Perigus Energy Ireland Midco Limited

Greenhills Renewable Energy Park

Noise and Vibration Impact Assessment

RSK Project No. 605444

JULY 2026

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1 NOISE AND VIBRATION

1.1 Introduction

This chapter presents the assessment of the potential impacts of Greenhills Renewable Energy Park (hereafter referred to as the Proposed Development) as a result of noise and vibration arising from the construction and operational phases, and the corresponding effects on noise and vibration sensitive receptors.

This assessment considers the potential for the construction and operational activities to give rise to noise and vibration impacts, including the following:

- Construction activities within the Red Line Boundary (RLB), including solar farm construction, open cut trenching, and construction of the substation and BESS;
- Construction vehicle movements on public roads and construction access routes; and
- Operational aspects of the Proposed Development, including the operation of the solar farm, the substation and the BESS.

1.1.1 Study Area

A study area for the construction and operational noise and vibration assessment has not been defined as the approach has been to assess the impacts at the closest sensitive receptors in accordance with the relevant guidelines.

1.2 Methodology

1.2.1 Relevant EU Directive, Legislation and Guidance

There is no specific noise/vibration guidance relating to the operation of solar farms and associated infrastructure. This section presents relevant guidance documents and criteria in relation to noise and vibration generated at noise sensitive receptors.

The guidance documents used in this assessment include:

- British Standards Institution (BSI), British Standard (BS) 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites - Noise* (hereafter referred to as BS 5228-1). BS 5228-1 is used for all construction noise calculations and assessment;
- BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Vibration* (hereafter referred to as BS 5228-2). An assessment of the likelihood of significant impacts as a result of ground-borne vibration has been carried out using the guidance contained within BS 5228-2;
- Environmental Protection Agency (EPA) *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (hereafter referred to as the NG4 Guidance Note for Noise);

- ISO9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation;*
- BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (hereafter referred to as BS 4142);
- National Roads Authority (NRA) *Guidelines for Treatment of Noise and Vibration in National Road Schemes* (hereafter referred to as NRA Road Noise Guidelines);
- National Roads Authority (NRA) *Good Practice Guidance for Treatment of Noise during the Planning of National Road Schemes* (hereafter referred to as NRA Good Practice Road Noise Guidelines); and
- United Kingdom Highways Agency (UKHA) *Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration*.

S.I. No. 549/2018 - European Communities (Environmental Noise) Regulations 2018 (as amended) transposes Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (as amended) (commonly referred to the Environmental Noise Directive (END)) for the strategic control of environmental noise in Ireland. The relevant local authorities are required to prepare noise action plans based on strategic noise mapping to identify how noise will be managed and to deliver their obligations under the END.

Nuisance due to noise is dealt with by Number 7 of 1992 - Environmental Protection Agency Act, 1992 (as amended), and S.I. No. 179/1994 - Environmental Protection Agency Act, 1992 (Noise) Regulations, 1994 (as amended), and Number 27 of 2003 - Protection of the Environmental Act 2003 (as amended). The legislation requires the use of Best Available Techniques to control noise because of human activity "*which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment*."

Other policy documents relevant to the assessment include:

- Cork County Council (CCC) *Noise Action Plan 2024-2028*, February 2025.

1.2.2 Desk Study

The desk study has comprised of an assessment of the potential noise and vibration impacts in line with relevant guidance and using the following sources:

- GIS data of the Red Line Boundary, Transformers, Solar Arrays, Cable Routes, Access Roads, Substation, BESS and Eircode data (supplied in August 2025); and
- Google Maps.

1.2.3 Field Assessment

The field assessment has comprised of a series of baseline noise surveys undertaken in March 2025. Full details of the noise surveys carried out for the assessment are shown in Section 15.3. Figure 1.1 shows the location of the baseline noise surveys (BN1 to

BN12) and the location of the noise sensitive receptors within 300m of the Red Line Boundary.

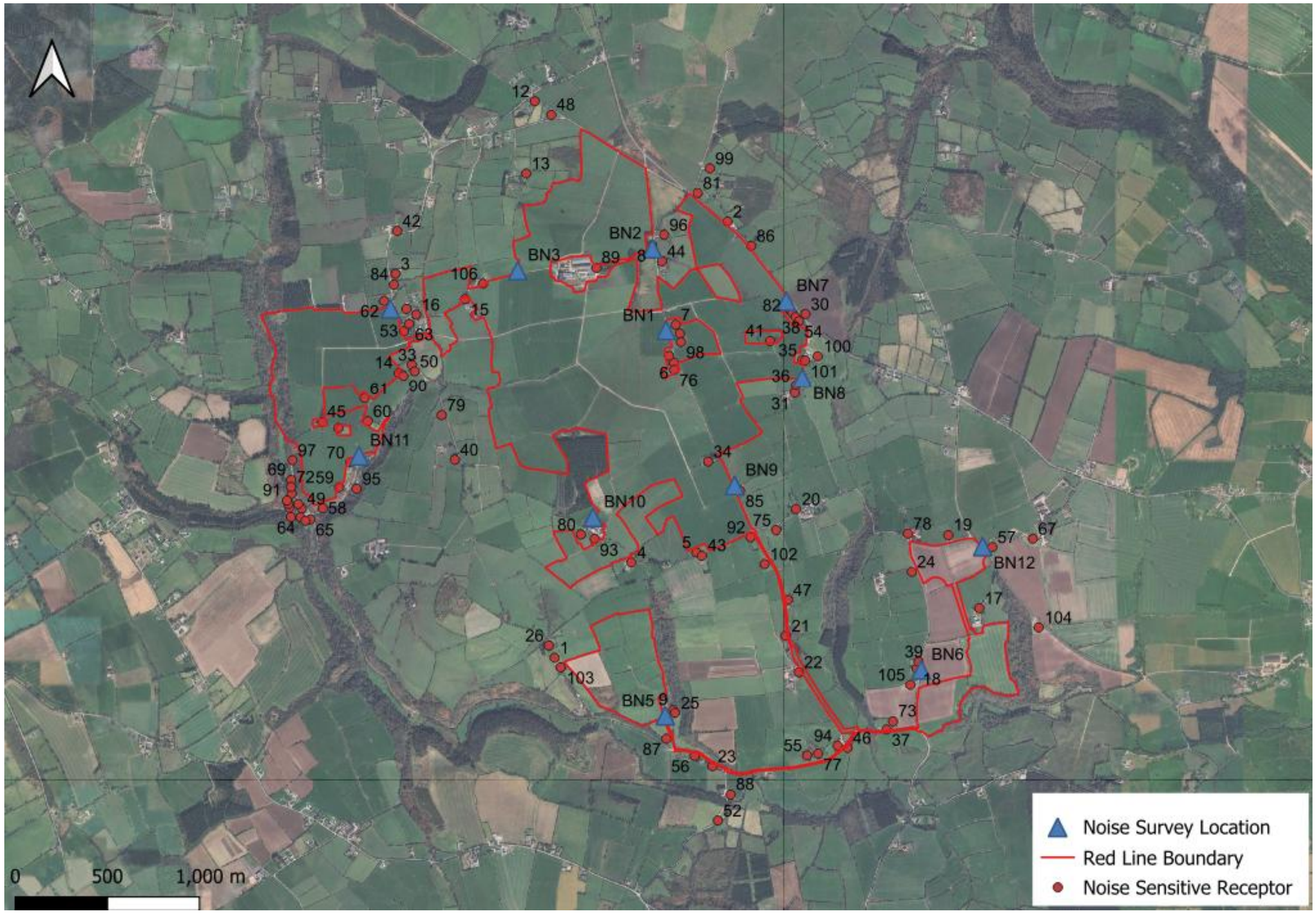

Figure 1.1: Baseline Noise Survey and Sensitive Receptor Locations

Table 1.1 shows the closest distance from each noise sensitive receptor to the Red Line Boundary.

Table 1.1: Closest Distance from Noise Sensitive Receptor to Red Line Boundary (RLB)

Receptor ID	Distance to RLB (m)
1	54
2	18
3	152
4	31
5	26
6	19
7	34
8	29
9	54
10	114
11	39
12	293
13	154
14	5
15	11
16	55
17	82
18	102
19	42
20	250
21	8
22	13
23	14
24	33
25	57
26	117
27	104

Receptor ID	Distance to RLB (m)
28	142
29	40
30	75
31	83
32	11
33	65
34	67
35	15
36	41
37	7
38	39
39	137
40	232
41	9
42	295
43	47
44	86
45	17
46	9
47	17
48	179
49	69
50	78
51	53
52	266
53	16
54	30
55	47
56	16
57	43
58	33

Receptor ID	Distance to RLB (m)
59	16
60	23
61	23
62	40
63	52
64	100
65	80
66	67
67	258
68	21
69	52
70	17
71	62
72	61
73	47
74	58
75	107
76	16
77	44
78	45
79	257
80	35
81	31
82	17
83	97
84	119
85	24
86	14
87	29
88	115
89	19

Receptor ID	Distance to RLB (m)
90	21
91	99
92	26
93	15
94	26
95	78
96	60
97	48
98	53
99	175
100	84
101	15
102	32
103	34
104	164
105	49
106	15

1.2.4 Evaluation Process

1.2.4.1 Construction Noise

The potential construction noise impacts from the Proposed Development have been assessed according to BS 5228-1. The approach adopted designates noise sensitive receptors into a specific category (A, B or C) based on existing ambient noise levels. This then sets a threshold noise value that, if exceeded, indicates a potential significant noise impact, depending on other factors such as duration of the impact. Table 1.2 sets out the construction noise thresholds for the Proposed Development, reproduced from BS 5228-1.

Table 1.2: Construction Noise Thresholds BS 5228-1

Assessment Category and Threshold Value Period	Threshold Value in Decibels (dB) $L_{Aeq,T}$		
	Category A[A]	Category B[B]	Category C[C]
Daytime (07:00hrs to 19:00hrs) and Saturdays (07:00hrs to 13:00hrs)	65	70	75
Evenings and weekends (19:00hrs to 23:00hrs weekdays, 13:00hrs to 23:00hrs Saturdays and 07:00hrs to 23:00hrs Sundays)	55	60	65
Night-time (23:00hrs to 07:00)	45	50	55

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

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

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

A list of proposed construction activities and plant / equipment has been developed using the information in Chapter 5 (Project Construction), along with additional information gathered from the project team and experience of similar projects. Table 1.3 presents the proposed construction activities, plant items and sound power levels taken from BS 5228-1.

Table 1.3: Proposed Construction Activities and Items of Plant

Construction Activity	Item of Plant (inc. BS5228-1 Ref.)	Sound Power Level (dB L_w)
Deliveries	Lorry (C.2.34)	108
	Wheeled Loader (C.2.26)	107
General Construction Solar Farm inc. piling works	Tracked Excavator (C.2.2)	105
	Hydraulic Hammer Rig (C.3.4)	105
	Concrete Mixer Truck (C.4.27)	107
	Poker Vibrator (C.4.34)	97

Construction Activity	Item of Plant (inc. BS5228-1 Ref.)	Sound Power Level (dB L_w)
	Metal Cutter (C.1.18)	107
	Mobile Telescopic crane (C.4.41)	99
Trenching	Tracked excavator (C.2.14)	107
	Road planer (C.5.7)	110
	Dumper (C.4.3)	104
	Asphalt paver (+ tipper lorry) (C.5.31)	105
	Vibratory roller (C.5.25)	103
Substation works	Tracked excavator (C.2.14)	107
	Diesel generator (C.4.76)	89
	Vibratory roller (C.5.25)	103
	Telescopic handler (C.4.54)	107

1.2.4.2 Construction Vibration

The potential vibration impacts from the Proposed Development have been assessed according to BS 5228-2. Vibration impacts can occur in terms of human perception (at lower levels of vibration) and building damage (at higher levels of vibration).

