/04/2026     | 09:00:00 | 58               | 71                | 59               | 56               |
| 25/04/2026     | 09:30:00 | 58               | 62                | 59               | 56               |
| 25/04/2026     | 10:00:00 | 58               | 64                | 59               | 56               |
| 25/04/2026     | 10:30:00 | 58               | 62                | 59               | 56               |
| 25/04/2026     | 11:00:00 | 57               | 69                | 58               | 55               |
| 25/04/2026     | 11:30:00 | 57               | 67                | 59               | 55               |
| 25/04/2026     | 12:00:00 | 57               | 66                | 58               | 55               |
| 25/04/2026     | 12:30:00 | 56               | 69                | 57               | 54               |
| 25/04/2026     | 13:00:00 | 57               | 64                | 59               | 55               |
| 25/04/2026     | 13:30:00 | 58               | 68                | 59               | 56               |
| 25/04/2026     | 14:00:00 | 58               | 62                | 59               | 56               |
| 25/04/2026     | 14:30:00 | 58               | 66                | 59               | 56               |
| 25/04/2026     | 15:00:00 | 58               | 64                | 59               | 56               |
| 25/04/2026     | 15:30:00 | 58               | 66                | 59               | 56               |
| 25/04/2026     | 16:00:00 | 58               | 70                | 59               | 56               |
| 25/04/2026     | 16:30:00 | 59               | 69                | 60               | 56               |
| 25/04/2026     | 17:00:00 | 60               | 73                | 61               | 57               |
| 25/04/2026     | 17:30:00 | 60               | 64                | 61               | 59               |
| 25/04/2026     | 18:00:00 | 59               | 66                | 61               | 57               |
| 25/04/2026     | 18:30:00 | 58               | 64                | 60               | 56               |
| 25/04/2026     | 19:00:00 | 58               | 69                | 59               | 56               |
| 25/04/2026     | 19:30:00 | 58               | 65                | 59               | 56               |
| 25/04/2026     | 20:00:00 | 58               | 65                | 60               | 56               |
| 25/04/2026     | 20:30:00 | 58               | 71                | 59               | 55               |
| 25/04/2026     | 21:00:00 | 58               | 73                | 59               | 55               |
| 25/04/2026     | 21:30:00 | 56               | 60                | 58               | 53               |
| 25/04/2026     | 22:00:00 | 55               | 60                | 57               | 53               |
| 25/04/2026     | 22:30:00 | 54               | 63                | 56               | 51               |
| <b>Average</b> |          | <b>58</b>        | <b>66</b>         | <b>59</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 25/04/2026     | 23:00:00 | 54               | 59                | 56               | 50               |
| 25/04/2026     | 23:30:00 | 54               | 59                | 56               | 50               |
| 26/04/2026     | 00:00:00 | 54               | 59                | 56               | 50               |
| 26/04/2026     | 00:30:00 | 51               | 57                | 54               | 47               |
| 26/04/2026     | 01:00:00 | 52               | 59                | 54               | 48               |
| 26/04/2026     | 01:30:00 | 49               | 57                | 52               | 43               |
| 26/04/2026     | 02:00:00 | 48               | 55                | 51               | 42               |
| 26/04/2026     | 02:30:00 | 48               | 58                | 52               | 41               |
| 26/04/2026     | 03:00:00 | 48               | 55                | 51               | 41               |
| 26/04/2026     | 03:30:00 | 49               | 56                | 52               | 43               |
| 26/04/2026     | 04:00:00 | 53               | 64                | 56               | 47               |
| 26/04/2026     | 04:30:00 | 57               | 65                | 60               | 52               |
| 26/04/2026     | 05:00:00 | 59               | 67                | 61               | 54               |
| 26/04/2026     | 05:30:00 | 58               | 71                | 60               | 53               |
| 26/04/2026     | 06:00:00 | 58               | 71                | 59               | 51               |
| 26/04/2026     | 06:30:00 | 56               | 70                | 57               | 52               |
| <b>Average</b> |          | <b>53</b>        | <b>61</b>         | <b>55</b>        | <b>48</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 26/04/2026     | 07:00:00 | 56               | 70                | 58               | 52               |
| 26/04/2026     | 07:30:00 | 54               | 62                | 56               | 51               |
| 26/04/2026     | 08:00:00 | 54               | 64                | 56               | 50               |
| 26/04/2026     | 08:30:00 | 56               | 62                | 57               | 53               |
| 26/04/2026     | 09:00:00 | 57               | 62                | 58               | 55               |
| 26/04/2026     | 09:30:00 | 58               | 66                | 59               | 56               |
| 26/04/2026     | 10:00:00 | 58               | 64                | 59               | 55               |
| 26/04/2026     | 10:30:00 | 58               | 71                | 59               | 56               |
| 26/04/2026     | 11:00:00 | 58               | 64                | 59               | 56               |
| 26/04/2026     | 11:30:00 | 58               | 62                | 59               | 56               |
| 26/04/2026     | 12:00:00 | 58               | 65                | 60               | 57               |
| 26/04/2026     | 12:30:00 | 58               | 65                | 60               | 57               |
| 26/04/2026     | 13:00:00 | 57               | 65                | 58               | 55               |
| 26/04/2026     | 13:30:00 | 57               | 69                | 59               | 56               |
| 26/04/2026     | 14:00:00 | 57               | 64                | 58               | 55               |
| 26/04/2026     | 14:30:00 | 57               | 63                | 58               | 55               |
| 26/04/2026     | 15:00:00 | 57               | 62                | 58               | 55               |
| 26/04/2026     | 15:30:00 | 57               | 63                | 58               | 55               |
| 26/04/2026     | 16:00:00 | 58               | 62                | 59               | 56               |
