April 2025

Noise Impact Assessment

LDA Wilton, Sarsfield Road, LRD (Large-Scale Residential Development)

On behalf of

The Land Development Agency ('LDA')

MALONE O'REGAN ENVIRONMENTAL

MALONE O'REGAN

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1A	19/12/24	Updated Layout	Draft	GE	PR	KG
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04	11/04/25	Updated Project Details	Final	GE	PR	KG

Noise Impact Assessment

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The Land Development Agency ('LDA')

Company Address

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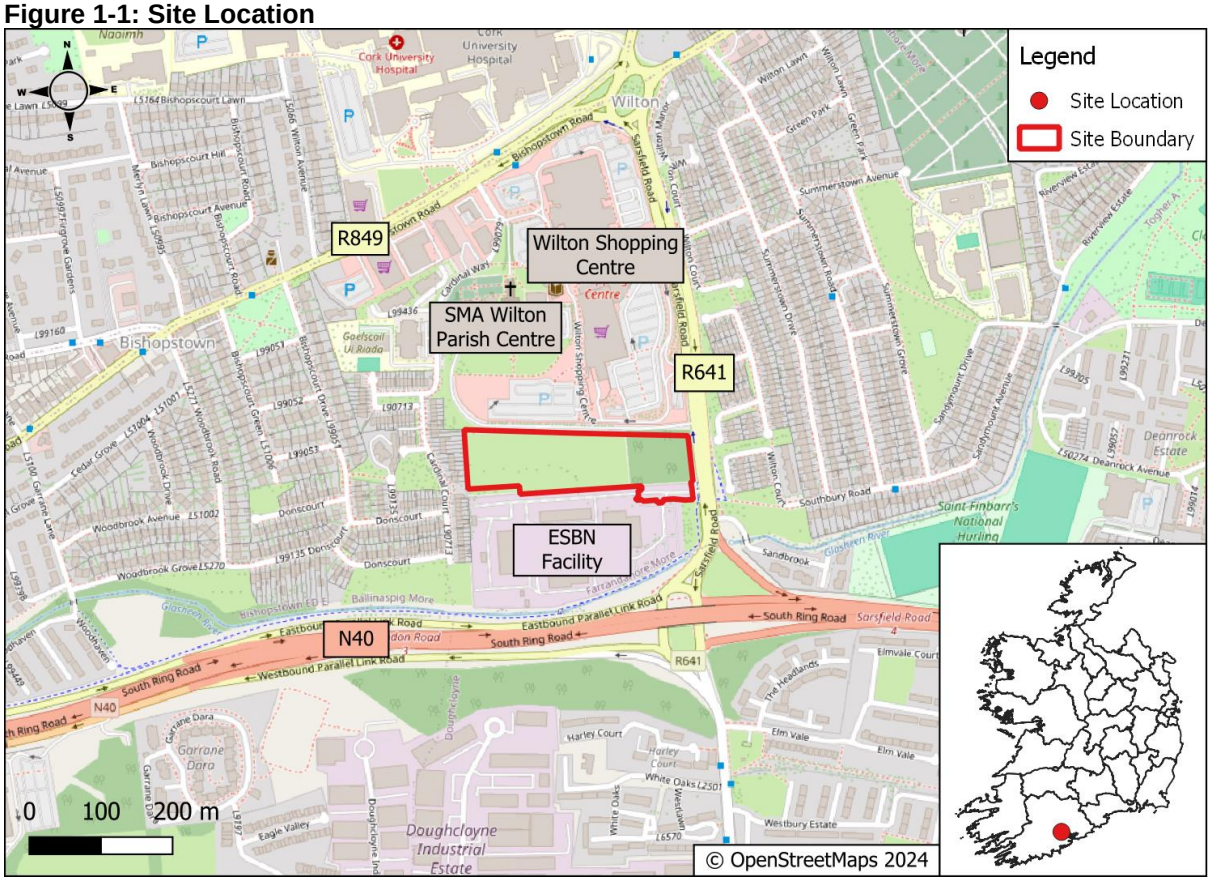
1 INTRODUCTION

Malone O'Regan Environmental ('MOR Environmental') was commissioned by the Land Development Agency ('LDA') to undertake a noise impact assessment report for the development of a large-scale residential development ('LRD') and all ancillary works ('the Proposed Development') at Sarsfield Road, Wilton, Cork ('the Site').

The Site is shown in Figure 1-1 below.

Figure 1-1: Site Location



1.1 The Proposed Development

The Proposed Development will consist of the following:

> *'The Land Development Agency (LDA) intends to apply to Cork City Council for permission for a Large Residential Development with a total application site area of c. 2.61ha, on lands adjoining the ESB Networks DAC Office, at Farrandahadore More, Sarsfield Road, Wilton, Cork City. The development will provide 348 no. residential unit and a 156 sqm childcare facility, revised access arrangements to Sarsfield Road and all associated development above and below ground.'*

Full details of the above Proposed Development can be found in the Planners Report submitted as part of this planning application.

2 METHODOLOGY

This section of the report presents the methodology used in scoping, surveying, and assessing the data regarding noise impact from the Proposed Development at the Site.

2.1 Competent Person

The analysis of the data and project management was conducted by a MOR Environmental Associate Director of Acoustics, who is a full member of the Institute of Acoustics ('MIOA') and a member of the Association of Acoustic Consultants of Ireland ('AACI') with over 15+ years' experience. The project is, therefore, deemed to be completed by a 'competent person' as per best practice.

2.2 Impact Assessment Criteria

This report looks at the following key aspects of the Proposed Development:

1. The potential for noise and vibration impacts during construction;
2. The potential for noise and vibration impact from the existing ambient environment on the future use of the Site; and,
3. The potential for noise impacts during the operation of the development from rooftop plant.

The methodologies used for each of these key stages are presented below.

2.2.1 Construction Criteria Assessment

As the control of construction noise and construction vibration are different, the criteria for assessing effect are presented separately below.

2.2.1.1 Construction Phase Noise

Construction stage noise will be assessed utilising the British Standard BS5228-1:2014 [1], which is designed for the assessment of noise arising from construction and open sites.

This standard identifies a methodology (the ABC method, section E.3.2 of the standard) for assigning construction noise limits at Noise Sensitive Receptors ('NSRs') based on the existing ambient noise levels. An excerpt detailing the ABC method is shown in Table 2-1.

Table 2-1: BS5228 - ABC Method for Assessing Construction Noise Impacts

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB) ($L_{Aeq,T}$)**		
	Category A[A)]	**Category B[B)]**	**Category C[C)]**
Night-time (23:00-07:00)	45	50	55
Evening and weekends [D)]	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75

Note 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e., the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise.

Note 3 Applied to all residential receptors only.

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

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A[A)]	Category B[B)]	Category C[C)]

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

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

D) 19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.

This method requires an understanding of the receiving environment at Noise Sensitive Receptors ('NSRs') to allocate suitable construction noise limits.

2.2.1.2 Construction Phase Vibration

Vibration standards are based on human comfort and structural or cosmetic damage to buildings. In both instances, the magnitude of vibration in terms of Peak Particle Velocity ('PPV') is assessed. PPV is the simplest indicator of both perceptibility and the risk of damage to structures. It is measured in millimetres per second ('mm/sec') and can be defined as the instantaneous maximum velocity.

BS 5228-2 [2] provides guidance on vibration and its control and management on various site types. The standard also presents details on the human response to vibration; refer to Table 2-2 below.

Table 2-2: Guidance on Effects of Vibration Levels

Vibration Level (PPV) mm/sec	Effect
0.14	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.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibrations of this level in residential environments will cause complaints, but they can be tolerated if residents have been given prior warning and explanation.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

The British Standard 7385-2 Evaluation and Measurement for Vibration in Buildings. Guide to Damage Levels Arising from Groundborne Vibration [3] provides guide values for building damage and is referenced in BS 5228-2. The Transient vibration guide values for cosmetic damage criteria presented in BS 5228-2 are presented below in Table 2-3.

Table 2-3: Transient Vibration Guide Values for Cosmetic Damage

Building Type	Peak component particle velocity in frequency range of predominant pulse 4Hz to 15Hz (mm/sec)	Peak component particle velocity in frequency range of predominant pulse 15Hz (mm/sec) and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above

Building Type	Peak component particle velocity in frequency range of predominant pulse 4Hz to 15Hz (mm/sec)	Peak component particle velocity in frequency range of predominant pulse 15Hz (mm/sec) and above
Unreinforced or light-framed structures Residential or light commercial buildings	15 mm/s at 4 Hz, increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz, increasing to 50 mm/s at 40 Hz and above

2.2.2 Operational Criteria Assessment

Several methods apply to airborne noise, depending on the approach to the assessment. These are outlined below.