For the vibration calculations, sheet piling has been considered a possibility anywhere within the solar array area. Vibration levels experienced during construction will be influenced by factors including the number of surface layers, the thickness, density and stiffness of surface layers, the depth of the water table, the topography of the site and the operating frequency of the plant.

Table 1.4 presents the magnitude of construction vibration impacts for human perception at residential receptors, which have been reproduced from BS 5228-2.

Table 1.4: Construction Vibration Thresholds Human Perception (BS 5228-2)

Construction Vibration Level	Magnitude of Impact
Below 0.3mm/s PPV	Negligible

Construction Vibration Level	Magnitude of Impact
Above or equal to 0.3mm/s PPV and below 1.0mm/s PPV	Minor
Above or equal to 1.0mm/s PPV and below 10mm/s PPV	Moderate
Above or equal to 10mm/s PPV	Major
Note: mm/s = millimetres per second, PPV = Peak Particle Velocity	

BS 5228-2 recommends that, for soundly constructed residential properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a PPV of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. Table 1.5 presents the construction vibration criteria in relation to cosmetic damage to buildings.

Table 1.5: Construction vibration criteria to prevent cosmetic damage to buildings

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

1.2.4.3 Construction Traffic Noise

Construction traffic noise predictions have been undertaken using the Calculation of Road Traffic Noise (CRTN) methodology (Department for Transport Welsh Office, 1988) to predict the Basic Noise Level (BNL) at each road on the day with the largest number of construction vehicles to ensure the peak impacts are assessed. BNL calculations are undertaken using traffic flow, speed and percentage of Heavy Goods Vehicles (HGVs) to calculate a reference noise emission for each road link.

The calculations included the following standard assumptions:

- Speed of 88km/hr (kilometres per hour) (in accordance with the CRTN for a single carriageway road, more than 9m wide);
- Impervious road surface; and
- No correction for road gradient.

1.2.4.4 Operational Noise

The operational noise impact assessment has been undertaken using the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*.

According to NG4 the Proposed Development is not in a 'Quiet Area' due to it being less than 5km from the N25. However, measured baseline noise levels satisfy the criteria for an 'Area of Low Background Noise'. Therefore criteria set out in Table 1.6 have been used to assess operational impacts of the Proposed Development.

Table 1.6: Noise Limit Criteria (Reproduced from NG4 Guidance Note for Noise)

Scenario	Daytime Noise Criterion dB $L_{Ar,T}$ (07:00 to 19:00)	Evening Noise Criterion dB $L_{Ar,T}$ (19:00 to 23:00)	Night-time Noise Criterion dB $L_{Aeq,T}$ (23:00 to 07:00)
Areas of low background noise	45dB	40dB	35dB

According to NG4, during daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive receptors. However, where tones and/or impulsive elements are likely to be present at sensitive receptors, a 5 dB penalty should be applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{Ar,T}$). During the night-time period no tonal or impulsive noise from the proposed development should be clearly audible or measurable at any noise sensitive receptor.

1.2.4.5 Operational Vibration

No source of vibration is anticipated during the operational phase of the Proposed Development and therefore has not been assessed any further.

1.2.4.6 Decommissioning

Table 1.7 shows the proposed plant expected to be used during the decommissioning phase.

Table 1.7: Proposed Items of Plant during Decommissioning

Construction Activity	Item of Plant (inc. BS5228-1 Ref.)	Sound Power Level (dB L_w)
Decommissioning	Tracked Excavator (C.1.16)	110
	Gas Cutter (C.1.18)	107
	Dozer (C.2.1)	103
	Lorry (C.2.34)	108

1.2.5 Impact Significance

1.2.5.1 Construction Noise

Table 1.8 presents the magnitude of impact scale for construction noise based on guidance from LA 111 which has been developed from assessment criteria set out in BS 5228-1. In accordance with LA 111, construction noise impacts shall constitute a significant impact where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- A period of 10 or more days or nights of working in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any six consecutive months.

Table 1.8: Construction Noise Magnitude Scale and Determination of Significance

Magnitude of Impact	Construction Noise Level	Duration	Determination of Significance
Major	Above or equal to BS 5228-1 Category A threshold +5dB	> 10 days/nights over 15 consecutive days/nights; or > 40 days over six consecutive months	Significant
Moderate	Above or equal to BS 5228-1 Category A threshold and below BS 5228-1 Category A +5dB		Significant
Minor/ Negligible	Below BS 5228-1 Category A threshold		Not Significant

1.2.5.2 Construction Vibration

Table 1.9 presents the magnitude of construction vibration impacts for human perception which have been reproduced from LA 111 and BS 5228-2. In accordance with LA 111, construction vibration impacts shall constitute a significant impact where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- A period of 10 or more days or nights of working in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any six consecutive months.

Table 1.9: Construction Vibration Magnitude Scale and Determination of Significance for Human Perception at Residential Receptors

Construction Vibration Level	Magnitude of Impact	Duration	Determination of Significance
Below 0.3mm/s PPV	Negligible	> 10 days/nights over 15 consecutive days/nights; or > 40 days over six consecutive months	Not Significant
Above or equal to 0.3mm/s PPV and below 1.0mm/s PPV	Minor		Not Significant
Above or equal to 1.0mm/s PPV and below 10mm/s PPV	Moderate		Significant
Above or equal to 10mm/s PPV	Major		Significant

1.2.5.3 Construction Traffic Noise

Table 1.10 presents the magnitude of impact and determination of significance based on guidance from LA 111. In accordance with LA 111, construction traffic noise impacts shall constitute a significant impact where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- A period of 10 or more days of working in any 15 consecutive days; or
- A total number of days exceeding 40 in any six consecutive months.

Table 1.10: Magnitude of Impact and Determination of Significance for Construction Traffic Noise

Magnitude of Impact	Change in BNL Resulting from Construction Traffic Noise (dB)	Duration	Determination of Significance
Major	Greater than or equal to 5.0	> 10 days/nights over 15 consecutive days/nights; or > 40 days over six consecutive months	Significant
Moderate	Greater than or equal to 3.0 and less than 5.0		Significant
Minor	Greater than or equal to 1.0 and less than 3.0		Not Significant
Negligible	Less than 1.0		Not Significant

1.2.5.4 Operational Noise

Significant permanent impacts are expected if operational noise levels exceed the thresholds stated in Table 1.6 for day, evening and night-time periods. The potential for tonal noise emissions.

1.3 Existing Environment

1.3.1 Introduction

This section presents the baseline noise survey undertaken to determine typical background noise levels at noise sensitive receptors close to the Proposed Development. This was done through a series of unattended and attended noise measurements in accordance with ISO 1996-2:2017 "*Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of sound pressure levels*". An unattended noise survey is where the noise monitoring equipment is installed securely in a weather proof case and is left for a period of approximately 24 hours. The surveyor then returns 24 hours later to collect the equipment. An attended survey is where the surveyor remains with the equipment for the duration of the survey. The attended surveys comprise of three 15-minute surveys over three consecutive hours.

1.3.2 Measurement Locations

The measurement locations were chosen to establish the noise environment at sensitive receptors close to the Proposed Development. Figure 1.1 shows the noise measurement locations. BN1, BN2, BN4, BN8, BN9, BN10 & BN12 were attended noise surveys and BN3, BN5, BN6, BN7 & BN11 were unattended surveys.

Location BN1

BN1 was positioned close to the centre of the site. BN1 was placed in a field alongside Park Hill to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

Location BN2

BN2 was placed in a field alongside Park Hill to establish daytime representative noise levels at receptors located nearby. The microphone was located adjacent to the site boundary and approximately 1.5m above ground level.

Location BN3

BN3 was positioned on the northern extent of the site to establish daytime and night-time representative noise levels. The microphone was set up approximately 1.5m above ground level. Measurements at this location were carried out for an approximate 24-hour period in order to capture typical noise levels during day, evening and night-time.

Location BN4

BN4 was positioned to the north-west of the site. BN4 was set up in a field within the site boundary to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

Location BN5

BN5 was positioned at the southern extent of the site. BN5 was set up in a field off Youghal Park to establish daytime and night-time representative noise levels at receptors located nearby. The microphone was located adjacent to the site boundary and approximately 1.5m above ground level. Measurements at this location were carried out for an approximate 24-hour period in order to capture typical noise levels during day, evening and night-time.

Location BN6

BN6 was positioned at the south eastern extent of the site. BN6 was set up in a field within the site boundary to establish daytime and night-time representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level. Measurements at this location were carried out for an approximate 24-hour period in order to capture typical noise levels during day, evening and night-time.

Location BN7

BN7 was positioned at the north eastern part of the site. BN7 was setup in a field within the site boundary off the R624 to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level. Measurements at this location were carried out for an approximate 24-hour period in order to capture typical noise levels during day, evening and night-time.

Location BN8

BN8 was positioned at the eastern extent of the site. BN8 was setup on a lane within the site boundary to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

Location BN9

BN9 was positioned at the south eastern part of the site. BN9 was setup in a field within the site boundary to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

Location BN10

BN10 was positioned towards the southern part of the site. BN10 was setup outside a residential property on Ballyneague Road within the site boundary to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

Location BN11

BN11 was positioned at the south western part of the site. BN11 was setup in a field within the site boundary to establish noise levels at receptors located nearby. The microphone was located adjacent to the site boundary and approximately 1.5m above ground level. Measurements at this location were carried out for an approximate 24-hour period in order to capture typical noise levels during day, evening and night-time.

Location BN12

BN12 was positioned on the south eastern extent of the site. BN12 was setup alongside the road to the east of the site boundary to establish daytime representative noise levels at receptors located nearby. The microphone was set up approximately 1.5m above ground level.

1.3.3 Survey Period

Noise measurements were conducted between 24th and 26th March 2025. The weather during the survey period was dry and temperatures were in the range of 5 to 14˚C. Wind speeds were in the range of 2 to 6 mph in the south-easterly direction. Weather conditions were therefore considered suitable for undertaking noise measurements.

1.3.4 Instrumentation

Noise measurements were undertaken using three Fusion Sound Meters (Serial numbers 15334, 15535, 15336), and one Rion Sound Level Meter and Environmental Monitoring Kit (Serial Number RION NC-75). Sample periods were 15-minute log periods. The instrumentation was calibrated using a Bruel & Kjaer Type 4231 Sound Level Calibrator. Calibration certificates are available on request.

1.3.5 Measurement Parameters

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

$L_{Aeq,T}$ is the equivalent continuous sound level and is used to describe a fluctuating sound as a single value over the sample period (T).