| 26/04/2026     | 16:30:00 | 58               | 65                | 59               | 56               |
| 26/04/2026     | 17:00:00 | 57               | 63                | 58               | 55               |
| 26/04/2026     | 17:30:00 | 57               | 63                | 58               | 56               |
| 26/04/2026     | 18:00:00 | 58               | 68                | 59               | 56               |
| 26/04/2026     | 18:30:00 | 58               | 70                | 59               | 56               |
| 26/04/2026     | 19:00:00 | 58               | 69                | 59               | 55               |
| 26/04/2026     | 19:30:00 | 58               | 65                | 59               | 55               |
| 26/04/2026     | 20:00:00 | 57               | 62                | 59               | 55               |
| 26/04/2026     | 20:30:00 | 57               | 65                | 59               | 55               |
| 26/04/2026     | 21:00:00 | 58               | 69                | 60               | 54               |
| 26/04/2026     | 21:30:00 | 57               | 63                | 58               | 54               |
| 26/04/2026     | 22:00:00 | 56               | 65                | 58               | 53               |
| 26/04/2026     | 22:30:00 | 54               | 62                | 56               | 49               |
| <b>Average</b> |          | <b>57</b>        | <b>65</b>         | <b>58</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 26/04/2026     | 23:00:00 | 50               | 60                | 52               | 47               |
| 26/04/2026     | 23:30:00 | 50               | 62                | 52               | 46               |
| 27/04/2026     | 00:00:00 | 48               | 55                | 51               | 41               |
| 27/04/2026     | 00:30:00 | 47               | 56                | 50               | 41               |
| 27/04/2026     | 01:00:00 | 47               | 56                | 51               | 34               |
| 27/04/2026     | 01:30:00 | 48               | 58                | 51               | 34               |
| 27/04/2026     | 02:00:00 | 48               | 56                | 51               | 39               |
| 27/04/2026     | 02:30:00 | 48               | 58                | 52               | 36               |
| 27/04/2026     | 03:00:00 | 48               | 58                | 52               | 38               |
| 27/04/2026     | 03:30:00 | 50               | 58                | 53               | 40               |
| 27/04/2026     | 04:00:00 | 54               | 66                | 56               | 48               |
| 27/04/2026     | 04:30:00 | 59               | 67                | 62               | 54               |
| 27/04/2026     | 05:00:00 | 60               | 66                | 62               | 56               |
| 27/04/2026     | 05:30:00 | 60               | 72                | 62               | 57               |
| 27/04/2026     | 06:00:00 | 60               | 66                | 61               | 58               |
| 27/04/2026     | 06:30:00 | 59               | 65                | 60               | 56               |
| <b>Average</b> |          | <b>52</b>        | <b>61</b>         | <b>55</b>        | <b>45</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 27/04/2026     | 07:00:00 | 58               | 63                | 59               | 56               |
| 27/04/2026     | 07:30:00 | 56               | 60                | 57               | 55               |
| 27/04/2026     | 08:00:00 | 58               | 64                | 59               | 57               |
| 27/04/2026     | 08:30:00 | 58               | 62                | 59               | 57               |
| 27/04/2026     | 09:00:00 | 59               | 65                | 60               | 57               |
| 27/04/2026     | 09:30:00 | 58               | 62                | 59               | 56               |
| 27/04/2026     | 10:00:00 | 58               | 63                | 59               | 56               |
| 27/04/2026     | 10:30:00 | 59               | 68                | 60               | 56               |
| 27/04/2026     | 11:00:00 | 58               | 64                | 59               | 56               |
| 27/04/2026     | 11:30:00 | 58               | 63                | 59               | 56               |
| 27/04/2026     | 12:00:00 | 59               | 69                | 60               | 57               |
| 27/04/2026     | 12:30:00 | 59               | 75                | 60               | 57               |
| 27/04/2026     | 13:00:00 | 59               | 67                | 61               | 57               |
| 27/04/2026     | 13:30:00 | 58               | 64                | 59               | 57               |
| 27/04/2026     | 14:00:00 | 58               | 63                | 59               | 56               |
| 27/04/2026     | 14:30:00 | 58               | 66                | 59               | 56               |
| 27/04/2026     | 15:00:00 | 58               | 67                | 60               | 57               |
| 27/04/2026     | 15:30:00 | 57               | 70                | 58               | 55               |
| 27/04/2026     | 16:00:00 | 56               | 66                | 58               | 54               |
| 27/04/2026     | 16:30:00 | 57               | 62                | 58               | 54               |
| 27/04/2026     | 17:00:00 | 56               | 62                | 57               | 54               |
| 27/04/2026     | 17:30:00 | 57               | 69                | 59               | 54               |
| 27/04/2026     | 18:00:00 | 56               | 64                | 58               | 53               |
| 27/04/2026     | 18:30:00 | 57               | 64                | 59               | 55               |
| 27/04/2026     | 19:00:00 | 57               | 72                | 58               | 54               |
| 27/04/2026     | 19:30:00 | 56               | 68                | 57               | 53               |
| 27/04/2026     | 20:00:00 | 57               | 63                | 58               | 55               |
| 27/04/2026     | 20:30:00 | 58               | 62                | 59               | 56               |
| 27/04/2026     | 21:00:00 | 58               | 65                | 60               | 56               |
| 27/04/2026     | 21:30:00 | 58               | 66                | 59               | 55               |
| 27/04/2026     | 22:00:00 | 57               | 62                | 59               | 54               |
| 27/04/2026     | 22:30:00 | 55               | 60                | 57               | 53               |
| <b>Average</b> |          | <b>57</b>        | <b>65</b>         | <b>59</b>        | <b>55</b>        |