2.2.2.1 Desk-Based

The Cork Agglomeration Area Noise Action Plan 2018-2023 [4] has been prepared in accordance with the European Communities Environmental Noise Regulations 2018, S.I. No. 549/2018 [5]. The Noise Action Plan ('NAP') details the proposed onset noise levels for assessment of noise mitigation as:

- 70 dB L_{den} (day evening night average sound level); and,
- 57 dB L_{night} (night-time average sound level).

Therefore, specific guidance for residential developments (The Professional Guidance on Planning & Noise: New Residential Development [6]) has been reviewed and utilised in the operational noise assessment below.

2.2.2.2 Operational Phase Noise

The predicted operational noise of the Proposed Development was determined utilising ISO 1996 Part 2 2017 Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels [7] and ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [8].

The ProPG provides guidance to local authorities to minimise the impacts of noise on proposed residential developments. The two sequential stages of the ProPG's overall approach are:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment; and,
    - Element 4 - Other Relevant Issues.

The internal ambient criteria provided in BS8233 [9] is detailed in Table 2-4 below.

2.2.3 Building Services Plant Assessment

The predicted noise levels from the proposed building services plant (refer to Section 4.4 below) was assessed utilising the following guidance:

- BS4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound.

2.2.4 BS:8233 Guidance

ProPG considers the guidance provided within BS8233:2014 to be suitable for the assessment of internal noise levels; refer to Table 2-4.

Table 2-4: Internal Ambient Noise Level Criteria of BS:8233

Activity	Location	Day (07:00 to 23:00)	Night (23:00 to 07:00)
Resting	Living Room	35dB $L_{Aeq,16\ hr}$	~
Dining	Dining Room/Area	40dB $L_{Aeq,16\ hr}$	~
Sleeping	Bedroom	35dB $L_{Aeq,16\ hr}$	30dB* $L_{Aeq,8\ hr}$

**ProPG states 45dB L_{AFmax} more than 10 times a night as an additional parameter*

ProPG states all dwellings should be provided with an amenity area (private, communal or public) with levels below the WHO/BS8233 guidelines for noise nuisance.

In cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, ProPG states that a relaxation of the internal L_{Aeq} values presented in Table 2-2 above by up to 5dB can still provide reasonable internal conditions.

2.2.4.1 Operational Phase Vibration

During the Operational Phase of the Proposed Development, vibrational impacts are not anticipated and are therefore not considered further.

2.3 Noise Monitoring Locations

Three attended and one continuous noise monitoring locations were selected in the vicinity of the Site to characterise the local environment, as presented in Figure 2-1 and detailed in Table 2-5 below.

Figure 2-1: Noise Monitoring Locations

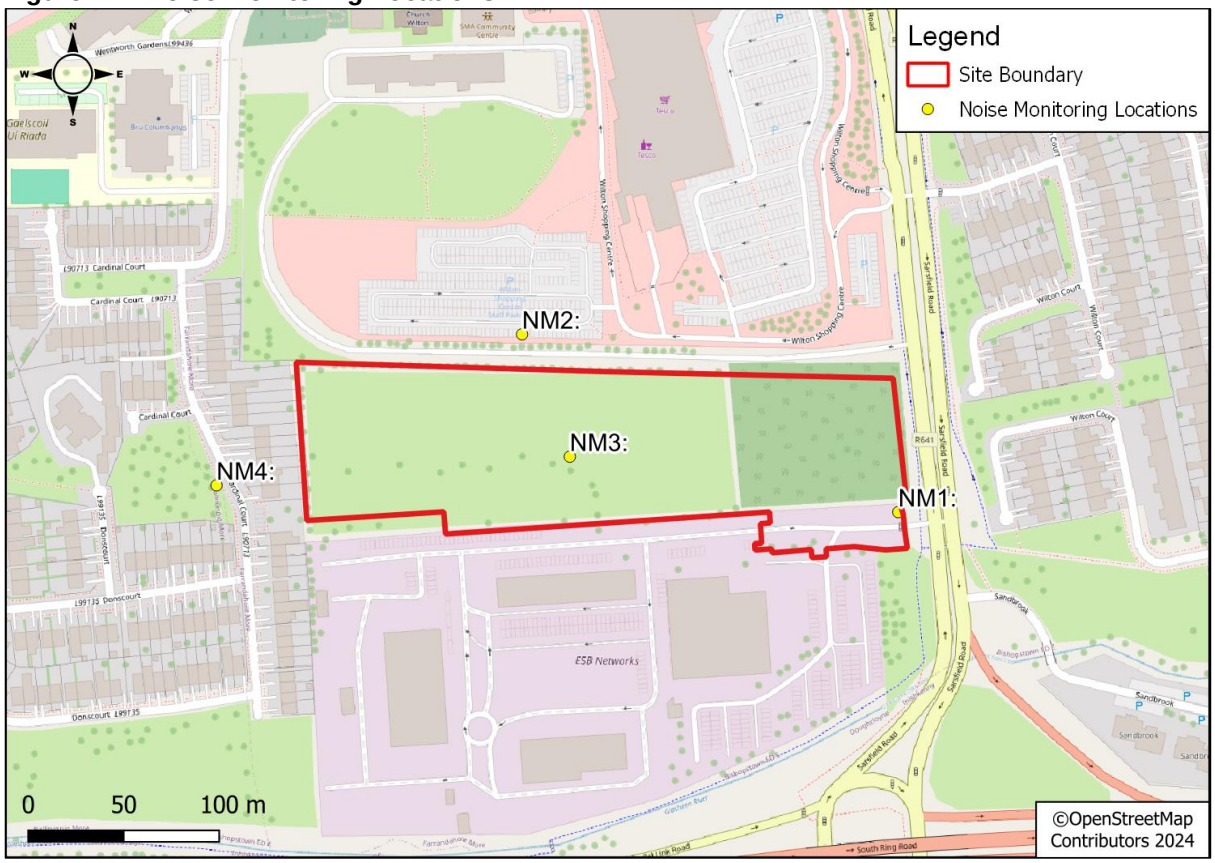


Table 2-5: Noise Monitoring Locations

Monitoring Location	Description of Location
NM1	Located within the entrance to the Site off Sarsfield Road.
NM2	Located the carpark of Wilton Shopping Centre to the north of the Site.
NM3	Located within the Site.
NM4	Located to the west of the Site, along Cardinal Court.

2.4 Measurements

The methodology followed was in accordance with the recommendation of:

- ISO 1996-1:2016 Acoustics - Description, measurements and assessment of environmental noise - Part 1: Basic quantities and assessment procedures 2003 [10];
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels [7]; and,
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) [11].

At all noise monitoring locations, the Sound Level Meter ('SLM') was positioned to maximise distance from reflective surfaces and mounted on a tripod to an approximate height of 1.2 to 1.5m over ground level.

As per the recommendations of NG4, wind speeds were recorded during the survey event utilising a hand-held anemometer and the values were recorded by the on-Site acoustician.

2.5 Equipment

Noise measurements were carried out using:

- NTI XL2 sound level meter, a Type 1 SLM equipped with Frequency Analysis Software; and,
- NTI XL3 sound level meter, a Type 1 SLM equipped with Frequency Analysis Software.

The monitoring equipment was calibrated prior to and post the measurement period using a:

- Larson Davis calibrator.

Broadband noise levels were measured using the A-weighted network and a fast-sampling interval, unless otherwise stated.

Laboratory calibration certificates for the SLMs and the field calibrator are available upon request.

The prevailing weather conditions at the time of measurement were noted and recorded in the monitoring report. A portable weather meter (Kestrel 2500) was used to record wind speed before, during and after the noise monitoring periods.

2.6 Frequency Analysis

Real time 1/3 octave band frequency analysis was carried out at each monitoring location, during both day, evening, and night-time monitoring events. The frequency spectra recorded at each of the monitoring events are available on request.

Tones were objectively assessed in accordance with Section 5 of NG4. The standard states that:

> *"For a prominent, discrete tone to be identified as present, the time-averaged linear sound pressure level in the one-third octave band of interest is required to exceed the time-averaged linear sound pressure levels of both adjacent one-third-octave bands by some constant level difference".*

The standard gives the level differences as follows:

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

In addition, the on-Site acoustician noted any subjective tonality or defining characteristic arising from Site specific noise emission sources, as per Section 5.1 of NG4.

2.7 Weather Conditions

As per Section 7.6 of NG4, the prevailing weather conditions at the time of measurement were noted and recorded in the survey report. A portable anemometer (Kestrel 2500) was used to record wind speed before, during and after the noise survey periods.

On-site weather observations are supplemented by the closest Met Éireann weather station, Cork Airport, which is circa ('ca.') 3 km southeast of the Site. A summary report is shown in Table 2-6. Overall conditions were suitable for collecting sound pressure levels without undue interference.