$L_{AFmax,T}$ The maximum A-weighted sound pressure level occurring within a specified time period (T). Measured using the "Fast" time weighting.

$L_{AF10,T}$ Refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period (T). It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic.

$L_{AF90,T}$ Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval (T). It is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level without contribution from intermittent sources. Measured using the "Fast" time weighting.

All noise levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

1.3.6 Measurement Results

1.3.6.1 BN1 (Attended)

Table 1.11 presents a summary of the measured noise levels at the baseline noise monitoring location BN1.

Table 1.11: Noise Measurement Results at Location BN1

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/03/25 16:44*	44.1	54.9	46.3	38.9
	25/03/25 17:57	42.0	61.8	42.7	34.2
	26/03/25 14:38	46.6	64.4	50.3	34.1

*3-minutes of strimmer noise removed from data analysis

During the survey period, the dominant noise sources were passing cars on the nearby road, birds and nearby voices.

1.3.6.2 BN2 (Attended)

Table 1.12 presents a summary of the measured noise levels at the baseline noise monitoring Location BN2.

Table 1.12: Noise Measurement Results at Location BN2

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/03/25 16:20	46.4	59.5	48.2	39.9
	25/03/25 17:35	44.1	63.6	45.7	38.1
	26/03/25 13:31	45.1	70.9	48.0	37.1

During the survey period, the dominant noise sources were passing cars on the nearby road and birds.

1.3.6.3 BN3 (Unattended)

Table 1.13 summarises the measured daytime (i.e. 07:00 to 23:00) noise levels at Location BN3.

Table 1.13: Daytime Noise Measurement Results at Location BN3

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime (24/03/25 – 25/03/25)	14:00-15:00	54	72	57	38
	15:00-16:00	50	76	49	31
	16:00-17:00	47	71	43	32
	17:00-18:00	47	71	45	32
	18:00-19:00	40	64	40	30
	19:00-20:00	45	67	42	29
	20:00-21:00	37	48	39	27
	21:00-22:00	37	45	39	26
	22:00-23:00	36	42	39	25
	07:00-08:00	52	72	49	34
	08:00-09:00	51	71	49	35
	09:00:10:00	46	66	46	36
	10:00-11:00	55	82	47	34
	11:00-12:00	54	75	51	31
	12:00-13:00	43	68	42	31
	13:00-14:00	51	71	46	30
	14:00-15:00	54	78	48	31

Daytime ambient noise levels were in the range 36 to 55 dB $L_{Aeq,1hr}$ with an average ambient noise level throughout the survey period of 50 dB $L_{Aeq,16hr}$. The background noise levels were in the range of 25 to 38 dB $L_{A90,1hr}$ with an average background noise level throughout the survey period of 31 dB $L_{A90,16hr}$.

Table 1.14 summarises the measured night-time (i.e. 23:00 to 07:00) noise levels at Location BN3.

Table 1.14: Night-time Noise Measurement Results at Location BN3

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Night (24/03/25 – 25/03/25)	23:00-00:00	36	44	38	25
	00:00-01:00	37	50	38	25
	01:00-02:00	35	41	38	24
	02:00-03:00	36	42	38	25
	03:00-04:00	36	40	38	25
	04:00-05:00	36	49	38	25
	05:00-06:00	56	75	52	31
	06:00-07:00	53	73	48	35

Night-time ambient sound levels were in the range 35 to 56 dB $L_{Aeq,1hr}$ with an average ambient sound level throughout the survey period of 49 dB $L_{Aeq,8hr}$. The background sound levels were in the range of 24 to 35 dB $L_{A90,1hr}$ with an average background sound level throughout the survey period of 27 dB $L_{A90,8hr}$.

Figure 1.2 presents the time-history graph of the measured noise levels over the duration of the survey.

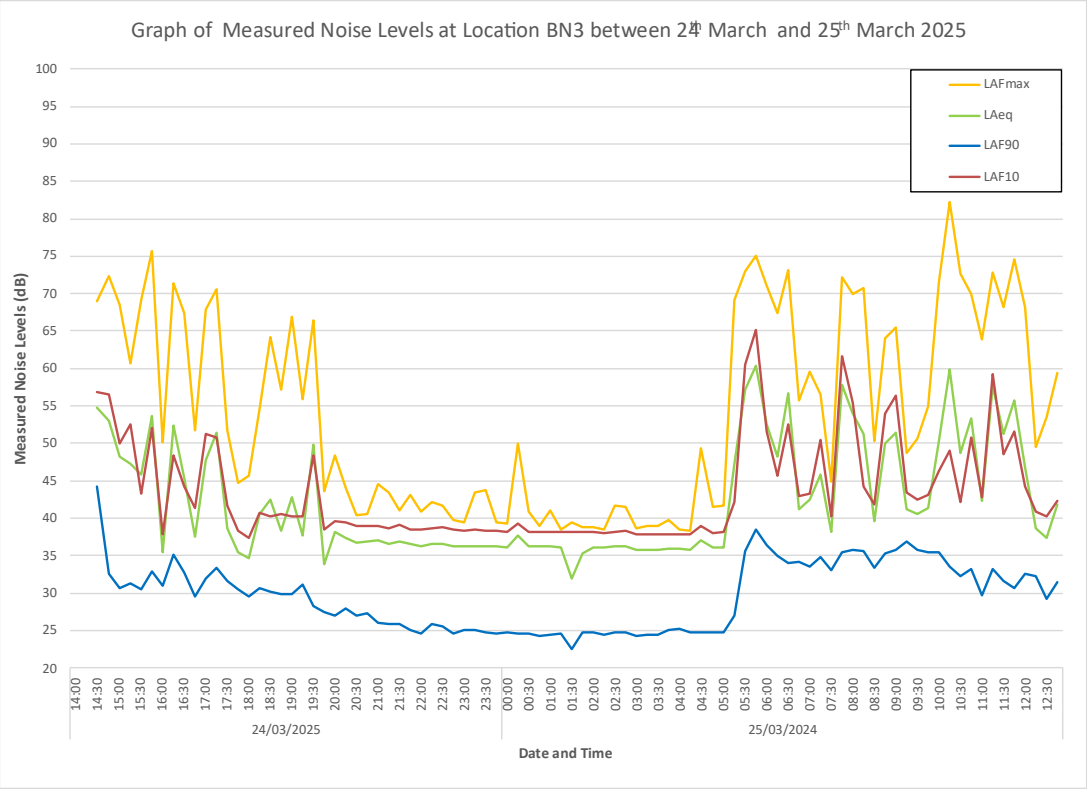

Figure 1.2: Graph of Measured Noise Levels at Location BN3

1.3.6.4 BN4 (Attended)

Table 1.15 presents a summary of the measured noise levels at the baseline noise monitoring Location BN4.

Table 1.15: Noise Measurement Results at Location BN4

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/04/25 17:08	51.6	71.6	51.2	32.2
	26/03/25 13:31	41.9	60.8	42.3	33.1
	26/03/25 14:01	39.2	60.5	42.0	31.5

During the survey period, the dominant noise sources were passing cars on the nearby road, dogs barking and birds.

1.3.6.5 BN5 (Unattended)

Table 1.16 summarises the measured daytime (i.e. 07:00 to 23:00) noise levels at Location BN5.

Table 1.16: Daytime Noise Measurement Results at Location BN5

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime (24/03/25 – 25/03/25)	16:00-17:00	50	75	49	35
	17:00-18:00	45	66	47	37
	18:00-19:00	47	66	50	39
	19:00-20:00	45	63	45	36
	20:00-21:00	34	49	34	32
	21:00-22:00	48	69	38	32
	22:00-23:00	50	68	40	32
	07:00-08:00	51	71	51	39
	08:00-09:00	48	67	51	37
	09:00:10:00	47	66	49	36
	10:00-11:00	48	68	50	36
	11:00-12:00	52	70	54	37
	12:00-13:00	47	69	48	35
	13:00-14:00	47	68	47	36
	14:00-15:00	49	66	49	36

Daytime ambient noise levels were in the range 34 to 52 dB $L_{Aeq,1hr}$ with an average ambient noise level throughout the survey period of 48 dB $L_{Aeq,16hr}$. The background noise levels were in the range of 32 to 39 dB $L_{A90,1hr}$ with an average background noise level throughout the survey period of 36 dB $L_{A90,16hr}$.

Table 1.17 summarises the measured night-time (i.e. 23:00 to 07:00) noise levels at Location BN5.

Table 1.17: Night-time Noise Measurement Results at Location BN5

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Night (24/03/25 – 25/03/25)	23:00-00:00	53	68	47	32
	00:00-01:00	34	49	34	32
	01:00-02:00	33	34	33	32
	02:00-03:00	32	34	32	31
	03:00-04:00	32	49	32	32
	04:00-05:00	33	43	33	32
	05:00-06:00	45	64	42	36
	06:00-07:00	49	68	51	40

Night-time ambient sound levels were in the range 32 to 53 dB $L_{Aeq,1hr}$ with an average ambient sound level throughout the survey period of 46 dB $L_{Aeq,8hr}$. The background sound levels were in the range of 31 to 40 dB $L_{A90,1hr}$ with an average background sound level throughout the survey period of 33 dB $L_{A90,8hr}$.

Figure 1.3 presents the time-history graph of the measured noise levels over the duration of the survey.

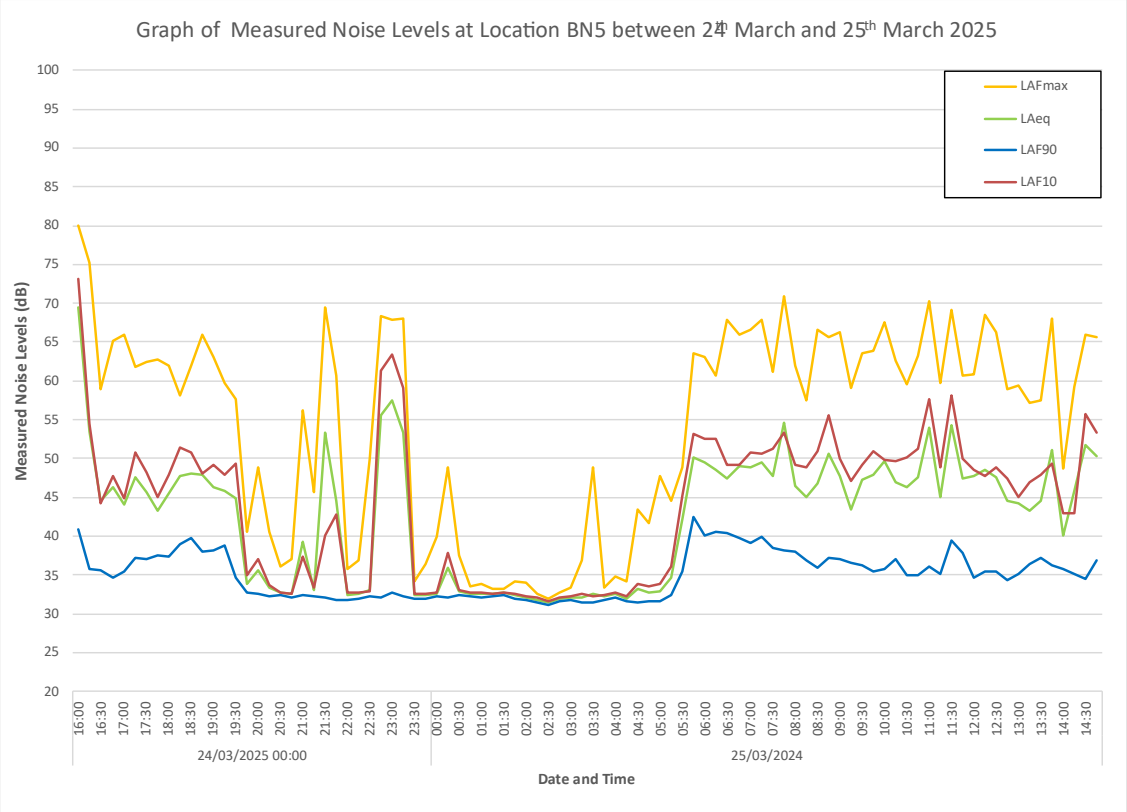

Figure 1.3: Graph of Measured Noise Levels at Location BN5

1.3.6.6 *BN6 (Unattended)*

Table 1.18 summarises the measured daytime (i.e. 07:00 to 23:00) noise levels at Location BN6.