**Night Time Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 27/04/2026     | 23:00:00 | 55               | 61                | 57               | 51               |
| 27/04/2026     | 23:30:00 | 54               | 62                | 57               | 49               |
| 28/04/2026     | 00:00:00 | 53               | 59                | 55               | 46               |
| 28/04/2026     | 00:30:00 | 52               | 60                | 55               | 43               |
| 28/04/2026     | 01:00:00 | 49               | 58                | 53               | 40               |
| 28/04/2026     | 01:30:00 | 50               | 60                | 53               | 40               |
| 28/04/2026     | 02:00:00 | 50               | 60                | 54               | 39               |
| 28/04/2026     | 02:30:00 | 51               | 59                | 54               | 39               |
| 28/04/2026     | 03:00:00 | 51               | 59                | 55               | 36               |
| 28/04/2026     | 03:30:00 | 52               | 58                | 55               | 44               |
| 28/04/2026     | 04:00:00 | 54               | 62                | 57               | 50               |
| 28/04/2026     | 04:30:00 | 58               | 66                | 61               | 54               |
| 28/04/2026     | 05:00:00 | 61               | 69                | 63               | 58               |
| 28/04/2026     | 05:30:00 | 61               | 69                | 62               | 58               |
| 28/04/2026     | 06:00:00 | 61               | 64                | 62               | 59               |
| 28/04/2026     | 06:30:00 | 59               | 64                | 60               | 58               |
| <b>Average</b> |          | <b>54</b>        | <b>62</b>         | <b>57</b>        | <b>48</b>        |