Table 2-6: Summary of Weather Conditions at Cork Airport Synoptic Station

Date	Rainfall (mm)	Temp Max (°C)	Temp Min (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)
27/06/2024	tr	15.4	10.5	9.1	12.2 (6.3m/s)

Date	Rainfall (mm)	Temp Max (°C)	Temp Min (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)
28/06/2024	3.9	17.9	10.6	9.9	8.0 (4.1m/s)

Appendix A shows weather graphs generated by the Met Éireann Synoptic Station. These graphs show the wind and rain conditions at the synoptic station over the two days when the noise survey was carried out.

On-site anemometer readings demonstrated that at the noise monitoring locations, wind speeds were at or below 5m/s which was favourable for acoustic measurements to be undertaken.

2.7.1 Strategic Noise Mapping

The following strategic noise maps [12] were reviewed to assess the baseline noise environment:

- Round 4: Road Noise Maps;

Figures 2-2 and 2-3 below show Round 4 Road noise contours relevant to the Site (L_{den} and L_{night}).

Figure 2-2: Round 4 Strategic Noise Maps (Road L_{den})

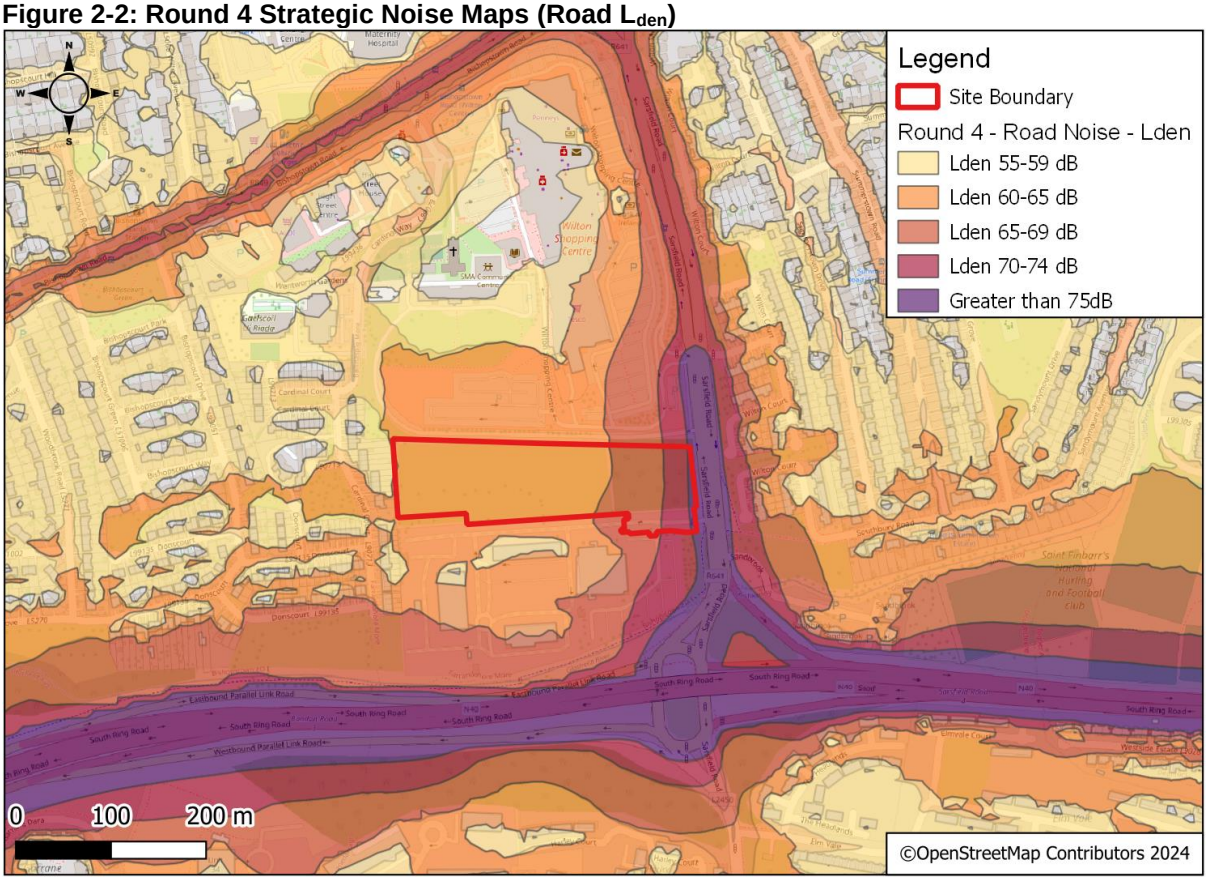
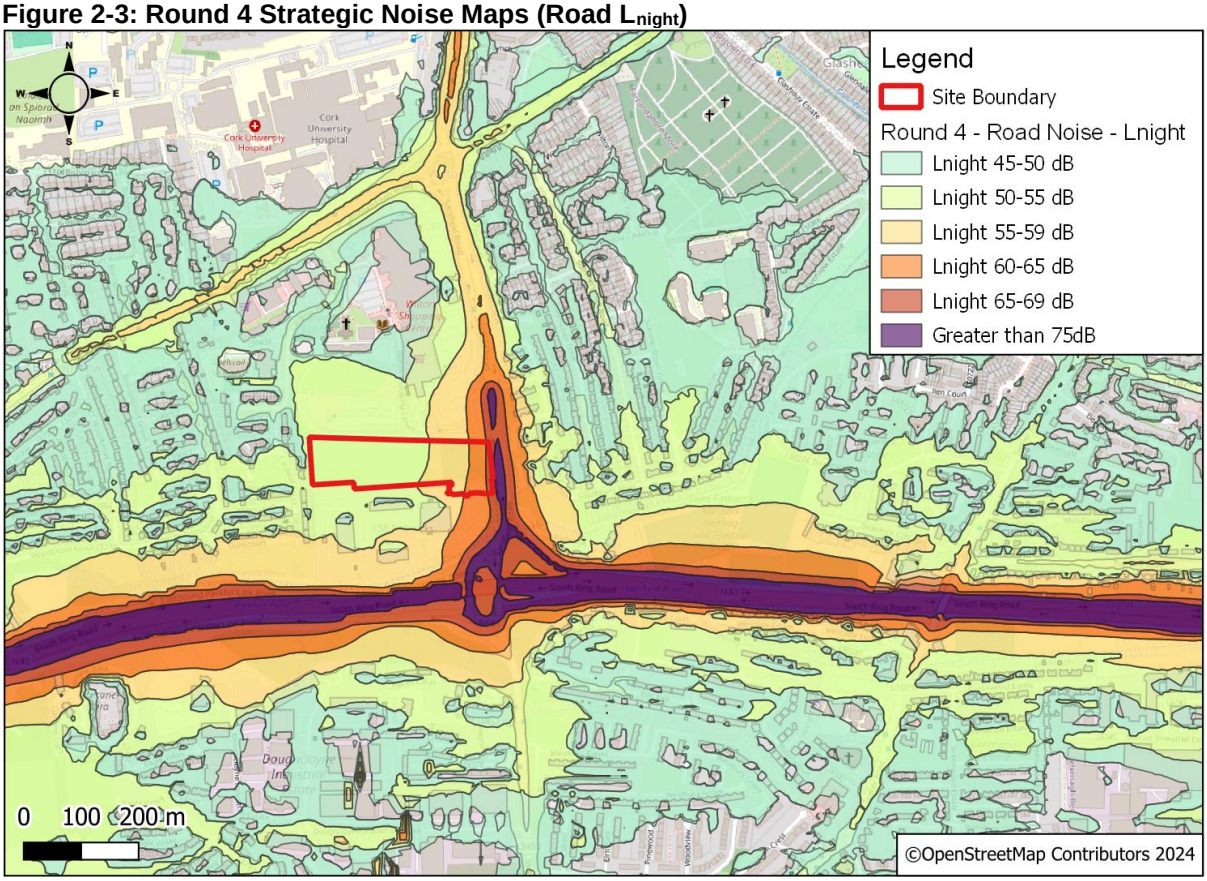


Figure 2-3: Round 4 Strategic Noise Maps (Road L_{night})



3 BASELINE AMBIENT SOUND ASSESSMENT

The results of the baseline ambient sound survey undertaken by MOR Environmental to quantify the ambient sound levels across the existing Site are detailed in Tables 3-1 to 3-3 below.

