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APPENDIX 12-1

CONSTRUCTION NOISE REPORT

A specialist energy consultancy

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Appendix 12.1

Construction Noise Report

Lackareagh Wind Farm, Co. Clare

EDF Renewables Ireland

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Executive Summary

TNEI Services Limited (TNEI) was commissioned by MKO on behalf of EDF Renewables (the Applicant) to undertake predictions of noise levels associated with the construction of the proposed Lackareagh Wind Farm (hereinafter referred to using the following terminology as outlined in Section 1.1.1 of Chapter 1: 'the Proposed Project', 'the Proposed Wind Farm', the Proposed Grid Connection Route', 'the site'). The noise predictions were used to assess the potential impact of noise attributable to the construction of the Proposed Project on the occupiers of nearby noise sensitive receptors.

The noise impact assessment was undertaken using guidance contained in BS 5228: Part 1 2009+A1:2014 *'Noise and vibration control on construction and open sites- Noise'* and the calculation methodology in ISO9613: 1996 *'Acoustics - Attenuation of sound during propagation outdoors' -Part 2: General Method of Calculation*', together with noise data for appropriate construction plant.

There were 160 buildings (potential noise sensitive receptors) identified within ~3 km search area of the site. Two of the buildings identified were subsequently classified as derelict (NSR01 and NSR108) and therefore were not considered to be noise sensitive for the purposes of this assessment.

Predictions have been made at all identified noise sensitive receptors assuming that all items of plant were operating continually to provide a precautionary scenario. In addition, the noise model assumed that noise sources would be located within the most likely activity areas closest to the receptors, whereas in reality plant would move around the site and only a proportion of the plant may be operating at any one time. As such, the predictions are inherently likely to over-predict the actual sound levels that are likely to be experienced.

The predicted levels for the construction of the Proposed Wind Farm (as opposed to the Grid Connection Route) are below the Category A Daytime and Evening and Weekend Threshold Levels, as detailed within BS 5228:2009, for all receptors except CNAL04 and 05. At CNAL04 and 05, noise levels will be above the evening and weekend 55 dBA threshold levels. Whilst this is unlikely to result in a significant impact, as duration of exposure will be limited, it is recommended that construction activities are not undertaken in proximity to these properties outwith normal daytime working hours (Mon-Fri 07:00 – 19:00 and Saturday 07:00 – 13:00).

Accordingly, construction noise impacts are below the indicator for a potential significant effect. For some periods, it is unavoidable that construction activities and plant will be located directly outside a property. On these occasions, noise immission levels may be higher than predicted for a short time, resulting in instantaneous noise levels which may exceed 65 dB(A) for short periods of time. Nevertheless, noise levels will vary throughout the construction phase as activities, plant and locations vary and for much of the working day the noise associated with construction activities will be less than predicted - the assessment assumes all equipment is operating simultaneously, concurrently and at full power, whereas in practice, equipment load and location will vary throughout the day.

No significant effects resulting from construction noise are predicted, nevertheless, good practice during construction is recommended following guidance from BS 5228.

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1 Introduction

1.1 Brief

1.1.1 TNEI was commissioned by MKO on behalf of EDF Renewables to undertake a construction noise assessment for the proposed Lackareagh Wind Farm (hereinafter referred to using the terms as outlined in the Executive Summary above and Section 1.1.1 of Chapter 1 of this EIAR). The following steps summarise the noise assessment process:

- Establish typical ambient noise levels at sensitive receptors located closest to the anticipated construction activities and derive appropriate noise threshold levels in accordance with BS 5228-1:2009 +A1:2014 (1);
- Undertake predictions of activity noise from different construction phases that would be incident at the nearest sensitive receptors;
- Compare the predicted noise levels with the derived threshold values; and,
- Identify any requirements for mitigation measures, if needed.

1.2 Nomenclature

1.2.1 The following terms and definitions are used throughout this report;

- **Emission** refers to the sound level emitted from a sound source, expressed as either a sound power level or a sound pressure level;
- **Immission** refers to the sound pressure level received at a specific location from a noise source(s);
- **SWL** indicates the sound power level in decibels (dB);
- **SPL** indicates the sound pressure level in decibels (dB);
- **NSR** (Noise Sensitive Receptor) are identified receptors that are sensitive to noise;
- **NML** (Noise Monitoring Location) refers to any location where baseline or specific noise levels have been measured; and
- **CNAL** (Construction Noise Assessment Location) refers to any location where the noise immission levels are calculated and assessed.