**Daytime Noise Levels**

| Date           | Time     | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|----------|------------------|-------------------|------------------|------------------|
| 28/04/2026     | 07:00:00 | 58               | 63                | 60               | 56               |
| 28/04/2026     | 07:30:00 | 58               | 63                | 60               | 56               |
| 28/04/2026     | 08:00:00 | 59               | 62                | 60               | 58               |
| 28/04/2026     | 08:30:00 | 59               | 65                | 60               | 57               |
| 28/04/2026     | 09:00:00 | 59               | 65                | 60               | 58               |
| 28/04/2026     | 09:30:00 | 60               | 66                | 61               | 58               |
| 28/04/2026     | 10:00:00 | 59               | 63                | 60               | 57               |
| 28/04/2026     | 10:30:00 | 59               | 64                | 60               | 57               |
| 28/04/2026     | 11:00:00 | 59               | 64                | 60               | 57               |
| 28/04/2026     | 11:30:00 | 59               | 77                | 60               | 57               |
| 28/04/2026     | 12:00:00 | 59               | 64                | 60               | 57               |
| 28/04/2026     | 12:30:00 | 59               | 67                | 60               | 57               |
| 28/04/2026     | 13:00:00 | 59               | 65                | 60               | 57               |
| 28/04/2026     | 13:30:00 | 59               | 63                | 61               | 58               |
| 28/04/2026     | 14:00:00 | 59               | 65                | 60               | 58               |
| 28/04/2026     | 14:30:00 | 59               | 70                | 60               | 57               |
| 28/04/2026     | 15:00:00 | 59               | 64                | 61               | 57               |
| 28/04/2026     | 15:30:00 | 58               | 62                | 59               | 56               |
| 28/04/2026     | 16:00:00 | 58               | 71                | 59               | 56               |
| 28/04/2026     | 16:30:00 | 57               | 63                | 59               | 55               |
| 28/04/2026     | 17:00:00 | 59               | 83                | 60               | 56               |
| 28/04/2026     | 17:30:00 | 59               | 71                | 60               | 57               |
| 28/04/2026     | 18:00:00 | 58               | 64                | 60               | 55               |
| 28/04/2026     | 18:30:00 | 58               | 70                | 60               | 55               |
| 28/04/2026     | 19:00:00 | 59               | 63                | 60               | 56               |
| 28/04/2026     | 19:30:00 | 59               | 64                | 60               | 57               |
| 28/04/2026     | 20:00:00 | 59               | 66                | 61               | 57               |
| 28/04/2026     | 20:30:00 | 58               | 72                | 59               | 55               |
| 28/04/2026     | 21:00:00 | 58               | 69                | 60               | 55               |
| 28/04/2026     | 21:30:00 | 56               | 60                | 57               | 53               |
| 28/04/2026     | 22:00:00 | 56               | 63                | 58               | 54               |
| 28/04/2026     | 22:30:00 | 55               | 60                | 57               | 52               |
| <b>Average</b> |          | <b>58</b>        | <b>66</b>         | <b>60</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time  | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|-------|------------------|-------------------|------------------|------------------|
| 28/04/2026     | 23:00 | 54               | 60                | 57               | 50               |
| 28/04/2026     | 23:30 | 53               | 61                | 57               | 48               |
| 29/04/2026     | 00:00 | 52               | 58                | 55               | 44               |
| 29/04/2026     | 00:30 | 51               | 59                | 55               | 42               |
| 29/04/2026     | 01:00 | 48               | 57                | 53               | 39               |
| 29/04/2026     | 01:30 | 49               | 59                | 53               | 39               |
| 29/04/2026     | 02:00 | 49               | 59                | 54               | 38               |
| 29/04/2026     | 02:30 | 50               | 58                | 54               | 38               |
| 29/04/2026     | 03:00 | 50               | 58                | 55               | 35               |
| 29/04/2026     | 03:30 | 51               | 57                | 55               | 43               |
| 29/04/2026     | 04:00 | 53               | 61                | 57               | 49               |
| 29/04/2026     | 04:30 | 57               | 65                | 61               | 53               |
| 29/04/2026     | 05:00 | 60               | 68                | 63               | 57               |
| 29/04/2026     | 05:30 | 60               | 68                | 62               | 57               |
| 29/04/2026     | 06:00 | 60               | 63                | 62               | 58               |
| 29/04/2026     | 06:30 | 58               | 63                | 60               | 57               |
| <b>Average</b> |       | <b>53</b>        | <b>61</b>         | <b>57</b>        | <b>47</b>        |