Table 3-1: Ambient Daytime Noise Monitoring Results 27th June 2024

Location ID	Start Date and Time	$L_{Aeq,T}$ dB	$L_{AF90,T}$ dB	L_{AFmax} dB	Commentary
NM1 Run 1	27/06/2024 11:36	61	53	85	Traffic on Sarsfield Road dominant noise source. 11:45 Very light rain for approx. 1min. 11:55 Car door closing approx. 10m from the SLM. 11:58 Resident asking questions. 12:04 Plane Passing overhead.
NM1 Run 2	27/06/2024 13:54	56	52	72	
NM2 Run 1	27/06/2024 10:02	67	58	94	Traffic on Sarsfield Road and distant N40 traffic audible. 10:12 Ambulance with siren passing approx. 15m from monitor. 10:22 Plane passing north overhead. 12:22 Plane passing north overhead. 12:28 Very strong gust of wind. 12:46 Horn Beeping approx. 15m from the SLM.
NM2 Run 2	27/06/2024 12:22	64	59	78	
NM4 Run 1	27/06/2024 10:55	58	54	78	Traffic on local road, distant Sarsfield Road and N40 traffic audible. 11:10 Plane passing overhead. 13:34 Plane passing overhead.
NM4 Run 2	27/06/2024 13:19	55	53	68	

Table 3-2: Ambient Night-time Noise Monitoring Results 27th and 28th June 2024

Location ID	Start Date and Time	$L_{Aeq,T}$ dB	$L_{AF90,T}$ dB	L_{AFmax} dB	Commentary
NM1 Run 1	27/06/2024 23:43	46	43	64	

Location ID	Start Date and Time	$L_{Aeq,T}$ dB	$L_{AF90,T}$ dB	L_{AFmax} dB	Commentary
NM1 Run 2	28/06/2024 00:48	39	34	65	Traffic on Sarsfield Road dominant noise source.
NM2 Run 1	27/06/2024 23:00	60	48	78	Traffic on Sarsfield Road and distant N40 traffic audible.
NM2 Run 2	28/06/2024 00:06	55	43	72	
NM4 Run 1	27/06/2024 23:21	47	44	62	Traffic on local road, distant Sarsfield Road and N40 traffic audible. 23:25 Plane passing overhead. 00:39 Plane passing overhead.
NM4 Run 2	28/06/2024 00:27	45	41	62	

Table 3-3: Continuous Noise Monitoring Location NM3 27th and 28th June 2024

Location ID	Start Date and Time	Elapsed Time (hh:mm)	$L_{Aeq,T}$ dB	$L_{AF90,T}$ dB	L_{AFmax} dB	Commentary
NM3 Daytime	27/06/2024 09:45-19:00	09:15	57	54	69	Traffic on Sarsfield Road and N40 traffic audible. Activities within ESB audible.
NM3 Evening Time	27/06/2024 19:00-23:00	04:00	53	49	57	Traffic on Sarsfield Road and N40 audible.
NM3 Night-time	27/06/2024 23:00-07:00	08:00	46	41	58	Traffic on Sarsfield Road and N40 audible.

3.1 Characterisation of the Ambient Acoustic Environment

Generally, higher levels of ambient acoustic sound were found with proximity to the N40 Road.

The monitoring locations recorded $L_{Aeq,T}$ values of 55dB to 67dB for daytime and 39dB to 60dB for night-time period.

The background ambient acoustic environment for all monitoring locations, as an $L_{A90,T}$ ranged from 52dB to 58dB for daytime and 34dB to 48dB during night-time period.

3.1.1 Conclusion of Existing Ambient Acoustic Environment

Based on the desk-based review of the area and the baseline survey carried out by MOR Environmental, it is reasonable to conclude that the ambient existing sound levels surrounding the Site are typical for an urbanising environment in proximity to a major road (N40 and Sarsfield Road).

4 CHARACTERISTICS AND IMPACTS OF PROPOSED DEVELOPMENT

The characteristics of the Proposed Development in relation to acoustics and dealt with under the following headings:

- Construction vibration;
- Construction noise;
- Construction mitigation;
- Operational noise;
- Operational mitigation.

As outlined earlier, no likely or significant vibration effects are predicted to occur during the Operational Phase.

4.1 Construction Phase Vibration

During the Construction Phase activities such as piling and excavation works have the potential to generate ground-borne vibrations. However, due to the distance of the activities from sensitive receptors and similar activities on other sites, it is not considered that ground-borne vibrations associated with activities during the Construction Phase will be in the orders of magnitude required to result in complaints due to human discomfort or result in cosmetic damage to nearby buildings. Therefore, the potential vibrational impacts associated with the Construction Phase are not discussed further.

4.2 Construction Phase Noise

Utilising Table 3-1 (refer to Section 3), the baseline results and strategic noise maps the Site is classified as Category 'A' therefore the following threshold values will apply at NSRs:

- Daytime (07:00-19:00) and Saturday (07:00-13:00) 65dB;
- Evening (19:00 – 23:00) and weekends[1] 55dB; and,
- Night-time (23:00-07:00) 45dB.

Construction noise will arise when heavy machinery is in use to move soils, site levelling, and create infrastructure and buildings onsite. Excavators and bulldozers will likely remove much of the material encountered during site clearance works. This noise assessment was based on the notable noise emission sources anticipated during the construction works, which are outlined in Table 4-1 below.

Construction Phase timelines will be as follows:

- 7:00am to 7:00pm Monday to Friday;
- 7:00am to 4:00pm on Saturdays*; and,
- No work on Sundays or public holidays.

This report did not assess the movement of workers to and from the Site. All worker movements will likely peak during the 30 minutes prior to, and following construction start and finish hours, with associated vehicle movement on the public road network. These movements will be in keeping with local commercial employee traffic and are, therefore, not deemed likely to impact local road noise.

[1] 19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.

The permissible levels of construction-related noise, as stipulated in Section 2.2.1 will vary based on the designated time frame. Specifically, as Category A, typically a noise limit of $L_{Aeq,1hr}$ will apply with the exception of works undertaken during the hours of 13:00 to 16:00 on Saturdays, when a more stringent noise restrictions shall be enforced. For this particular timeframe of 13:00 to 16:00 on Saturdays, the maximum allowable noise level will be 55dBA $L_{Aeq,1hr}$.

This Noise Impact Assessment has utilised generic sound pressure values from the BS5228-1 [1] standard as specific plant equipment is currently unknown. This is deemed a worst-case scenario as newer plant released to the market implement tighter controls on noise emissions.

The following standard noise equation, to assess the sound pressure (Lp2) at a distance r2, from a known sound pressure (Lp1) at a distance r1 was used to predict noise values at NSRs:

$$Lp2 = Lp1 - 20\log 10\,(\frac{r2}{r1})$$

The distances from receptors to the construction area were calculated from the closest façade of an NSR to the Proposed Development concrete pavement edge. A simplified barrier assessment for partially obscuring a source emission to the receptor was completed in accordance with the BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise [1].

The assessment incorporated screening between the Site and NSRs, i.e., embankments with mature hedging or walls with the source still visible (-5dB).

Expected plant and equipment utilised in the construction of the Proposed Development are outlined in Table 4-1 below.

The maximum value of the plant has been used for the calculations to present a worst-case scenario. Table 4-1 includes the associated sound pressure at 10m from the plant, obtained from BS-5228. Table 4-1 groups plants into phases of work to determine the overall sound pressure associated with each grouping of working plants.

Table 4-1: Typical Construction Phase Predicted Noise Emissions

Construction Phase	BS 5228-1 Ref.	Plant	Sound Pressure at 10m $L_{Aeq,T}$ dB	Max No. of Plant on Site	Combined Sound Pressure at 10m $L_{Aeq,T}$ dB
Site clearance	C.6.37	Bowser	81	2	93
	C1.9	Breaker	90	2	
	NA	Container	NA	1	
Construction	C5.14	Dozer	83	2	92
	C4.6	Dumper	79	3	
	C4.17	Excavator	71	3	
	C4.84	Generator	74	3	
	C2.41	Plate Compactor	80	2	
	C6.38	Power Washer	83	1	
	C2.37	Roller	79	2	
	C4.74	Tractor & Trailer	80	2	

Construction Phase	BS 5228-1 Ref.	Plant	Sound Pressure at 10m $L_{Aeq,T}$ dB	Max No. of Plant on Site	Combined Sound Pressure at 10m $L_{Aeq,T}$ dB
	C5.37	Crane	76	1	
Road	C5.30	Paver	75	1	87
	C4.20	Concrete Mixers	80	4	
	C4.90	Road Sweeper	76	1	