1.2.2 Unless otherwise stated, all noise levels refer to free field levels i.e. noise levels without influence from any nearby reflective surfaces.

1.2.3 As detailed in Section 1.1.1 in Chapter 1 of the EIAR, the various project components are described and assessed using the following references: ‘Proposed Project’, ‘Proposed Wind Farm’, ‘Proposed Grid Connection Route’ and ‘the site’.

1.3 Site Description

1.3.1 The Proposed Wind Farm site is located approximately 1 km east of Kilbane, County Clare. The approximate Irish Transverse Mercator (ITM) reference for the centre of the Proposed Wind Farm is (563783, 672952). The Proposed Grid Connection Route will connect the proposed onsite 38 kV substation to the existing 110 kV Ardnacrusha Substation via underground cabling. The Ardnacrusha 110 kV substation is located approximately 12.7 km to the south of the Proposed Wind Farm, with the length of the Proposed Grid Connection

Route underground cable being approximately 14.7 km in length. The Proposed Wind Farm and Proposed Grid Connection Route are shown on Figure A1.1a in Annex 1.

1.3.2 Access to the Proposed Wind Farm will be via the L7080 Local Road from Kilbane to Kilaloe (via the Gap) and existing farm and forestry tracks, in the townlands of Killeagy (Goonan) and Kilbane and adjacent townlands. As the L7080 bisects the Proposed Wind Farm, there are a number of temporary and permanent entrances proposed for assessment. These consist of an upgrade to an existing agricultural entrance and three new entrances off the L7080.

1.3.3 Construction of the Proposed Project will require tree felling, the construction of tracks across the site, upgrade to existing tracks and roads, establishment of a construction compound and a component set-down area, excavation of turbine foundations, construction of turbine bases, installation of turbines, and the installation of a substation, Battery Energy Storage System (BESS) & associated underground electrical cabling route, and all associated infrastructure, as detailed fully in Chapter 1 of this EIAR. Chapter 4 of the EIAR can be referred to for a detailed description of the Proposed Project and the construction methodologies for each component as appropriate.

2 Noise Planning Policy and Guidance

2.1 Overview of Noise Planning Policy and Guidance

2.1.1 There is no published statutory Irish guidance that contains suggested noise limits for construction activities, other than a 2014 document published by the National Roads Authority (NRA), which relates to noise from road developments only. The Association of Acoustic Consultants of Ireland, however, have published Environmental Noise Guidance for Local Authority Planning & Enforcement Departments(2), which states; *"The chief guidance document applied in the assessment of construction phase noise impacts is British Standard BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 1: Noise (2014)."* The assessment has therefore been undertaken in accordance with this standard, hereafter simply referred to as BS 5228.

2.2 Relevant Guidance

2.2.1 The BS 5228 standard provides useful guidance on practical noise and vibration control. Part 1 provides recommendations for basic methods of noise control including sections on community relations, training, occupational noise effects, neighbourhood nuisance and project supervision. The annexes provide information on noise sources, noise calculation procedures, mitigation measures and their effectiveness.

2.2.2 Part 1 also contains sound power level data for a variety of construction plant. This data was obtained from field measurements of actual plant operating on multiple construction and open sites and is therefore appropriate to use as source level data for construction noise predictions.

3 Potential Impacts

3.1 Construction Noise Sources

3.1.1 Noise levels from construction activities will vary continually over time as activities and plant start and stop and move around the site, however, for this assessment a precautionary scenario is considered where all construction plant and activities are assumed to be working continually and in locations closest to the nearest NSRs.

3.2 Construction Phases

3.2.1 To consider the variation in noise levels that would occur throughout the construction period, the assessed construction scenarios (through which the noise impacts of individual and concurrent construction activities are assessed) have been determined based on TNEI's knowledge and experience on the typical construction timetabling required for a wind farm and associated electrical infrastructure of this scale. However, all modelling and reporting has been informed by the construction activities and plant requirements presented in Chapter 4 of the EIAR and in Section 9.1 of Appendix 4-3 (Construction and Environmental Management Plan).