**Daytime Noise Levels**

| Date           | Time  | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|-------|------------------|-------------------|------------------|------------------|
| 29/04/2026     | 07:00 | 58               | 62                | 59               | 56               |
| 29/04/2026     | 07:30 | 58               | 62                | 59               | 56               |
| 29/04/2026     | 08:00 | 58               | 61                | 59               | 57               |
| 29/04/2026     | 08:30 | 58               | 64                | 59               | 57               |
| 29/04/2026     | 09:00 | 59               | 64                | 60               | 57               |
| 29/04/2026     | 09:30 | 59               | 65                | 60               | 57               |
| 29/04/2026     | 10:00 | 58               | 62                | 59               | 56               |
| 29/04/2026     | 10:30 | 58               | 63                | 59               | 56               |
| 29/04/2026     | 11:00 | 58               | 63                | 59               | 56               |
| 29/04/2026     | 11:30 | 58               | 74                | 59               | 56               |
| 29/04/2026     | 12:00 | 58               | 63                | 59               | 56               |
| 29/04/2026     | 12:30 | 58               | 66                | 59               | 56               |
| 29/04/2026     | 13:00 | 58               | 64                | 59               | 56               |
| 29/04/2026     | 13:30 | 59               | 62                | 60               | 57               |
| 29/04/2026     | 14:00 | 59               | 64                | 59               | 57               |
| 29/04/2026     | 14:30 | 59               | 69                | 59               | 56               |
| 29/04/2026     | 15:00 | 59               | 63                | 60               | 56               |
| 29/04/2026     | 15:30 | 58               | 61                | 58               | 55               |
| 29/04/2026     | 16:00 | 58               | 70                | 58               | 55               |
| 29/04/2026     | 16:30 | 57               | 62                | 58               | 54               |
| 29/04/2026     | 17:00 | 58               | 80                | 59               | 55               |
| 29/04/2026     | 17:30 | 58               | 70                | 59               | 56               |
| 29/04/2026     | 18:00 | 58               | 63                | 59               | 54               |
| 29/04/2026     | 18:30 | 58               | 69                | 59               | 54               |
| 29/04/2026     | 19:00 | 58               | 62                | 59               | 55               |
| 29/04/2026     | 19:30 | 58               | 63                | 59               | 56               |
| 29/04/2026     | 20:00 | 58               | 65                | 60               | 56               |
| 29/04/2026     | 20:30 | 58               | 71                | 58               | 54               |
| 29/04/2026     | 21:00 | 58               | 68                | 59               | 54               |
| 29/04/2026     | 21:30 | 56               | 59                | 56               | 52               |
| 29/04/2026     | 22:00 | 56               | 62                | 57               | 53               |
| 29/04/2026     | 22:30 | 55               | 59                | 56               | 51               |
| <b>Average</b> |       | <b>58</b>        | <b>65</b>         | <b>59</b>        | <b>56</b>        |

**Night Time Noise Levels**

| Date           | Time  | LA <sub>eq</sub> | LA <sub>max</sub> | LA <sub>10</sub> | LA <sub>90</sub> |
|----------------|-------|------------------|-------------------|------------------|------------------|
| 29/04/2026     | 23:00 | 55               | 62                | 57               | 49               |
| 29/04/2026     | 23:30 | 54               | 63                | 57               | 48               |
| 30/04/2026     | 00:00 | 53               | 60                | 55               | 44               |
| 30/04/2026     | 00:30 | 52               | 61                | 55               | 42               |
| 30/04/2026     | 01:00 | 49               | 59                | 53               | 39               |
| 30/04/2026     | 01:30 | 50               | 61                | 53               | 39               |
| 30/04/2026     | 02:00 | 50               | 61                | 54               | 38               |
| 30/04/2026     | 02:30 | 51               | 60                | 54               | 38               |
| 30/04/2026     | 03:00 | 51               | 60                | 55               | 35               |
| 30/04/2026     | 03:30 | 52               | 59                | 55               | 43               |
| 30/04/2026     | 04:00 | 54               | 63                | 57               | 49               |
| 30/04/2026     | 04:30 | 58               | 67                | 61               | 53               |
| 30/04/2026     | 05:00 | 61               | 70                | 63               | 57               |
| 30/04/2026     | 05:30 | 61               | 70                | 62               | 57               |
| 30/04/2026     | 06:00 | 61               | 65                | 62               | 58               |
| 30/04/2026     | 06:30 | 59               | 65                | 60               | 57               |
| <b>Average</b> |       | <b>54</b>        | <b>63</b>         | <b>56</b>        | <b>46</b>        |

ENVIRONMENTAL NOISE AND VIBRATION IMPACT ASSESSMENT  
CASTLETHORN OLD CONNA ULC  
LANDS NORTH OF OLD CONNAUGHT AVENUE, OLD CONNAUGHT, CO. DUBLIN  
COMPLETED  
BY  
TRAYNOR ENVIRONMENTAL LTD

APPENDIX G – PLANNING AUTHORITY LRD OPINION RESPONSE MATRIX



**Planning Authority LRD Opinion Response Matrix**

| LRD Request        | Section Addressed |
|--------------------|-------------------|
| Baseline survey    | Section 3         |
| Construction noise | Section 4         |
| Rock breaking      | Section 4         |
| Balcony amenity    | Section 5         |
| Future N11         | Section 5         |
| ADS                | Section 5         |