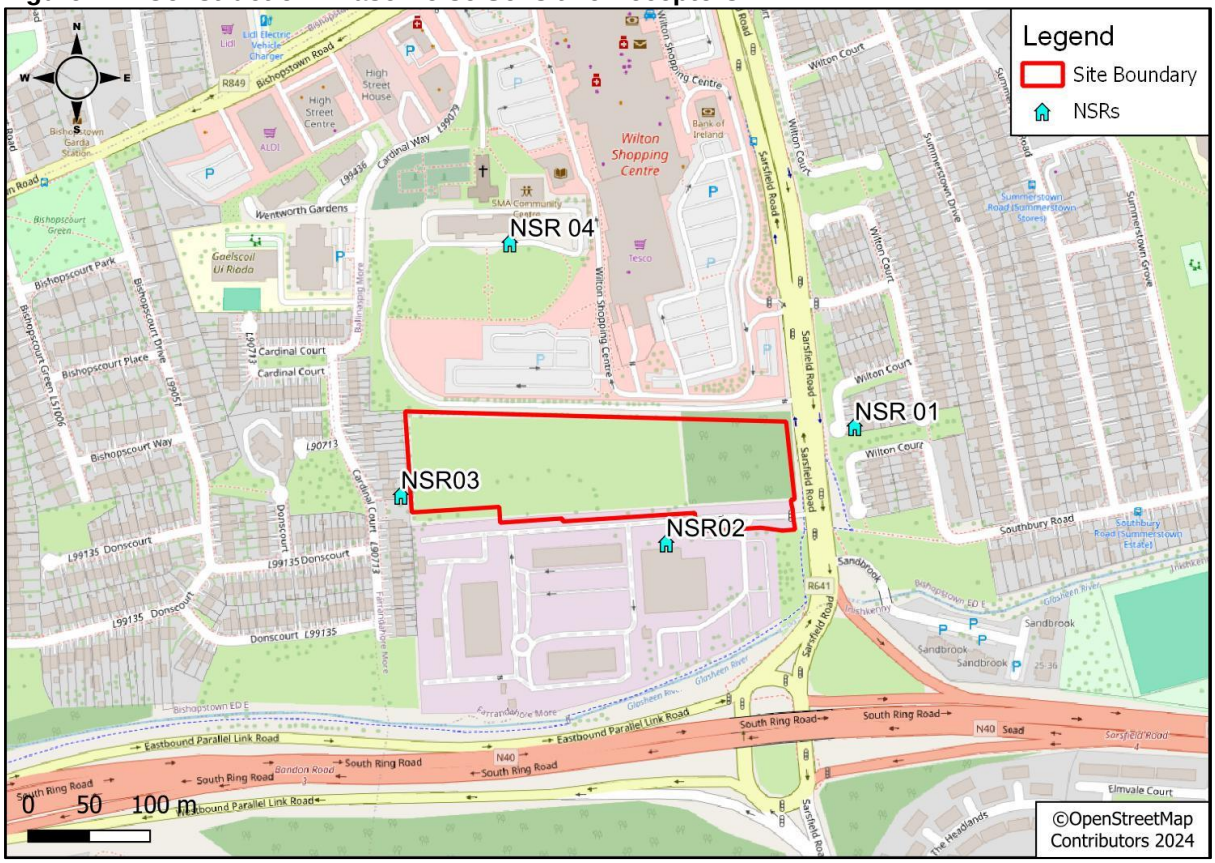
Table 4-2 below details the construction noise impact at NSRs (refer to Figure 4-1 below) utilising the BS5228 ABC Method for peak noise associated with the Site Clearance Phase and combined sound pressure of 93dB at 10m. This assessment has modelled all plant in any phase, as operational at the closest boundary to any sensitive receptor.

Table 4-2: Construction Noise Assessment (BS5228 Example ABC Method)

NSR	Predicted Site Specific Sound Pressure Level $L_{Aeq,T}$ dB	Distance to Site Boundary (m)	Screening (-5dB)	65dB Threshold Compliant
NSR01	79	55	74	Non-Compliant
NSR02	86	23	81	Non-Compliant
NSR03	95	8	90	Non-Compliant
NSR04	70	142	65	Compliant

The values presented in Table 4-2 represent the worst case when construction plant will be operational on the closest boundary to the properties, assumes all plant are fully working to duty capacity throughout the 1-hour assessment period. The predicted values considered that the maximum number of equipment presented in Table 4-2 above is working simultaneously. Furthermore, Table 4-2 does not consider noise control measures or mitigation factors.

Figure 4-1: Construction Phase Noise Sensitive Receptors



The closest NSRs (NSR01, NSR02 and NSR03) will experience a construction sound level at or above the recommended criterion of $L_{Aeq,1hr}$ of 65dB. The elevation at these NSRs is due to the proximity to the Proposed Development site boundary. Although this will be for a short duration as construction works are near these properties, mitigation measures for construction works are outlined in Section 4.3 and will need to be applied.

The remaining NSR will be compliant with the $L_{Aeq,1hr}$ 65dB limit and will not require any additional mitigation, however, mitigation incorporated to the Proposed Development will benefit these NSRs.

4.3 Construction Phase Mitigation

The noise levels generated at times during the period of the construction works have the potential to breach the lower recommended noise limit ('Category A') at the closest identified NSRs. The Applicant is committed to implementing standard noise mitigation measures throughout the construction phase of the proposed development. This will include the development of a Construction Environmental Management Plan ('CEMP'), where noise mitigation measures, complaints procedures and monitoring programmes will be clearly defined.

Such measures will include:

- Activities and deliveries to the Site to occur only during permitted hours;
- All plant where possible shall be low noise rated;
- Where necessary enclosures and noise screens shall be used to control noise from plant;
- On-site policy for all plant and equipment, including Site delivery vehicles, to power off rather than to be left with idling engines;

- All plant and vehicles on the Site will be in a fit condition for use, to prevent the addition of noise from maintenance issues;
- Working Method Statements will be developed for the Site Construction Personnel to ensure optimal working procedures are employed, thereby minimising time spent in proximity to NSRs; and,
- A Site Representative will be appointed to receive and respond to noise complaints and enquiries during construction by local residents, the Local Authority, and any other regulatory body. Relevant details will be provided to the Local Authority prior to construction, and will be made available to third parties, including local residences.

Utilising the above measures, along with the implementation of a dedicated contractor designed CEMP, will ensure construction works noise will be maintained below a best practice noise nuisance value of $L_{Aeq,1hour}$ of 65dB at local noise sensitive receptors and therefore keeping works in-line with best construction noise criteria at residences locally.

4.4 Operational Phase

Operational noise sources associated with the Proposed Development will consist of:

- Centralised Heating ('CH') with air-to-water heat pumps ('AWHP'); and,
- Substation.

4.4.1 Proposed Building Services Plant

The Centralised heating system is heated by the Air-Water Heat Pumps, located in a centralised location in each apartment block, most commonly on the roof. The proposed CH units are manufactured by WiSAN YEE1, and the model types are:

- West Block - 3no.– Model 75.4;
- Middle Block - 3no.– Model 80.4; and
- East Block - 3no.– Model 65.4.

The sound power levels associated with the proposed CH units are detailed in Table 4-3 below.

Table 4-3: CH Unit Sound Power Levels

Block / WiSAN YEE1 Model	Sound Power Level (dBA)
East Block - 65.4	88dBA each
West Block - 75.4	89dBA each
Middle Block - 80.4	89dBA each

The proposed CH units located on the roofs of each block are assessed in Table 4-4 below utilising the nearest distance from each NSR to the respective Block. The cumulative for the three blocks has been used and a 15dB attenuation is considered for the plant enclosure surrounding the three units. No acoustic correction has been included. The lowest $L_{A90,T}$ values have been utilised in Table 4-4 below.

For the Future NSRs, future residents of each block, a 20m distance has been used to be representative. The results presented in Table 4-4 are calculated at the façade.

Table 4-4: Building Services Plant - CH System

Receptor	Typical Measured Background $L_{A90,T}$ Noise Level (dB)		Specific Noise Level $L_{Aeq,T}$		Noise Rating Level		BS 4142 Score	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
NSR01	52	34	38	38	52	39	0	+5
NSR02	49	41	39	39	49	44	0	+1
NSR03	53	41	32	32	53	42	0	+1
NSR04	58	43	30	30	58	41	0	0
Future NSR	53	46	45	45	50	46	+1	+5

NSRs 02 to 04 are predicted to be +1dB or below the existing background noise levels during the daytime and nighttime. This is an indication of a low impact. NSR 01 and Future NSR (at 20m distance) are predicted to be +5dB or below the existing background noise levels during the daytime and nighttime. However, due to the absolute noise levels (45dB at the façade of NSR01) and context (urban area, proximity to road traffic, and Future NSRs will have acoustic glazing and mechanical ventilation), the impact is not considered to be significant at NSR01 and Future NSR.