3.2.2 Only construction activities deemed to be contributory to the generation of noise have been considered. These are, namely; the operation of the temporary construction compound; upgrade of existing tracks and roads and the provision of new site access roads; the permanent upgrading of the existing site entrance and the provision of new access junctions off the L7080; the excavation of one borrow pit area; the construction of the substation and Battery Energy Storage System (BESS); tree felling; the construction and erection of seven wind turbines and associated hardstand areas; and the construction of the Proposed Grid Connection Route underground cabling and associated infrastructure..

3.2.3 Each scenario has been assessed against a set of threshold levels to determine the likely temporary noise impacts.

3.2.4 The assessment does not consider the noise impacts associated with decommissioning, as the plant and activities used for that phase are assumed to be similar in nature (and noise output) to those already considered in the modelled construction scenarios. Accordingly, if noise levels during the construction phases are acceptable, they will also be acceptable during decommissioning.

3.2.5 The core hours for construction activity will be 07:00 and 19:00 on weekdays and 07:00 – 13:00 on Saturdays. There will be no working on Sundays and Public Holidays, however, it should be noted that, out of necessity, some activity outside of the core hours could arise. This could be from the delivery and unloading of abnormal loads, health and safety requirements, or to ensure optimal use is made of fair-weather windows for concrete deliveries, the erection of turbine tower sections and blades, and the erection and dismantling of cranes.

4 Methodology

4.1 Methodology for the Prediction of Noise

4.1.1 In order to predict the noise immission levels attributable to the construction of the Proposed Project, noise propagation models are produced using the propriety noise modelling software CadnaA. Within the software, complex models can be used to simulate the propagation of noise according to a range of international calculation standards.

4.1.2 For each assessed receptor, the $L_{Aeq(t)}$ levels have been predicted in accordance with ISO 9613-2:1996 *'Acoustics - Attenuation of sound during propagation outdoors: General method of calculation'*. [3]

4.1.3 The ISO 9613 propagation model was chosen in preference to the calculation method presented in BS 5228, primarily because of some of the significant distances from source to receptor evident on this site. Specifically, BS 5228 notes in F 2.2.2.2, that at distances over 300 m noise predictions using the BS 5228 methodology should be treated with caution, especially where a soft ground correction factor has been applied because of the increasing importance of meteorological effects; whereas ISO 9613-2 provides equations that have been validated up to 1,000 m.

4.1.4 The ISO 9613 model can take account of the following factors that influence sound propagation outdoors:

- geometric divergence;
- air absorption;
- reflecting obstacles;
- screening;
- vegetation; and
- ground reflections.

4.1.5 The model uses the octave band sound power output of the proposed plant as its acoustic input data, and calculates on an octave band basis, attenuation due to geometric spreading, atmospheric absorption, and ground effects.

4.1.6 For the purposes of this assessment, all noise level predictions have been undertaken using a receiver height of 1.5 m above local ground level. Soft ground (G=1) attenuation has been assumed at all locations except for water bodies, construction compounds, turbine bases and similar areas of hardstanding, which have been modelled with a ground attenuation of G=0 (hard ground). Air absorption based on a temperature of 10°C and 70% relative humidity has been assumed.

4.2 Limitations of the Noise Model

4.2.1 The noise propagation models are intended to give a good approximation of the specific noise level and the contribution of each individual source. However, it is expected that actual levels are unlikely to be matched exactly with modelled values and the following limitations in the model should be considered:

- In accordance with ISO 9613-2, all assessment locations are modelled as downwind of all noise sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for;
- Unless specifically stated, the models assume all noise sources are operating continuously and simultaneously; and
- All mobile plant assumed to be working along tracks (excavators, dozers, rollers etc) have been modelled as moving point sources along their anticipated movement paths and the sound power level of the source is effectively averaged out across the length of the entire line. This will give an approximation of the overall noise levels from mobile plant at receptor locations; however, in reality noise levels will fluctuate as construction plant and activities move around in their activity areas.

4.2.2 The above limitations provide an estimate of the noise levels under theoretical precautionary conditions and predicted levels are likely to be higher than actual measured levels.