Table 1.18: Daytime Noise Measurement Results at Location BN6

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime (24/03/25 – 25/03/25)	17:00-18:00	47	71	46	34
	18:00-19:00	55	72	51	37
	19:00-20:00	44	71	45	34
	20:00-21:00	53	62	38	29
	21:00-22:00	41	58	37	29
	22:00-23:00	39	71	38	30
	07:00-08:00	53	81	58	38
	08:00-09:00	54	82	52	37
	09:00:10:00	56	90	47	35
	10:00-11:00	52	75	52	37
	11:00-12:00	46	71	45	31
	12:00-13:00	45	70	43	29
	13:00-14:00	58	65	45	32
	14:00-15:00	57	85	46	33
	15:00-16:00	45	72	46	33

Daytime ambient noise levels were in the range 39 to 58 dB $L_{Aeq,1hr}$ with an average ambient noise level throughout the survey period of 53 dB $L_{Aeq,16hr}$. The background noise levels were in the range of 29 to 38 dB $L_{A90,1hr}$ with an average background noise level throughout the survey period of 33 dB $L_{A90,16hr}$.

Table 1.19 summarises the measured night-time (i.e. 23:00 to 07:00) noise levels at Location BN6.

Table 1.19: Night-time Noise Measurement Results at Location BN6

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Night (24/03/25 – 25/03/25)	23:00-00:00	37	70	34	26
	00:00-01:00	31	44	30	26
	01:00-02:00	27	33	28	26
	02:00-03:00	29	40	29	27
	03:00-04:00	29	45	31	26
	04:00-05:00	30	49	32	27
	05:00-06:00	52	75	43	33
	06:00-07:00	54	83	58	39

Night-time ambient sound levels were in the range 27 to 54 dB $L_{Aeq,1hr}$ with an average ambient sound level throughout the survey period of 47 dB $L_{Aeq,8hr}$. The background

sound levels were in the range of 26 to 39 dB $L_{A90,1hr}$ with an average background sound level throughout the survey period of 29 dB $L_{A90,8hr}$.

Figure 1.4 presents the time-history graph of the measured noise levels over the duration of the survey.

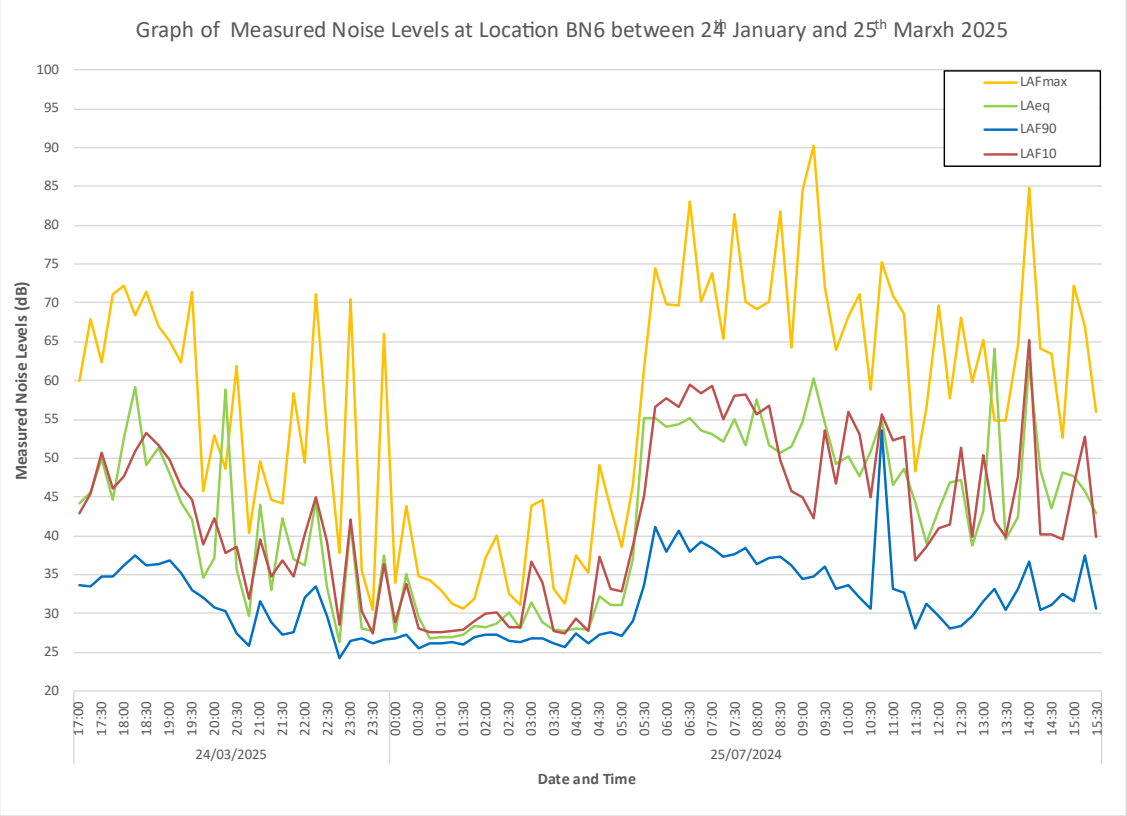

Figure 1.4: Graph of Measured Noise Levels at Location BN6

1.3.6.7 BN7 (Unattended)

Table 1.20 summarises the measured daytime (i.e. 07:00 to 23:00) noise levels at Location BN7.

Table 1.20: Daytime Noise Measurement Results at Location BN7

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime (24/03/25 – 25/03/25)	14:00-15:00	54	72	57	33
	15:00-16:00	55	72	60	37
	16:00-17:00	55	70	60	37
	17:00-18:00	55	73	60	38
	18:00-19:00	54	70	59	36
	19:00-20:00	54	76	58	31
	20:00-21:00	49	65	49	25
	21:00-22:00	47	67	45	22
	22:00-23:00	44	66	35	20

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
	07:00-08:00	50	66	51	28
	08:00-09:00	52	69	58	30
	09:00:10:00	51	68	55	28
	10:00-11:00	51	68	54	28
	11:00-12:00	50	69	52	28
	12:00-13:00	50	67	54	29
	13:00-14:00	52	70	56	31
	14:00-15:00	52	73	56	32

Daytime ambient noise levels were in the range 44 to 55 dB $L_{Aeq,1hr}$ with an average ambient noise level throughout the survey period of 52 dB $L_{Aeq,16hr}$. The background noise levels were in the range of 20 to 38 dB $L_{A90,1hr}$ with an average background noise level throughout the survey period of 30 dB $L_{A90,16hr}$.

Table 1.21 summarises the measured night-time (i.e. 23:00 to 07:00) noise levels at Location BN7.

Table 1.21: Night-time Noise Measurement Results at Location BN7

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Night (25/03/25 – 26/03/25)	23:00-00:00	38	64	28	19
	00:00-01:00	38	65	22	19
	01:00-02:00	35	66	21	19
	02:00-03:00	-	-	-	-
	03:00-04:00	36	63	23	20
	04:00-05:00	38	66	28	22
	05:00-06:00	41	63	36	26
	06:00-07:00	48	67	47	28

Night-time ambient sound levels were in the range 35 to 48 dB $L_{Aeq,1hr}$ with an average ambient sound level throughout the survey period of 41 dB $L_{Aeq,8hr}$. The background sound levels were in the range of 19 to 28 dB $L_{A90,1hr}$ with an average background sound level throughout the survey period of 22 dB $L_{A90,8hr}$. A period of heavy rainfall occurred between 02:00 and 03:00 therefore this data was removed from the analysis.

Figure 1.5 presents the time-history graph of the measured noise levels over the duration of the survey.

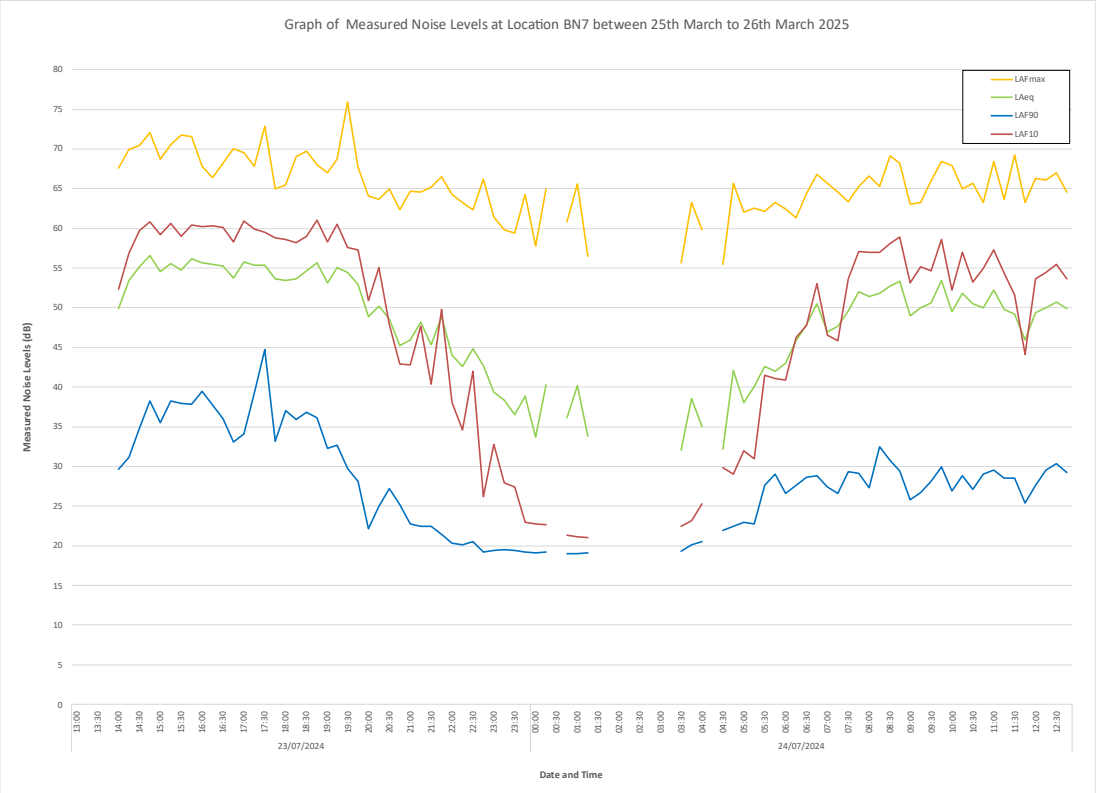

Figure 1.5: Graph of Measured Noise Levels at Location BN7

1.3.6.8 BN8 (Attended)

Table 1.22 presents a summary of the measured noise levels at the baseline noise monitoring Location BN8.