4.4.2 Substation

The substation is located within the Site to the west of the Eastern Block and is assessed in Table 4-5 below. The substation will be built within a blockwork construction to reduce noise transmission through the walls and ceiling. A louvred door will be present, this will be acoustically rated to ensure the noise emission from the Substation is reduced.

Table 4-5: Substation Assessment

Location	External @1m	Noise Level ($L_{Aeq,T}$)		Min. Façade Reduction/ Attenuation dB R_{w+Ctr}	Predicted Noise Level in Receiving Space ($L_{Aeq,T}$)	
		Daytime	Night-time		Daytime (limit 35dB)	Night-time (limit 30dB)
Substation	Ground floor	69	69	50	19	19

Noise levels from the Substation are predicted to be 19dB during the daytime and night-time which is significantly below the existing ambient daytime and night-time $L_{A90,T}$ values.

4.4.3 Operational Phase Mitigation

The Proposed Development will be a large residential development. However, the assessment has indicated there is potential for impact arising from the rooftop plant, if considerations are

not given to the embedded mitigation (plant enclosures) and noise emissions associated with the plant.

Based on the layout present, when tendering for the equipment, the overall sound pressure associated with the proposed plant will be set to nor more than +5dB above the existing ambient daytime and night-time $L_{A90,T}$ values at existing and future NSRs.

5 STAGE 2 – FULL ACOUSTIC ASSESSMENT

This assessment concerns the proposed Large-Scale Residential Development ('LRD') by The Land Development Agency ('LDA'). The Proposed Development is located along Sarsfield Road, Wilton, Cork. To the south of the Site is the N40 national road (ca. 160m).

5.1 Do Nothing Scenario

The Site is zoned 'Z01—New Residential Neighbourhoods' as per Map 9 of the Cork City Development Plan 2022-2028, and it is reasonable to assume the Site will be developed in the future. The impact of any future residential development would be similar to the impact identified within this assessment.

However, if the Site did not become developed as per the zoning objective, noise levels in the vicinity of the Site would likely remain unchanged. There would also be no supplementary noise-sensitive receptors in the vicinity exposed to the existing ambient noise levels.

5.2 Element 1: Good Acoustic Design Process

Applicants must, therefore, consider all possibilities for mitigation, including but not limited to:

- Checking the feasibility of relocating or reducing noise levels from relevant sources;
- Considering options for planning the site or building layout;
- Considering the orientation of proposed building(s);
- Selecting construction types and methods for meeting building performance requirements;
- Assessing the viability of alternative solutions;
- Assessing external amenity area noise;
- Examining the effects of noise control measures on ventilation, fire regulation, health; and,
- Safety, cost, construction, design, and management ('CDM'), etc.

5.3 Application of Good Acoustic Design Process to the Proposed Development

Regarding the Site's limitations and taking care not to limit the extent of the Site's footprint the principles of Good Acoustic Design have been applied to the Proposed Development as detailed below.

5.4 Noise at Source

The dominant noise source is offsite traffic from the adjacent road network outside of the Site's red line boundary. Baseline monitoring undertaken by MOR Environmental recorded sound levels across the Site from east to the west of:

- $L_{Aeq,T}$ day; and,
- $L_{Aeq,T}$ night.

Within the Proposed Development, noise from the proposed heating systems - heat pumps have been considered within this assessment due to their proximity to residential units.

5.5 Layout and Orientation

Figure 5-1 below shows the site layout.

Figure 5-1: Layout of Phase 1 with identification

The Proposed Development layout presents a linear layout, following the form of the Site. There are 4 distinct plots:

- East Block;
- Middle Block;
- West Block; and,
- Townhouses.

Communal external amenity areas are sheltered by the form of the Middle and West Blocks and the form of the western and northwestern Townhouses, additionally a 2.6m blockwork wall is to be added to the southern boundary. Private external amenity areas associated with the townhouses are generally rectangular in design with rear gardens.

5.6 Construction Type

These elements will comply with the Technical Guidance Document E - Sound [13] with regards to sound insulation performance. The following design for build-up has been outlined.

For Townhouses, the construction involves masonry cavity or timber-framed external walls with brick / block outer layers. Party walls are solid masonry blockwork. Internal walls feature plasterboard on timber studs.

These construction types provide good sound insulation performance. As with all construction, glazing and ventilation elements have reduced sound insulation properties compared to the wall make-up.

For the Eastern, Middle (and Creche) and Western Blocks, the construction involves masonry cavity or timber-framed external walls with brick / block outer layers. Party walls are solid masonry blockwork. Internal walls feature plasterboard on timber studs.

These construction types provide good sound insulation performance. As with all construction, glazing and ventilation elements have reduced sound insulation properties compared to the wall make-up.

5.7 External Amenity Area

ProPG recommend that external amenity areas should not be above the range of 50-55dB $L_{Aeq,16hr}$. Existing noise levels across the Site currently exceed this value, based on the ambient monitoring undertaken by MOR Environmental in 2024; refer to Section 3 above.

The Proposed Development layout identifies three main external amenity and recreational areas located within the Site, refer to Figure 5-2 below.

- Townhouse Amenity Area;
- Middle Block Amenity Area; and,
- East Block Amenity Area.

This layout will provide for sheltering by the proposed Buildings to the four external amenity areas shown in Figure 5-2 below and the proposed 2.6m blockwork wall to the southern boundary. BS8233 states:

> *"….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."*

Figure 5-2: External Amenity areas within the Proposed Development

The monitoring locations recorded $L_{Aeq,T}$ values of 55dB to 67dB for daytime across the Site with higher noise levels recorded in proximity to the road network. NM3 evening time recorded an $L_{Aeq,T}$ of 53dB. However, it is considered that with the shielding associated with the Blocks of the Proposed Development there will be areas where the external amenity areas are predicted to fall below upper value of 55 dB $L_{Aeq,16hours}$ within the centre and western portion of the Site, refer to Section 5.10 below.

5.8 Impact of Acoustic Design on Fire, Health and Safety

The acoustic design measures such as layout will not have any significant impact on issued related to fire and / or health and safety. Any recommendations relating to upgrading of glazing and ventilation elements will need to be verified by a relevant specialist; however, standard options have been specified in this assessment.

5.9 Element 2: Internal Noise Levels – BS:8233 Assessment

The assessment of good acoustic design on internal noise levels during use is outlined below under the following headings:

- Wall construction;
- Glazing vs. open window;
- Ventilation; and,
- Roof.

5.9.1 Wall Construction

The estimated sound insulation rating of the Proposed Development's external walls and glazing are described in Table 5-1 below, providing an indicative build-up and associated sound reduction.

Table 5-1: External Sound Insulation Rating

Item	Sound Insulation Rating dB R_w
External Wall for Apartments: Masonry external walls with insulated cavity and rendered/brick outer leaf. External Wall for Houses/Duplexes/Creche: Masonry cavity external walls with insulated cavity / timber frame with rendered / brick outer leaf.	>50
External Glazing for Apartments and Townhouses: High performance uPVC double glazed external windows & doors, Low E Glass External Glazing for Houses/Duplexes/Creche: High performance uPVC double glazed windows, Low E Glass.	35

To determine the estimated impact of the external noise to the Proposed Development internal residential units the most exposed façade for each block (i.e. the eastern façade for the East Block) was utilised as a worst-case scenario; refer to Table 5-2 below.

Table 5-2: Calculation of Façade Reduction

Location	Floor Level	Noise Level ($L_{Aeq,T}$)		Min. Façade Reduction/ Attenuation dB R_{w+Ctr}	Predicted Noise Level in Receiving Space ($L_{Aeq,T}$)	
		Daytime	Night-time		Daytime (limit 35dB)	Night-time (limit 30dB)
East Block	Ground floor	69	65	35	34	30
	First floor	69	65	35	34	30

Location	Floor Level	Noise Level ($L_{Aeq,T}$)		Min. Façade Reduction/ Attenuation dB R_{w+Ctr}	Predicted Noise Level in Receiving Space ($L_{Aeq,T}$)	
		Daytime	Night-time		Daytime (limit 35dB)	Night-time (limit 30dB)
Middle Block	First Floor	65	55	30	35	25
	Second Floor	65	55	30	35	25
West Block	First Floor	65	55	30	35	25
	Second Floor	65	55	30	35	25
Townhouses	Ground floor	65	55	30	35	25
	First floor	65	55	30	35	25

Parameters have been derived from the attended measurements and review of the Strategic Noise Maps for Sarsfield Road and the N40, taking the higher values as appropriate. These values represent daytime and night-time periods, respectively. The results for location NM1, located to the eastern boundary of the Proposed Development, are:

- LAeq,30min, day 61dB;
- LAeq,15min, night 46dBA;
- Lden 69dBA; and,
- Lnight 65dBA.