4.3 Assessing Construction Noise Effects

4.3.1 Annex E, part E.3.2 of BS 5228 provides example criteria for assessing the significance of construction noise effects and acceptable limits for construction noise.

4.3.2 Table E.1 of BS 5228 is reproduced below in Table 4.1 and contains an example of the significance criteria that can be used to assess construction activities for residential receptors.

Table 4.1: Example of Threshold of Potential Significant Effect at Dwellings ($dB_{(A)}$)

Assessment Category and Threshold Value Period	Threshold Value $L_{Aeq,T}$ dB		
	Category $A_{(A)}$	Category $B_{(B)}$	Category $C_{(C)}$
Night-Time (23:00 – 07:00)	45	50	55
Evenings and Weekends[(D)]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 to 13:00)	65	70	75

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

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

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

(D) 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00 - 23:00 Sundays.

4.3.3 The values can be considered thresholds for the construction noise levels (quantified using the L_{Aeq} noise metric). The thresholds in each category are to be used where the existing noise level at each location, rounded to the nearest 5 dB, is below the level given for a particular time of day. BS 5228 provides the following advice regarding the threshold levels:

"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 3 dB due to site noise.

Note 3: Applied to residential receptors only."

4.3.4 Therefore, the assessment of construction noise reflects a noise threshold for a specific locality (set relative to the existing ambient noise levels) and for a particular period of the day, rather than an absolute noise level.

4.3.5 It should be noted that exceedance of the threshold does not in itself indicate a significant effect, rather, the standard states *"If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider* *other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect".*

4.4 Study Area

4.4.1 The Study Area for the noise assessment has been defined by a 3 km buffer around the proposed turbine locations. Within this study area, 160 buildings have been identified, of which the majority are residential properties.

4.4.2 Rather than identifying individual buildings along the Proposed Grid Connection Route, this report considers the typical noise levels that are likely to occur along the length of the route, which can be applied to the assessment of all nearby sensitive receptors.

4.4.3 Noise Sensitive Receptors (NSRs) are properties, people or fauna that are sensitive to noise and, therefore, may require protection from nearby noise sources. Residential receptors are deemed to have a high level of sensitivity, therefore, all identified residential NSRs within the study area have been assessed. Two of the buildings identified within the 3 km buffer were subsequently classified as derelict (NSR01 and NSR108) and therefore have not been considered further within this assessment.

4.4.4 A representative sample of nine Construction Noise Assessment Locations (CNALs) have been chosen to represent the closest individual or clusters of NSRs to the Proposed Wind Farm site, further detail on the location of the 9 no. CNALs is provided in Annex B. The assessment of these CNALs are included in this report on the supposition that if noise levels are within acceptable levels at the closest receptors, then it can be assumed they will also be acceptable at more distant locations. Nevertheless, noise level predictions for all identified NSRs located within the study area are provided in Annex C for completeness. Table 4.2 details the CNALs considered within the report, which are also shown on Figure A1.1. For clarity, all CNALs are also labelled as 'NSR' and numbered for ease of reference. A set of inset maps (Figures A1.1b-d) showing NSR locations have been included within Annex A.

Table 4.2: Construction Noise Assessment Locations

CNAL Name	Coordinates (ITM)	
	Eastings	Northings
CNAL01 (NSR10)	564702	673649
CNAL02 (NSR02)	564689	673091
CNAL03 (NSR07)	564759	672513
CNAL04 (NSR04)	562790	672791
CNAL05 (NSR08)	562253	672814
CNAL06 (NSR13)	561663	673086
CNAL07 (NSR46)	561078	673791

CNAL Name	Coordinates (ITM)	
	Eastings	Northings
CNAL08 (NSR16)	562540	671813
CNAL09 (NSR28)	562416	671818

4.5 Baseline Noise Levels

4.5.1 Baseline noise level monitoring was undertaken as part of the operational noise assessment for the Proposed Wind Farm site. See Appendix 12-2 for more information. The Noise Monitoring Locations (NMLs) are shown on Figure A1.1a-d.