Table 1.22: Noise Measurement Results at Location BN8

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/03/25 17:26	44.4	60.8	48.3	33.4
	25/03/25 18:34	44.8	62.7	46.4	32.8
	26/04/25 10:50	45.1	67.6	47.8	29.3

During the survey period, the dominant noise sources were passing cars on the local road, animals, and birds.

1.3.6.9 BN9 (Attended)

Table 1.23 presents a summary of the measured noise levels at the baseline noise monitoring Location BN9.

Table 1.23: Noise Measurement Results at Location BN9

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/03/25 16:59	46.6	61.0	50.2	37.8

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
	25/03/25 18:12	40.7	58.0	44.4	30.5
	26/03/25 12:28	43.9	65.8	42.6	28.7

During the survey period, the dominant noise sources were passing cars on the nearby road, farm animals, dogs barking and birds.

1.3.6.10 BN10 (Attended)

Table 1.24 presents a summary of the measured noise levels at the baseline noise monitoring Location BN10.

Table 1.24: Noise Measurement Results at Location BN10

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	25/03/25 16:35	47.1	67.4	50.5	36.1
	25/03/25 17:51	43.4	66.1	43.1	32.1
	26/03/25 11:36	42.6	64.0	43.4	39.0

During the survey period, the dominant noise sources were passing cars on the nearby road, dogs barking and birds.

1.3.6.11 BN11 (Unattended)

Table 1.25 summarises the measured daytime (i.e. 07:00 to 23:00) noise levels at Location BN11.

Table 1.25: Daytime Noise Measurement Results at Location BN11

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime (25/03/25 – 26/03/25)	14:00-15:00	41	58	42	37
	15:00-16:00	46	59	49	38
	16:00-17:00	44	62	46	37
	17:00-18:00	48	67	50	38
	18:00-19:00	42	56	44	38
	19:00-20:00	40	58	41	37
	20:00-21:00	39	53	39	37
	21:00-22:00	38	53	38	37
	22:00-23:00	38	51	38	37
	07:00-08:00	43	59	46	39
	08:00-09:00	46	73	47	39
	09:00:10:00	43	56	45	40
	10:00-11:00	42	59	43	39
	11:00-12:00	44	67	45	39
	12:00-13:00	47	73	46	39

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
	13:00-14:00	43	59	45	39
	14:00-15:00	45	66	46	39

Daytime ambient noise levels were in the range 38 to 48 dB $L_{Aeq,1hr}$ with an average ambient noise level throughout the survey period of 44 dB $L_{Aeq,16hr}$. The background noise levels were in the range of 37 to 40 dB $L_{A90,1hr}$ with an average background noise level throughout the survey period of 38 dB $L_{A90,16hr}$.

Table 1.26 summarises the measured night-time (i.e. 23:00 to 07:00) noise levels at Location BN11.

Table 1.26: Night-time Noise Measurement Results at Location BN11

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Night (25/03/25 – 26/03/25)	23:00-00:00	38	51	38	37
	00:00-01:00	38	42	38	37
	01:00-02:00	38	40	38	37
	02:00-03:00	38	45	38	38
	03:00-04:00	38	50	38	38
	04:00-05:00	42	60	43	39
	05:00-06:00	43	60	44	39
	06:00-07:00	43	59	46	39

Night-time ambient sound levels were in the range 38 to 43 dB $L_{Aeq,1hr}$ with an average ambient sound level throughout the survey period of 40 dB $L_{Aeq,8hr}$. The background sound levels were in the range of 37 to 39 dB $L_{A90,1hr}$ with an average background sound level throughout the survey period of 38 dB $L_{A90,8hr}$.

Figure 1.6 presents the time-history graph of the measured noise levels over the duration of the survey.

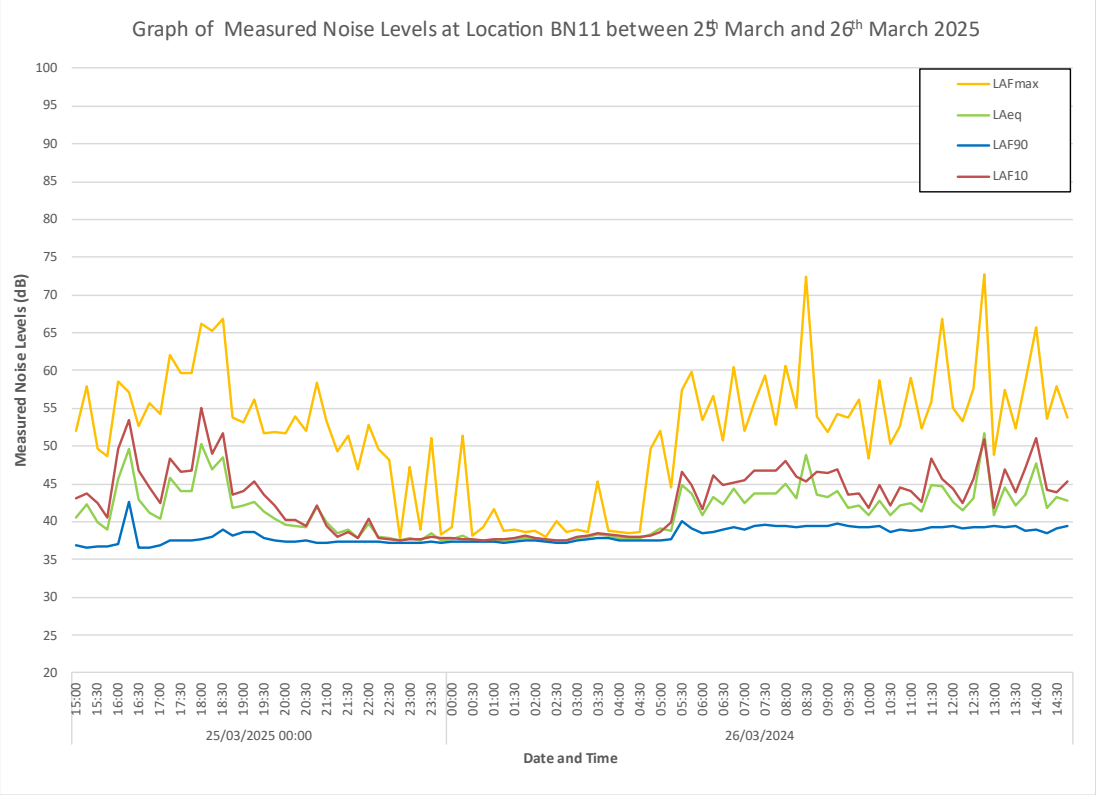

Figure 1.6: Graph of Measured Noise Levels at Location BN11

1.3.6.12 BN12 (Attended)

Table 1.27 presents a summary of the measured noise levels at the baseline noise monitoring Location BN12.

Table 1.27: Noise Measurement Results at Location BN12

Period	Date & Time	Measured Noise Levels (dB re 2 x 10^{-5} Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Daytime	26/03/25 10:20	39.7	60.3	43.7	26.4
	26/03/25 11:12	60.8	85.8	49.0	26.3
	26/03/25 12:05	42.2	66.2	46.1	29.8

During the survey period, the dominant noise sources were passing cars on the nearby road traffic, farm noise, dogs barking and birds.

1.4 Potential Effects and Impacts

1.4.1 Do Nothing

If the project is not built the existing noise environment as stated in Section 1.3 will remain unchanged.

1.4.2 Construction Impacts

1.4.2.1 Noise

This section presents the predicted noise levels expected during the construction phase of the project, including:

- Noise from delivery vehicles during construction;
- Noise arising from the construction of the solar farm;
- Noise from the trenching works; and
- Noise from the construction of the substation and BESS.

Figure 1.7 shows the location of the noise sensitive receptors where predictions have been undertaken, the scheme RLB, proposed cable routes, substation and BESS, access tracks, solar arrays and transformers.

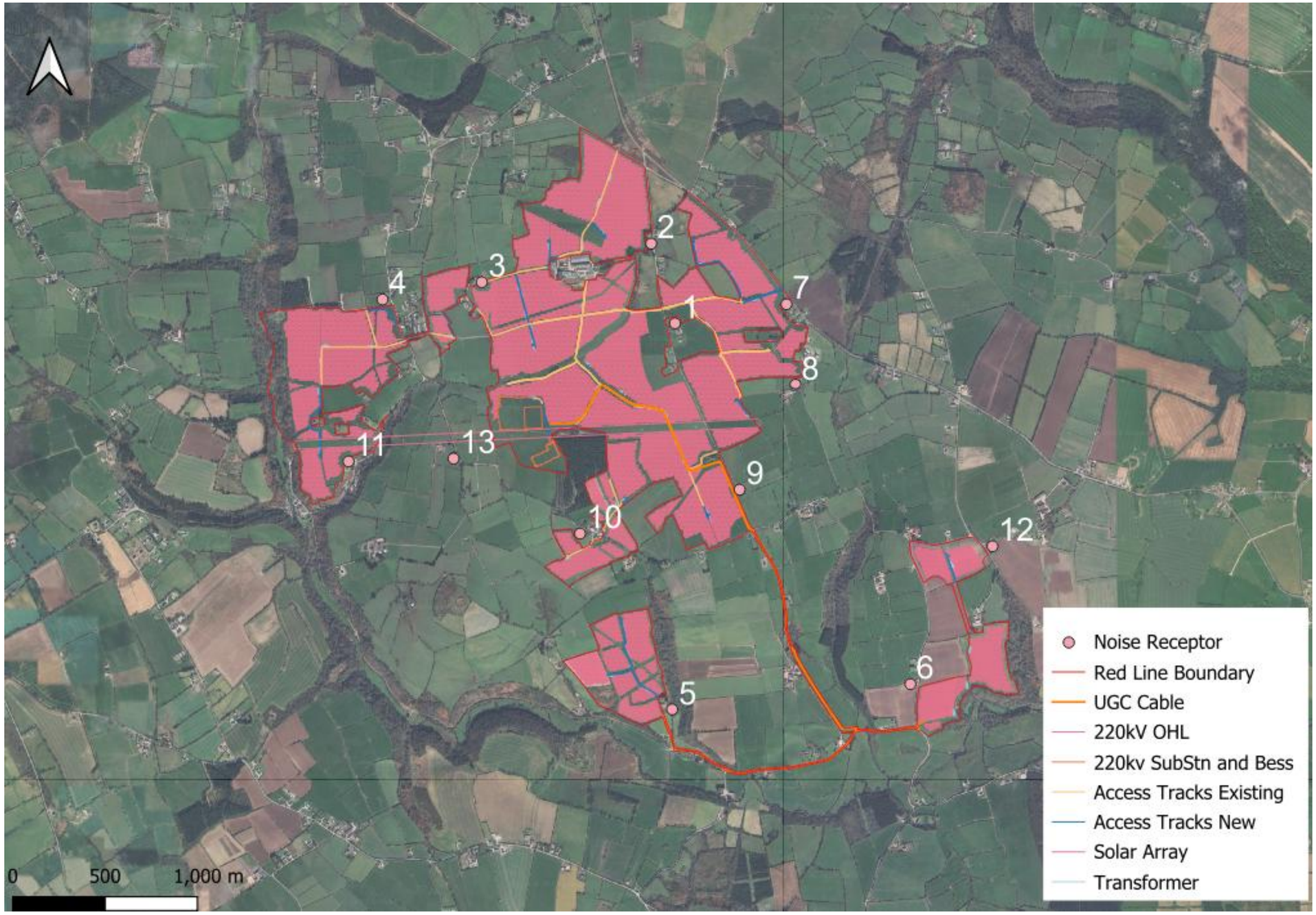

Figure 1.7: Proposed Development including Location of Representative Noise Sensitive Receptors

Table 1.28 presents the predicted noise levels at the closest receptors for each construction phase activity. Predicted construction noise levels exceeding the BS 5228-1 Category A threshold level of 65 dB L_{Aeq} indicate a potential significant impact, depending on the duration of the impact.