The minimum façade attenuation has been calculated to achieve the BS-8233 limits for daytime and night-time periods internally to the most exposed façade for each block/plot of the Proposed Development.

5.9.2 Glazing Open V Closed Windows

Eastern Block

External glazing (total sound reduction of ≥35dBA) will result in an internal noise level of 35dB during the daytime and <30dB during the nighttime.

When windows are open, a reduction of 15dB from outside to inside is assumed (World Health Organization [14]). This would result in an internal noise level when windows are open of 49dB during the daytime and 39dB during the nighttime, which exceeds ProPG's recommended internal L_{Aeq} levels; refer to Table 5-2 above.

The key criteria are to ensure the rooms can be comfortably lived within with the windows closed. The ability to open the windows for occupants' personal preference (non-acoustic likely) will present a higher internal noise value, but this is an option the design cannot mitigate.

Middle Block, Western Block & Townhouses

External glazing (total sound reduction of ≥30dBA) will result in an internal noise level of 35dB during the daytime and <30dB during the night-time.

When windows are open, a reduction of 15dB from outside to inside is assumed (World Health Organization,[14]). This would result in an internal noise level when windows are open of 49dB during the daytime and 39dB during the nighttime, which exceeds ProPG's recommended internal L_{Aeq} levels. Refer to Table 5-2 above.

The key criteria are to ensure the rooms can be comfortably lived within with the windows closed. The ability to open the windows for occupants' personal preference (non-acoustic likely) will present a higher internal noise value, but this is an option the design cannot mitigate.

Creche

Utilising the standard internal criteria of educational space, supplied under the Department of Education SDG 02-05-03 Acoustic Performance in New Primary & Post Primary School Buildings October 2020 [15] specifies an Upper limit for the indoor ambient noise level, $L_{Aeq,30min}$ of 35dB for the majority of purposes. As such, the minimum attenuation requirements for the block with windows closed will achieve the internal noise levels required. Considering the standard building presented for the Creche, the compliance with minimum building control Technical Guidance Document E – Sound, break-in noise will not require special acoustic attenuation; break-in noise to the creche can be managed through standard building design as presented.

5.9.3 Ventilation

The ventilation strategy will be via mechanical ventilation.

To remove vents from contributing a pathway, a $D_{ne,w}$ dB performance of +7dB or more than the proposed glazed unit will be required. For example, a window performance of 35dB R_w+C_{tr} would require a 42dB $D_{ne,w}$ vent. Where two or more vents are needed, the performance of the vent will need to be increased by 3dB for each doubling of the number of vents.

All ducting shall be installed to ensure no vibrational-borne noise occurs within the building.

5.9.4 Roof

The roof construction will involve placing concrete roof tiles on battens, which are supported by a breather membrane on a trussed timber rafter roof.

Solar Panels will be positioned on the roof with mini-inverters, negligible noise from these inverters is likely.

5.10 Element 3 – External Amenity Area Noise Assessment

As stated previously in Section 5.7 above, noise levels across the Site exceed the range of 50-55dB $L_{Aeq,16hr}$. However, the proposed layout for parks and recreational areas presents how the constructed homes, apartments and boundary walls will provide a sheltering to these parks. Accruing a standard of 5dB for barrier effects, as per BS5228, the parks are estimated to achieve the upper desired ambient noise level of 55dBA in locations within the external amenity areas with the presence of soft landscaping and structures to shield patrons.

5.11 Element 4 – Assessment of Other Relevant Issues

Element 4 of Stage 2 details other issues which may be considered relevant to the assessment which are:

- Compliance with relevant national and local policy;
- Magnitude and extent of compliance with ProPG;
- Likely occupants of the development;
- Acoustic Design V Unintended adverse consequences; and,
- Acoustic Design V wider planning objectives.

5.11.1 Compliance with relevant national and local policy

The Site is zoned 'Z01- New Residential Neighbourhoods' as per Map 9 of the CDP and is therefore identified by the Council as an area in need of good residential development in the town to manage the growing population. Although a specific layout or design is not identified within the zoning, the fundamental use of the land for residential is in line with ProPG approach for new development.

5.11.2 Magnitude and extent of compliance with ProPG

As detailed above, the proposed development is within compliance with ProPG when windows are closed for living spaces. In addition, amenity areas are within the Proposed Development and are predicted to be within compliance with ProPG recommended range.

5.11.3 Likely Occupants of the Development

Long-term residents will occupy the Proposed Development.

The criteria adopted in this assessment are based upon criteria recommended for long-term / permanent dwellings and, therefore, considered appropriate.

5.11.4 Acoustic Design V Unintended Adverse Consequences

Design measures taken to reduce intrusion by noise have not had any unintended adverse consequences for the Proposed Development or the nearby environment.

Regarding Operational noise, low-noise heat pumps are recommended to reduce noise intrusion to the Proposed Development.

5.11.5 Acoustic Design V Wider Planning Objectives

This assessment has demonstrated that the living areas of the Proposed Development will achieve a good internal noise environment.

6 CONCLUSIONS

Based on the results of the baseline survey and the findings of this assessment, the following can be concluded:

- The results of the baseline acoustic survey ranged from $L_{Aeq,T}$ 55dB to 67dB for daytime and 39dB to 60dB for night-time period. Background ambient acoustic environment $L_{A90,T}$ ranged from 52dB to 58dB for daytime and 34dB to 48dB during night-time period;
- Strategic Round four road noise maps show the L_{den} ranges from 60dB to >75dB across the Site and L_{night} ranges from 55dB to 74dB with higher contour bands closer to Sarsfield Road;
- The baseline noise monitoring confirmed that noise levels across the Site is consistent with the Strategic noise maps associated with the movement of traffic in the locality;
- The dominant noise sources experienced onsite were road traffic noise (daytime and night-time);
- A Stage 2 assessment was undertaken with regard to the likely impact of both the internal and external amenity areas of the Proposed Development as per ProPG;
- The results indicate that the required daytime and night-time internal acoustic environment would be met utilising enhanced glazing and ventilation when windows are closed for sensitive spaces of the Proposed Development;
- Through acoustic design outlined within this report the Proposed Development would enable internal and external noise levels to be achieved as per ProPG and BS 8233;
- No vibrational impacts during the construction phase are likely to occur;
- There is potential for construction noise limits to be exceeded due to the proximity of some NSRs. However, utilising the above measures, along with the implementation of a dedicated contractor designed CEMP, will ensure construction works noise will be maintained below a best practice noise nuisance value of $L_{Aeq,1hr}$ of 65dB at local noise sensitive receptors and therefore keeping works in-line with best construction noise criteria at residences locally; and,
- During the Operational Phase of the Proposed Development the proposed building services plant are not predicted to result in a significant impact at NSRs during the daytime and night-time.

REFERENCES

[1] British Standard, BS 5228-1:2009+A1 2014 Code of practice for noise and vibration control on construction and open sites. Noise, London: BS, 2009.

[2] British Standard, BS5228-2:2009 Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration, London: BS, 2009.

[3] British Standard, BS 7385-2: Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration, London: BS, 1993.

[4] Councils, Cork City and Cork County, "Cork Agglomeration Area Noise Action Plan 2018-2023," 2018.

[5] Statutory Instrument, S.I. No. 549/2018 European Communities (Environmental Noise) Regulations, Government of Ireland, 2018.

[6] Association of Noise Consultants (ANC), Institute of Acoustics (IOA)and Chartered Institute of Environmental Health (CIEH), "The Professional Practice Guidance on Planning and Noise (ProPG)," 2017.

[7] ISO, ISO 1996-2:2017 Acoustics - Description, measurement and assessment of envirionmental noise - Part 2: Detemination of sound pressure levels, Switzerland: International Organization for Standardization, 2017.

[8] ISO, ISO 9613-2:2017: Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation, ISO, 2017.

[9] B. S. Institution, "BS 8233:2014 Guidance on sound insulation and noise reduction for buildings," 2014.

[10] ISO, ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise Part 1: Basic quantities and assessment procedures, Geneva: ISO, 2016.

[11] EPA, Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities, EPA, 2016.

[12] Enivronmental Protection Agency, "GIS Noise Mapping," [Online]. Available: https://gis.epa.ie/EPAMaps/. [Accessed 09 02 2021].

[13] Government of Ireland, Building Regulations: Technical Guidance Document E: Sound, 2014.

[14] World Heatlh Organization, "Night Noise Guidelines for Europe," WHO, 2009.

[15] IOA, ProPG: Planning & Noise – New Residential Development, IOA, 2017.

[16] Department of Education, SDG 02-05-03 Acoustic Performance in New Primary & Post Primary School Buildings, Department of Education, October 2020 .