4.5.2 At all locations the ambient sound levels were below the Category A Threshold Values, as detailed in Table 4.1.

4.6 Construction Noise Level Thresholds

4.6.1 Having due regard to the existing ambient noise levels around the Proposed Wind Farm site, the BS 5228 Category A Threshold Values have been considered for the construction noise assessment.

4.6.2 Accordingly, the assessment is made against the following noise levels:

- Daytime weekdays 07:00 – 19:00: 65 dB $L_{Aeq\ (12\ hours)}$
- Saturday (morning) 07:00 – 13:00: 65 dB $L_{Aeq\ (6\ hours)}$
- Evenings (weekdays) 19:00 – 23:00: 55 dB $L_{Aeq\ (4\ hours)}$
- Saturday 13:00 – 23:00: 55 dB $L_{Aeq\ (10\ hours)}$
- Sundays 07:00 – 23:00: 55 dB $L_{Aeq\ (16\ hours)}$
- Night time 23:00 – 07:00: 45 dB $L_{Aeq\ (8\ hours)}$

5 Noise Impact Assessment

5.1 Modelling of Individual Sound Sources

5.1.1 Noise immission levels will vary throughout the construction period as construction activities, plant and locations vary. For much of the working day the noise associated with construction activities would be less than predicted, as the assessment assumes all equipment is continually operating at full power and in locations closest to the NSRs, whereas in practice, equipment load and location may vary throughout the day. This approach has been adopted to present a precautionary assessment.

5.1.2 At this stage a detailed plant list is not available, therefore, a generic plant list based upon experience of similar projects has been used. All modelled noise sources and associated sound power level (SWL) and sound pressure level (SPL) data is included in Annex 2: Noise Model Data.

5.1.3 For tree felling activities broadband noise level data for a harvester, a forwarder and a skidder has been taken from *Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment* (4) (Forestry Commission). No octave band data is available therefore modelling has been undertaken assuming all sound energy is in the 500 Hz octave band data, as recommended in ISO 9613. Noise levels for the harvester and forwarder are actually given at the operator position inside a Q Cab. To estimate the external levels 10 dB has been added to the quoted levels sound pressure levels (SPLs) and the sound power level has been calculated assuming a measurement distance of 1 m.

5.1.4 For all other construction activities source noise level data is taken from Annex C of BS 5228, which provides octave band SPL levels for a wide variety of construction plant and activities.

5.1.5 Construction noise sources for any given activity will generally comprise a mix of both moving and static sources. Mobile sources include mobile construction plant and Heavy Goods Vehicles (HGVs), while static construction plant could include generators, lighting rigs and pumps. Static equipment is usually located at a fixed location for an extended period of time.

5.1.6 Most items of plant and activities, including some mobile plant, have been modelled as single point sources and it should be noted that the noise models present a snapshot in time only and cannot convey the dynamic nature of some of the activities. Notwithstanding the above, during activities in which construction plant will be moving continuously for the majority of time along a single path, e.g. when conducting road upgrades, plant has been modelled as a line source along the anticipated movement path.

5.2 Modelling of Construction Activities

5.2.1 Noise propagation modelling has been undertaken considering the key activities that are likely to occur throughout the construction period based on the indicative information found in Chapter 4 and as discussed in Section 3.2. Please note that the Proposed Grid Connection Route has been considered separately in Section 5.4 below.

5.2.2 A summary of the modelled scenarios is presented in Table 5.1, with further information regarding the specific plant modelled presented within Annex B. The modelled scenarios have been determined as precautionary, with the scale and extent of concurrent construction activities likely to be lesser in reality than what is presented herein. All references made to proposed infrastructure in Table 5.1, for example construction compounds, borrow pits etc. can be viewed on Figure A1.1a for context.