Table 1.28: Predicted Noise Levels During Construction Phase

Receptor ID	Predicted Noise Level for Construction Activity			
	Deliveries (dB $L_{Aeq,T}$)	General Construction (dB $L_{Aeq,T}$)	Trenching (dB $L_{Aeq,T}$)	Substation and BESS Construction (dB $L_{Aeq,T}$)
1	54	59	42	34
2	45	65	37	31
3	**70**	**66**	36	37
4	60	64	33	34
5	54	64	64	28
6	41	63	50	24
7	57	64	36	28
8	45	**66**	40	29
9	45	**66**	**69**	32
10	56	**66**	40	41
11	49	**66**	33	34
12	44	60	34	23
13	36	48	41	45

As Table 1.28 shows during deliveries to the site, calculated noise levels exceed the threshold level of 65 dB $L_{Aeq,T}$ at one receptor. The duration of the delivery phase is expected to be around 10 months. Therefore, according to the significance criteria set out in Section 15.2.5, potential significant effects (without mitigation) are likely during deliveries to the site. During general construction, noise levels are predicted to exceed the noise threshold level of 65 dB $L_{Aeq,T}$ at five receptors close to the site. The duration of the general construction phase is expected to be around 13 months. Therefore, according to the significance criteria set out in Section 15.2.5, potential significant effects (without mitigation) are likely during general construction works. During trenching works

the predicted construction noise level exceeds the threshold level at one receptor. Given the trenching works are expected to last 8 months, this indicates a potential significant effect, pre-mitigation. Predicted construction noise levels for the substation and BESS works are below the threshold levels, therefore no adverse impacts are anticipated during these works.

1.4.2.2 Vibration

Vibration impacts during piling works for construction of the solar farm have been predicted at the closest receptors. In accordance with the guidance in BS 5228-2, vibration levels have the potential to cause annoyance where PPV levels are around 1.0mm/s. The vibration predictions are presented in Table 1.29. The location of the noise sensitive receptors are shown in Figure 1.7.

Table 1.29: Predicted Vibration Levels During Construction Phase

Receptor ID	Predicted Vibration Level for Piling Works (PPV mm/s)
1	0.6
2	1.3
3	1.4
4	1.0
5	1.0
6	1.0
7	1.1
8	1.4
9	1.3
10	1.4
11	1.4
12	0.7
13	0.1

As Table 1.29 shows, predicted vibration levels are expected to exceed the threshold for significance (1.0mm/s) at several receptors. The construction period is anticipated to last around 12 months. Therefore, potential significant impacts in terms of human perception of vibration are anticipated.

In terms of building damage, predicted vibration levels are much lower than levels required to result in building damage. Therefore, no building damage is anticipated during the vibration works.

1.4.2.3 Construction Traffic

The traffic data, BNLs and the expected construction traffic noise change are presented in Table 1.30.

Table 1.30: Construction Traffic Data

	Construction Phase 2037: Base			Construction Phase 2037: Base + Construction Traffic			Construction Traffic Noise Change (dB)
Road	AADT	% HGV	BNL (dB)	AADT	% HGV	BNL (dB)	
R634	2650	6	66	3210	13	68	2
L7828	530	5	59	1080	28	65	6

As Table 1.30 shows the predicted construction traffic noise change for the R634 is 2dB which represents a minor magnitude of impact which is considered not significant. For the L7828, the predicted construction traffic noise change is 6dB which represents a major magnitude of impact. The duration of the construction works is around 12 months, which is therefore considered a significant effect.

1.4.3 Operational Impacts

1.4.3.1 Noise Model

In order to predict noise levels from the Proposed Development, a noise model of the site has been developed using iNoise modelling software. iNoise is a proprietary noise prediction software for calculating noise levels from various noise sources at receiver locations. Calculations have been undertaken using ISO9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*. This method takes into account a range of factors affecting the sound propagation, primarily:

- The overall sound power level of the noise source(s);
- The frequency content of the noise source(s);
- The ground cover between the source(s) and the receiver(s);
- The distance between the noise source(s) and the receiver(s);

1.4.3.2 Input Data and Assumptions

Transformers located throughout the Solar Farm area, at the substation and at the BESS building are the main potential sources of operational noise. Transformers typically generate a low frequency humming noise, associated with magnetic and electrical forces

within the core of the transformer. These forces generate vibrations within the transformer which generates noise.

Noise levels associated with the operational phase of the development are shown in Table 1.31.

Table 1.31 Expected Noise Levels during the Operational Phase

Noise Source	Sound Power Level	Source[1]
Substation	93 dB L_{WA}	Manufacturer's Data
Solar Farm Transformers	93 dB L_{WA}	Manufacturer's Data
BESS	93 dB L_{WA}	Manufacturer's Data

Octave band data is not available for the plant items. Therefore, an objective assessment of tonality cannot be undertaken at pre-planning stage. Potential special sound characteristics of transformer noise such as low frequency noise and tonality are rare and are not factors that can be foreseen at planning stage, but their presence can be measured and rated, typically in the event of a complaint, post construction. It is therefore standard practice for special sound characteristics to be investigated, only in the event of complaint, and, where the investigation verifies their presence, mitigation measures put in place to address any identified significant negative noise characteristics. In addition, any monitoring required by the Planning Authority in relation to noise measurement will be complied with.

Solar Farm

There will be transformers installed throughout the Solar Farm. Solar Farm transformers have the potential to generate noise when operational. As solar panels produce power only when the sun is shining, transformers will be silent for the hours of darkness at night.

Substation

As part of the Proposed Development, the substation will be operational on a day to day basis. The noise emission level associated with a typical substation that would support a development of this nature is the order of 93 dB $L_{WA.}$

BESS

The BESS is expected to contain inverter units and transformers in modular enclosures.

1.4.3.3 Noise Model Results

The predicted noise levels associated with the operation of the project at the closest noise sensitive receptors are presented in Table 1.32. The location of the noise sensitive receptors are shown in Figure 1.7.

[1] Operational noise level obtained from White Paper BU-LS-001: Sunny Central UP Sound Power Measurements on Sunny Central UP (-US) central inverters

Table 1.32: Operational Noise Predictions at Closest Receptors

Receptor ID	Predicted Noise Level Operational Phase dB $L_{Ar,T}$	Noise Criteria dB $L_{Ar,T}$	Complies?
1	Day: 41 Evening: 40 Night: 30	Day: 45 Evening: 40 Night: 35	Day: ✓ Evening: ✓ Night: ✓
2	Day: 40 Evening: 38 Night: 29		Day: ✓ Evening: ✓ Night: ✓
3	Day: 40 Evening: 38 Night: 29		Day: ✓ Evening: ✓ Night: ✓
4	Day: 36 Evening: 35 Night: 25		Day: ✓ Evening: ✓ Night: ✓
5	Day: 37 Evening: 36 Night: 26		Day: ✓ Evening: ✓ Night: ✓
6	Day: 34 Evening: 33 Night: 23		Day: ✓ Evening: ✓ Night: ✓
7	Day: 39 Evening: 37 Night: 28		Day: ✓ Evening: ✓ Night: ✓
8	Day: 37 Evening: 36 Night: 26		Day: ✓ Evening: ✓ Night: ✓
9	Day: 40 Evening: 38 Night: 29		Day: ✓ Evening: ✓ Night: ✓
10	Day: 40 Evening: 39 Night: 29		Day: ✓ Evening: ✓ Night: ✓
11	Day: 37 Evening: 36 Night: 29		Day: ✓ Evening: ✓ Night: ✓
12	Day: 33 Evening: 32 Night: 22		Day: ✓ Evening: ✓ Night: ✓
13	Day: 35 Evening: 34 Night: 26		Day: ✓ Evening: ✓ Night: ✓

The predicted noise levels associated with the operation of the solar farm are within the noise limit criteria during the day, evening and night periods. Therefore, operational noise impacts are not anticipated in relation to the Proposed Development.

Figure 1.8 shows the noise contour map for predicted operational noise levels associated with the Proposed Development during the daytime period (07:00 to 19:00). All closest sensitive receptors are within the daytime noise criteria of 45 dB $L_{Ar,T}$.

Figure 1.9 shows the noise contour map for predicted operational noise levels during the evening (19:00 to 23:00). All closest sensitive receptors are within the evening noise criteria of 40 dB $L_{Ar,T}$.

Figure 1.10 shows the noise contour map for predicted operational noise levels during the night-time (23:00 to 07:00). All closest sensitive receptors are within the night-time noise criteria of 35 dB $L_{Aeq,T}$.