APPENDICES

APPENDIX A

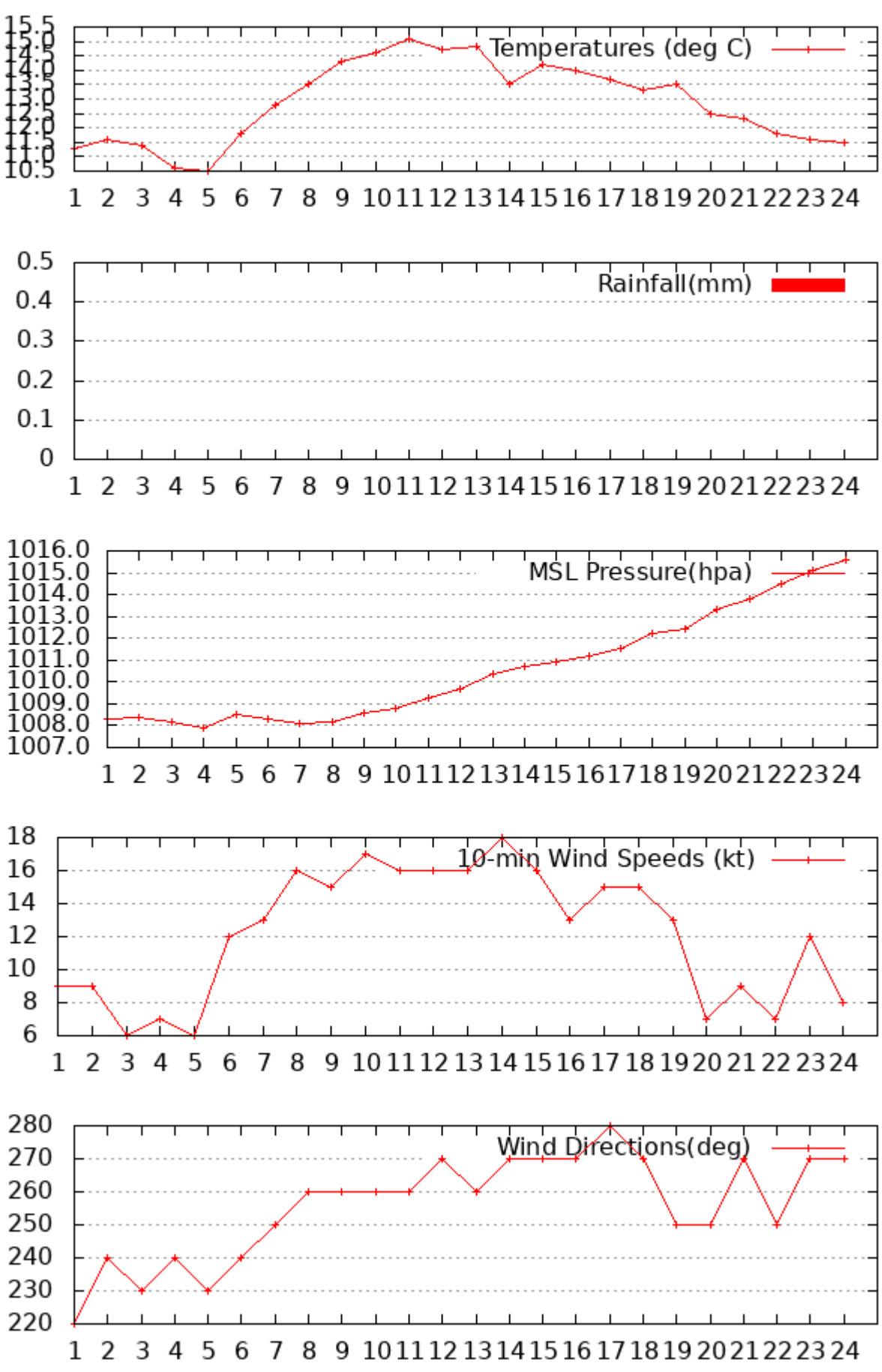
Daily Data

Weather station Data is available from 16/10/2015 to 06/08/2024

Select Station & Date: Station Cork Airport Date 27/06/2024 Go

Weather Station Reports from Cork Airport

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)	Max Gust (>= 34 knots)	Sunshine (hours)
27/06/2024	tr	15.4	10.5	9.1	12.2		4.0



Daily Data

Climate

Climate of Ireland

Climate Change

Weather Extreme Records for Ireland

Major Weather Events

Summer Centre

Storm Centre

Past Weather Statements

Services

NFCS

Weather Observations Website WOW-IE

Available Data

What we measure

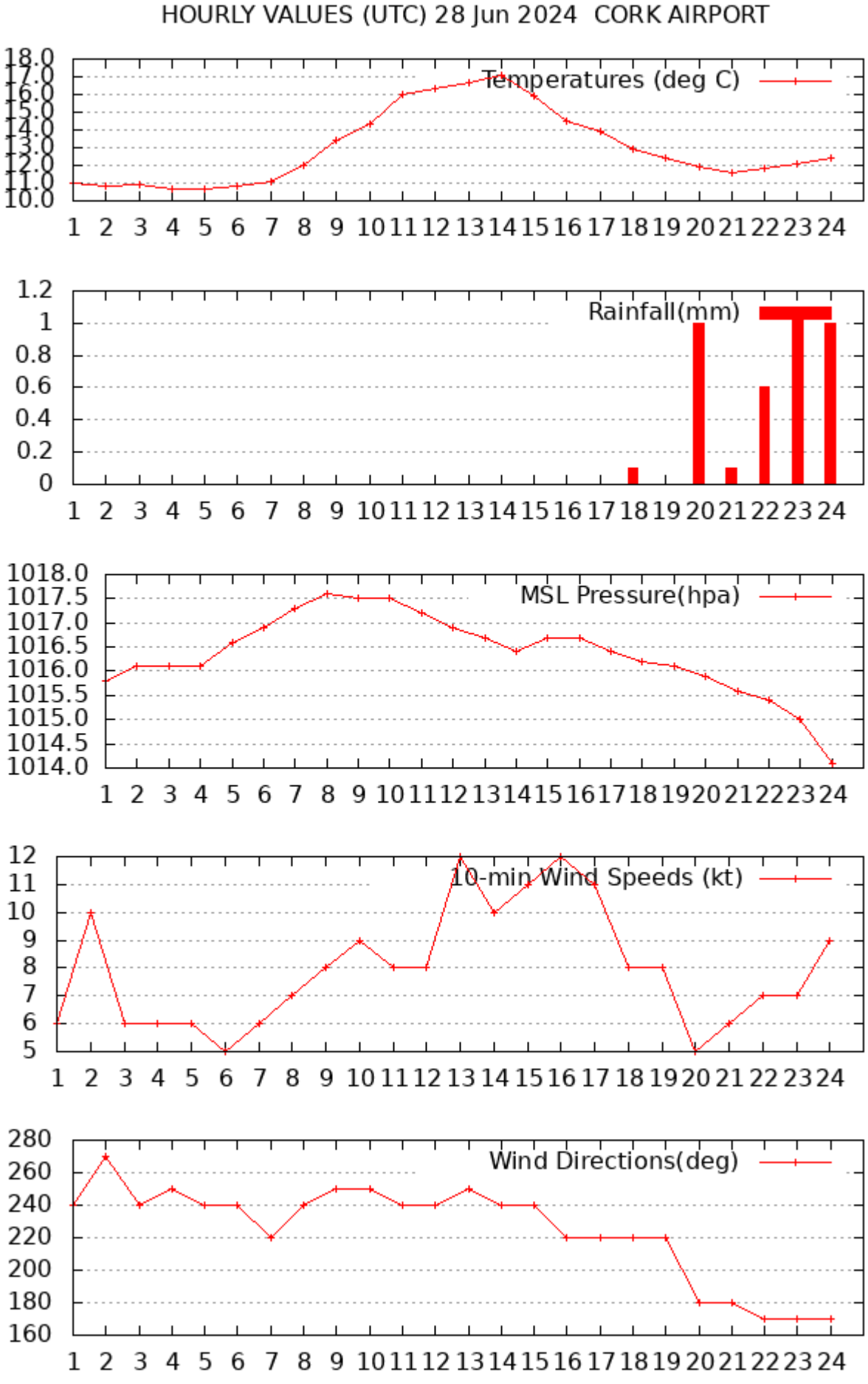
Daily Data

Weather station Data is available from 16/10/2015 to 06/08/2024

Select Station & Date: Station Cork Airport Date 28/06/2024 Go

Weather Station Reports from Cork Airport

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)	Max Gust (>= 34 knots)	Sunshine (hours)
28/06/2024	3.9	17.9	10.6	9.9	8.0		2.5



Daily Data

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Climate of Ireland

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Weather Extreme Records for Ireland

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Storm Centre

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What we measure