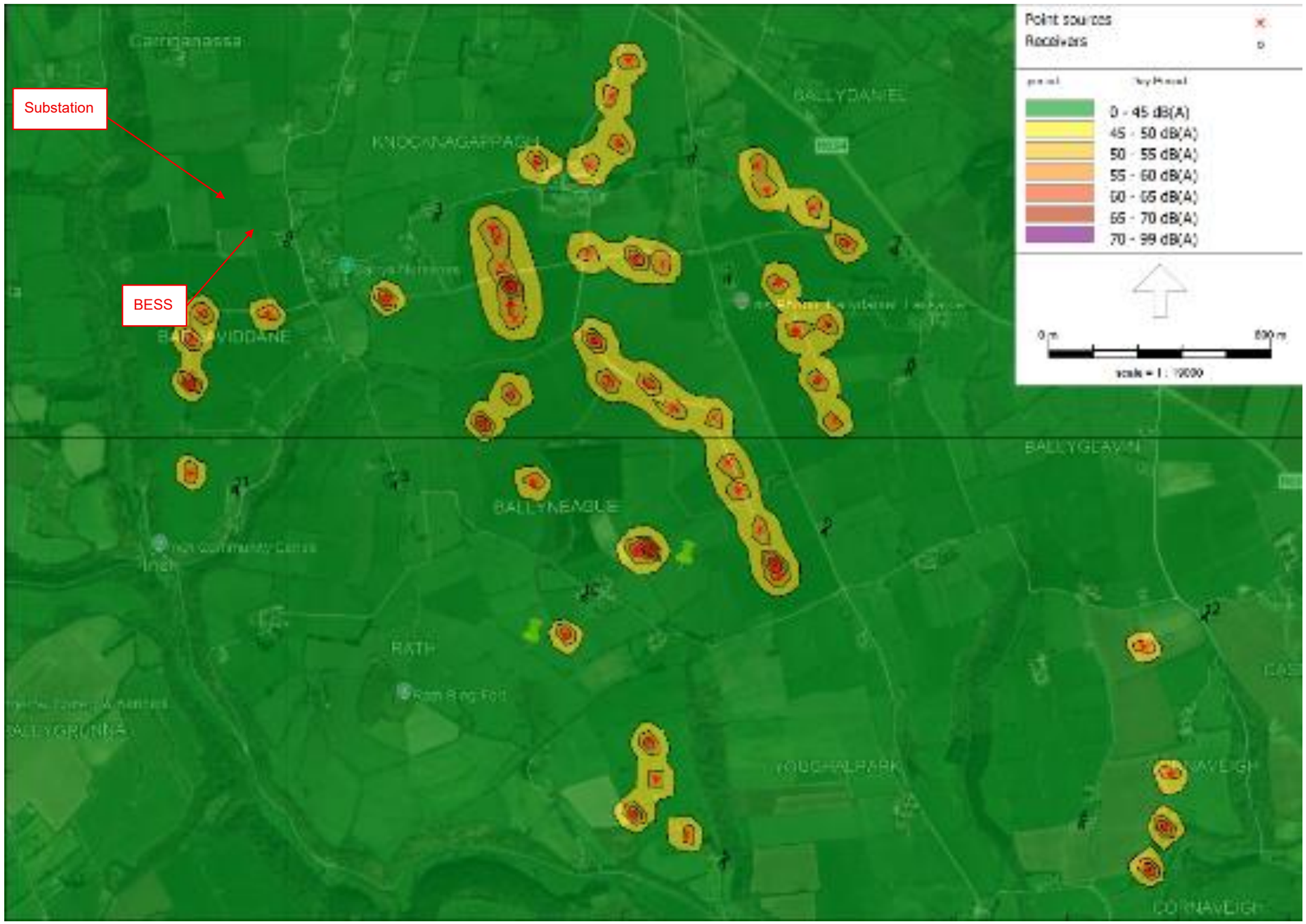

Figure 1.8: Operational Noise Contour Map – Daytime (45 dB)

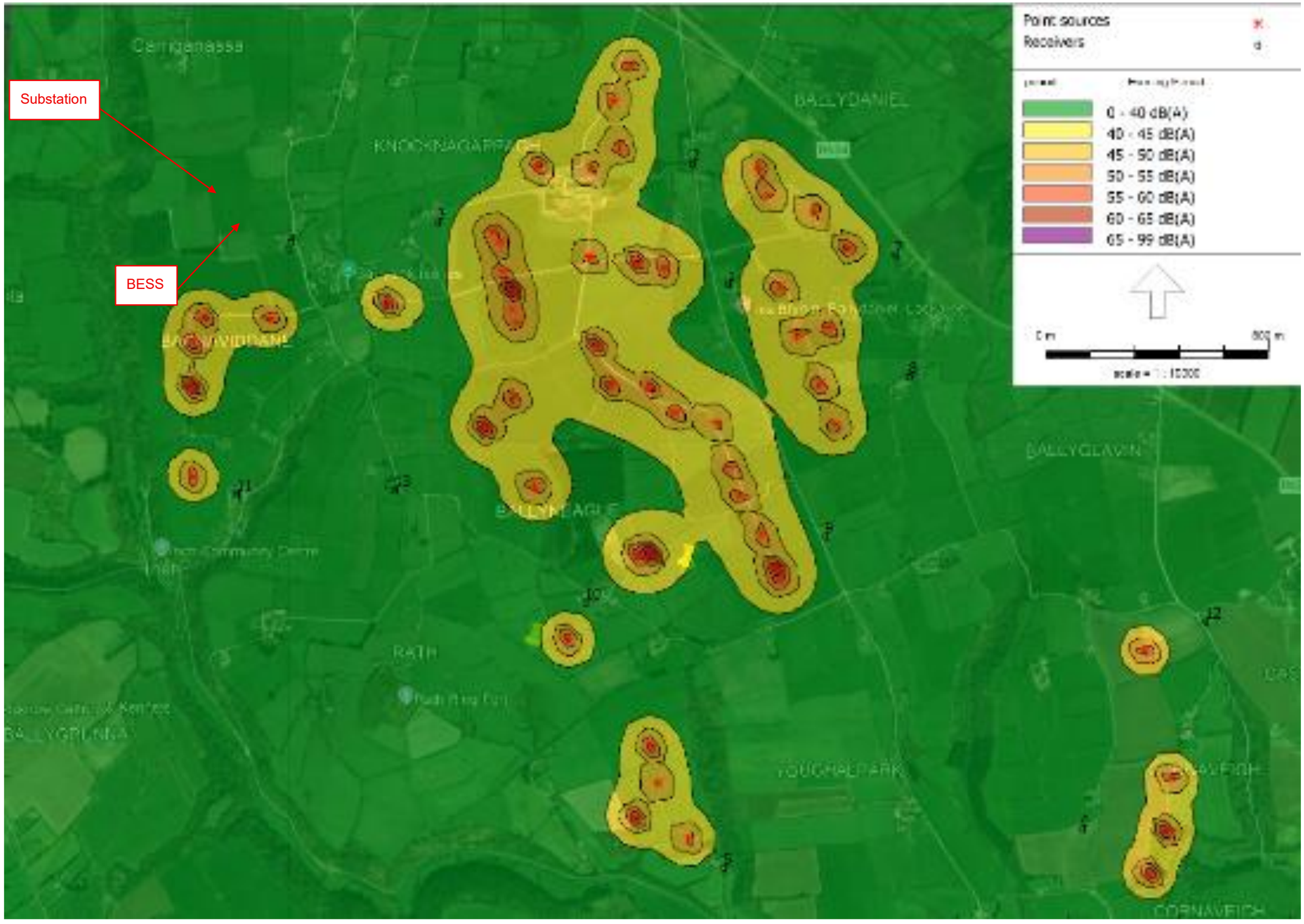

Figure 1.9: Operational Noise Contour Map – Evening (40 dB)

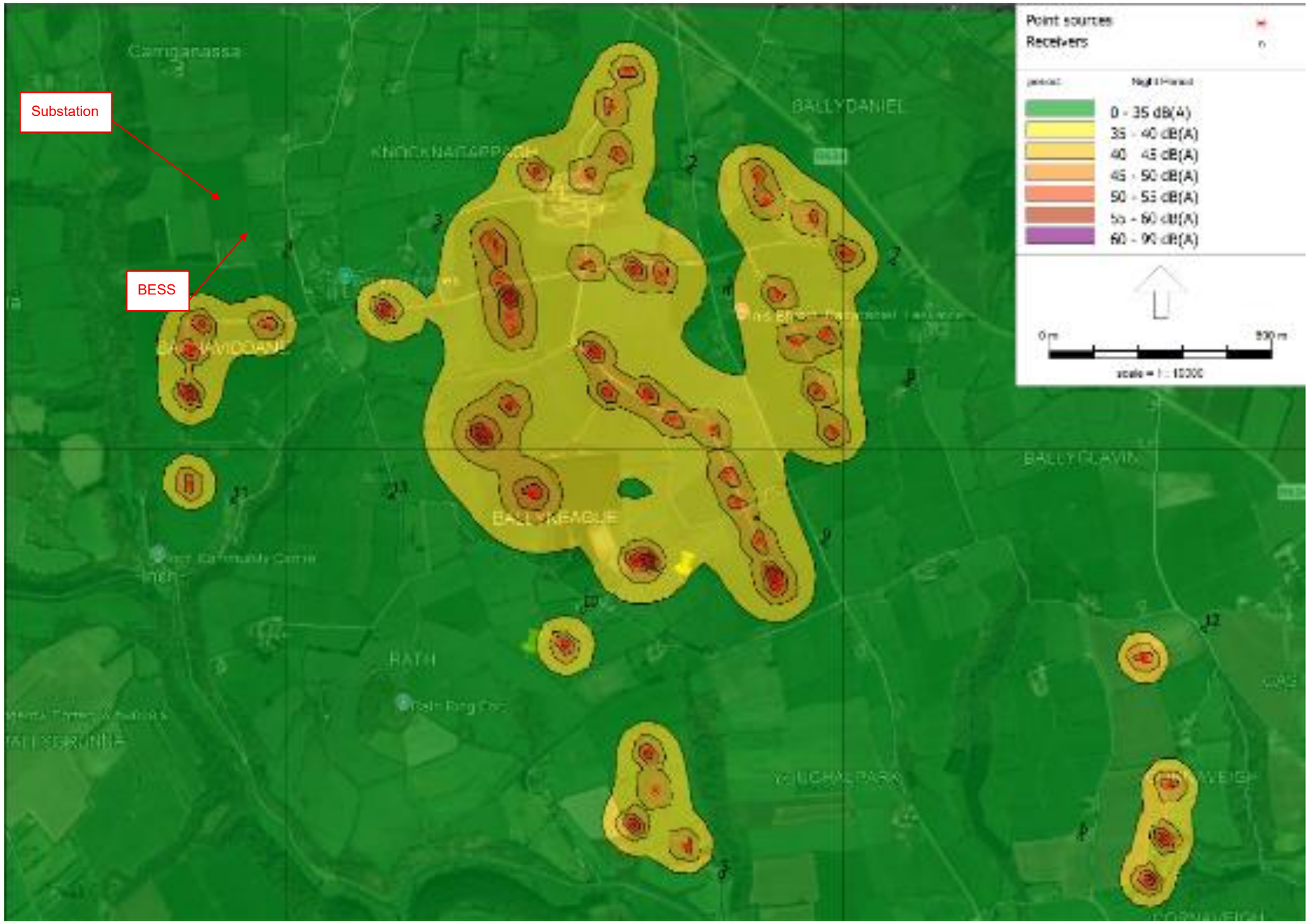

Figure 1.10: Operational Noise Contour Map – Night-time (35dB)

During the operational phase of the project there is likely to be a general change in the soundscape of the development site. This is due to the likely reduction in farming and agricultural sounds from the Proposed Development lands where the solar panels and associated infrastructure will be installed.

1.4.4 Decommissioning Impacts

Decommissioning works are anticipated to take around 20 weeks to complete. Predicted noise levels associated with the decommissioning phase are shown in Table 1.33.

Table 1.33: Decommissioning Noise Predictions at Closest Receptors

Receptor ID	Predicted Noise Level during Decommissioning Works dB $L_{Aeq,T}$
1	59
2	65
3	**66**
4	63
5	63
6	62
7	63
8	**66**
9	65
10	**66**
11	**66**
12	60
13	47

As Table 1.33 shows, noise levels during decommissioning are predicted to exceed threshold levels and the 20-week duration of the decommissioning phase is considered to be sufficient to result in significant adverse noise effects without mitigation.

No vibration impacts are anticipated during the decommissioning phase.

1.4.5 Potential Cumulative Impacts

Table 1.34 presents the cumulative noise impacts relating to the Proposed Development.

Table 1.34: Potential Cumulative Noise Impacts

Planning Ref No.	Description	Distance to RLB	Status	Cumulative Impact
CCC 175245	Construction of an up to 5MW solar PV farm, with an export capacity of 4MW, comprising approximately 14,000 no. photovoltaic panels on ground mounted galvanized steel frames within a site of 5.44ha and all associated development including; 4 no. transformer stations, 4 no. auxiliary transformer stations, 4 no inverters, 1 no. client side substation, 1 no. single storey storage building, 1 no. single storey communications building, 1 no. single storey DNO substation building, 3 no. CCTV security cameras mounted on 4m high poles, upgraded vehicular access from the public road, site access gate, perimeter security fencing (2m high).	4.32km Southeast	Permitted	This development is over 4km from the Proposed Development therefore cumulative noise and/or vibration impacts are not expected.
CCC 204407 (EXT. TO CCC 175245)	A 10 year planning permission for a 2.57ha extension to the solar PV farm permitted under Cork County Council planning permission reference number 17/05245 and will involve the incorporation of a 2.2 ha portion of the field to the north east of the permitted site on which approximately 5,016 additional photovoltaic panels on ground mounted galvanised steel frames will be installed. Associated works proposed include; 1 no CCTV security camera mounted on 4m high pole, internal access roads and perimeter security fencing	3.75km Southeast	Permitted	This development is 3.75km from the Proposed Development therefore cumulative noise and/or vibration impacts are not expected.

Planning Ref No.	Description	Distance to RLB	Status	Cumulative Impact
	(2m high). In addition, an alternative grid connection to the previously permitted on-site grid connection is proposed involving a connection to the existing Foxhall ESB substation and associated works via the R634 and private lands. A Natura Impact Statement will be submitted to the planning authority with the application.			
CCC 175498	Development at this site of circa 27.53 hectares will consist of : the construction of a Solar PV Energy Development comprising installation of circa 84,200sq.m of panels on ground mounted frames/support structures within existing field boundaries, underground cabling and ducting; provision of inverter and transformer stations (combined and separate formats); 1 No. MV substation; 1 No. storage container to house battery storage; 1 No. communications mast; site perimeter stock-proof security fencing; pole mounted CCTV security cameras; internal access tracks; landscaping; and all associated site development works. A temporary construction compound will also be provided.	13.13km Southwest	Permitted	This development is 13km from the Proposed Development therefore cumulative noise and/or vibration impacts are not expected.
WCC 1460010 9	To erect 12 no. wind turbines, overall height of up to 126.6 metres, 1 no. meteorological mast up to 80 metres in height	14.27km Northeast	Permitted	This development is over 14km from the Proposed Development

Planning Ref No.	Description	Distance to RLB	Status	Cumulative Impact
ACP PL 93.244006	with wind measuring equipment attached, access roads, electrical substation compound, equipment and control building and ancillary site works			therefore cumulative noise and/or vibration impacts are not expected.
WCC 041788	For Woodhouse wind energy project. The project will comprise eight wind turbines, access tracks, a fenced Switchyard comprising single-storey Control Building and Substation and anemometer mast. Wind turbines will comprise towers up to 70 metres high, with a diameter of about 4metres at the base. Three blades of up to 42 metres length will be attached. The anemometer mast will be up to 60 metres high. An Environmental Impact Statement accompanies this application		Operational	This development is over 12km from the Proposed Development therefore cumulative noise and/or vibration impacts are not expected.
ACP 309121	Windfarm development and all associated infrastructure.	1.36km North	Permitted	This development is 1.36km from the Proposed Development therefore there is potential for cumulative construction noise and/or vibration impacts depending on the construction programme. Cumulative operational noise impacts are not anticipated.

1.4.6 Summary of Potential Impacts without Mitigation

Construction noise and vibration impacts have the potential to be significant at the closest receptors without mitigation. This is because predicted noise and vibration levels are expected to exceed threshold levels and the duration of the works exceeds the significance threshold.

Operational noise impacts are not expected to be significant at receptors close to the Proposed Development.

Decommissioning noise impacts are expected to be significant at the closest receptors as predicted noise levels exceed threshold levels, and the duration of the decommissioning phase exceeds the significance criteria.

1.5 Mitigation Measures

1.5.1 Construction

This assessment has shown that there is the potential for significant construction noise and vibration impacts at the nearest sensitive receptors during general construction and trenching works. Construction traffic also has the potential to result in significant effects.

Construction activities will comply with BS 5228-1 and BS 5228-2 and the following measures will be implemented during construction:

- Best Practicable Means (BPM) as defined in BS 5228-1 will be employed at all times to reduce noise and vibration levels to a minimum;
- The appointed contractor will comply with local authority controls on noise and vibration during construction;
- The use of a high quality construction site hoarding will be included around all noise sensitive boundaries. Where the hoarding blocks line of sight between the works and the receptor a reduction in noise levels of around 10 dB can be achieved;
- A Community Liaison Plan will be developed by the developer in consultation with local residents and a single point of contact nominated to engage with CCC and the residents and to handle complaints and communication of site information if requested by CCC;
- Contact details for the site manager and liaison officer will be displayed on the site hoarding;
- All staff will be briefed on the complaints procedure and the mitigation requirement and their responsibilities to register and escalate complaints;
- Regular updates at appropriate intervals to all identified affected neighbours via a newsletter and the posting of relevant information on the site hoarding;
- Only plant conforming with or better than relevant national or international standards (including BS 5228-1 and BS 5228-2), directives or recommendations on noise or vibration emissions will be selected and used. Construction plant

will be maintained in good condition with regards to minimising noise and vibration emissions;

- Plant will be operated and maintained appropriately, with due regard for manufacturer recommendations. All vehicles, plant and equipment will be switched off when not in use;
- Routes and programming for the transport of construction materials, spoil and personnel will be carefully selected to reduce the risk of increased noise and vibration impacts during construction;
- Vehicle and mechanical plant / equipment used for the purpose of the works will be fitted with effective exhaust silencers, to be maintained in good working order and operated in such a manner to minimise noise emissions;
- Construction plant and activities will be positioned appropriately to minimise noise at sensitive locations;
- Equipment that breaks concrete by pulverising or similar, rather than by percussion, will be used close to noise sensitive locations;
- Mufflers will be used on pneumatic tools;
- Works will be programmed to minimise the requirement for working outside normal working hours;
- Unnecessary revving of engines and idling will be avoided;
- Plant and vehicles will be started-up sequentially rather than all together;
- Drop height of materials will be minimised;
- Rubber linings will be used in, for example, chutes and dumpers to reduce impact noise;
- Low vibratory or non-vibratory plant will be used when working in close proximity to a vibration sensitive receptor;
- Vibratory equipment will be started-up or turned off as far away from sensitive receptors as possible; and
- All site access roads will be kept even.

Construction noise monitoring should be undertaken during the proposed works at agreed locations. The precise monitoring locations shall be agreed with the client and/or Local Authority and shall be available to be relocated to alternative position(s), depending on construction works being carried out, specific works locations and on receipt of any noise complaint(s).

Measurements should be undertaken with noise measuring equipment conforming to the requirements of Annex G of BS 5228-1:2009+A1:2014 and, where required, vibration measuring equipment conforming to the requirements outlined in Section 9 of BS 5228-2:2009+A1:2014.

1.5.2 Operational

Significant adverse impacts during the operational phase are not expected, therefore no mitigation measures are required.

1.5.3 Decommissioning

This assessment has shown that there is the potential for significant noise impacts at the nearest sensitive receptors during the decommissioning phase.

The following measures will be implemented during decommissioning:

- Best Practicable Means (BPM) as defined in BS 5228-1 will be employed at all times to reduce noise levels to a minimum;
- The appointed contractor will comply with local authority controls on noise and vibration during decommissioning;
- The use of a high quality construction site hoarding will be included around all noise sensitive boundaries. Where the hoarding blocks line of sight between the works and the receptor a reduction in noise levels of around 10 dB can be achieved;
- A Community Liaison Plan will be developed by the developer in consultation with local residents and a single point of contact nominated to engage with CCC and the residents and to handle complaints and communication of site information if requested by CCC;
- Contact details for the site manager and liaison officer will be displayed on the site hoarding;
- All staff will be briefed on the complaints procedure and the mitigation requirement and their responsibilities to register and escalate complaints;
- Regular updates at appropriate intervals to all identified affected neighbours via a newsletter and the posting of relevant information on the site hoarding;
- Only plant conforming with or better than relevant national or international standards (including BS 5228-1 and BS 5228-2), directives or recommendations on noise or vibration emissions will be selected and used. Plant will be maintained in good condition with regards to minimising noise and vibration emissions;
- Plant will be operated and maintained appropriately, with due regard for manufacturer recommendations. All vehicles, plant and equipment will be switched off when not in use;
- Routes and programming for the transport of materials, spoil and personnel will be carefully selected to reduce the risk of increased noise and vibration impacts during decommissioning;
- Vehicle and mechanical plant / equipment used for the purpose of the works will be fitted with effective exhaust silencers, to be maintained in good working order and operated in such a manner to minimise noise emissions;
- Decommissioning plant and activities will be positioned appropriately to minimise noise at sensitive locations;
- Equipment that breaks concrete by pulverising or similar, rather than by percussion, will be used close to noise sensitive locations;
- Mufflers will be used on pneumatic tools;
- Works will be programmed to minimise the requirement for working outside normal working hours;

- Unnecessary revving of engines and idling will be avoided;
- Plant and vehicles will be started-up sequentially rather than all together;
- Drop height of materials will be minimised; and
- Rubber linings will be used in, for example, chutes and dumpers to reduce impact noise.

Noise monitoring should be undertaken during the decommissioning phase at agreed locations. The precise monitoring locations shall be agreed with the client and/or Local Authority and shall be available to be relocated to alternative position(s), depending on works being carried out, specific works locations and on receipt of any noise complaint(s).

Measurements should be undertaken with noise measuring equipment conforming to the requirements of Annex G of BS 5228-1:2009+A1:2014.

1.6 Residual Impacts and Effects

Residual significant construction noise and vibration effects are not anticipated due to mitigation measures set out in Section 1.5.1.

Residual significant operational effects are not anticipated as predicted operational noise levels are below noise threshold criteria.

Residual effects during the decommissioning phase are not anticipated to be significant due to the mitigation measures set out in Section 1.5.3

1.7 Conclusion on Noise and Vibration

This chapter has presented the noise and vibration assessment of the construction, operational and decommissioning impacts of the Proposed Development.

During the construction and decommissioning phases, mitigation measures will ensure that residual noise and vibration impacts do not occur.

During the operational phase, noise impacts are not anticipated to be significant as the predicted noise levels from the Proposed Development are below noise guideline threshold levels.