Table 5.1: Summary of Modelled Construction Scenarios

Scenario	Construction Activities	Description
01	Operation of the temporary construction compound	The welfare facilities located within the temporary construction compound are in operation.
	Provision of new roads	Upgrade/ construction of the existing L7080 is carried out.
	Felling	Tree felling around the locations of turbines 3, 4 and 5 is carried out.
02	Operation of the temporary construction compound	The welfare facilities located within the temporary construction compound are in operation.
	Upgrades to existing roads and provision of new roads	Construction/ upgrade to all four proposed access tracks is carried out. These access tracks are, namely; the tracks leading to T1, T3, T5, and T7, respectively.
	Operation of the borrow pit	Operation of the borrow pit for extraction of supplemental aggregate is underway.
03	Operation of the temporary construction compound	The welfare facilities located within the temporary construction compound are in operation.
	Operation of the borrow pit	Operation of the borrow pit for extraction of supplemental aggregate is underway.
	Construction of foundations for the proposed substation and BESS	Construction of the foundations for the proposed BESS and substation is undertaken, ready for the installation of the respective plant.
	Construction of turbine hardstands and foundations	The construction of foundations and hardstands for turbines 3, 4, and 5 is undertaken.
04	Operation of the temporary construction compound	The welfare facilities located within the temporary construction compound are in operation.
	Operation of the borrow pit	Operation of the borrow pit for extraction of supplemental aggregate is underway.
	Installation of plant for the proposed substation and BESS	The installation of the respective plant for both the proposed substation and BESS is undertaken.
	Construction of turbine hardstands and foundations	The construction of foundations and hardstands for turbines T1, T2, T6, and T7 is undertaken.
	Erection of turbines	The erection turbines T3, T4, and T5 is undertaken.
05	Operation of the temporary construction compound	The welfare facilities located within the temporary construction compound are in operation.
	Erection of turbines	The erection turbines T1, T2, T6, and T7 is undertaken.
06 (Night)	Operation of the temporary construction compound	Use of generators for lighting and providing power to the welfare facilities located within the temporary construction compound.

5.3 Calculated Noise Immission Levels

Table 5.2 presents the calculated noise immission levels at each CNAL for all modelled scenarios.

Table 5.2: Predicted Construction Noise Immission Levels, dB $L_{Aeq(t)}$

CNAL	Modelled Scenarios					
	01	02	03	04	05	06 (Night)
CNAL01 (NSR10)	26	23	29	30	13	2
CNAL02 (NSR02)	34	32	39	41	17	12
CNAL03 (NSR07)	34	31	39	41	19	7
CNAL04 (NSR04)	65	48	47	48	45	24
CNAL05 (NSR08)	56	53	40	44	43	19
CNAL06 (NSR13)	34	38	35	40	41	15
CNAL07 (NSR46)	29	32	30	36	37	10
CNAL08 (NSR16)	36	42	41	44	43	20
CNAL09 (NSR28)	35	41	40	43	42	19

5.3.1 The Proposed Wind Farm construction noise assessment results show that the predicted construction noise levels in core hours for Scenarios 01 - 05 do not exceed the daytime 65 dB(A) threshold Levels at all CNALs.

5.3.2 At CNAL04, during the construction/ upgrade of the L7080 (Scenario 01), predicted construction noise immission levels are equal the daytime 65 dB(A) threshold. It should be noted that this calculation assumes that the noise energy of mobile plant working along the road is averaged out along a linear movement path, however, for some periods it is unavoidable that construction activities and plant will be located directly outside a property. On these occasions, noise immission levels will be higher than predicted for a short time. Likewise, construction activities will also be less than predicted as plant and activities are operating elsewhere on the road.

5.3.3 At CNAL04 and 05 noise levels will be above the evening and weekend 55 dBA threshold levels. Whilst this is unlikely to result in a significant impact, as duration of exposure will be limited, it is recommended that construction activities are not undertaken in proximity to these properties outwith normal daytime working hours (Mon-Fri 07:00 – 19:00 and Saturday 07:00 – 13:00).

5.3.4 No construction activities are proposed during the night-time, however, a night-time scenario (Scenario 6) is included in the assessment in case of generator usage at night, for infrastructure such as welfare facilities and lighting only. The predicted noise levels for this scenario are comfortably below the night-time 45 dBA threshold level.

5.3.5 Results for all NSRs are also shown in Annex 3 for completeness for all assessed scenarios.

5.4 Proposed Grid Connection Route

5.4.1 For the Proposed Grid Connection Route, the amount of required plant is relatively small, typically being based around an excavator for trenching and backfill activities. As such, construction activities in any one location will be limited in duration and adverse noise effects are anticipated to be negligible. Chapter 4 of the EIAR describes the construction of the Proposed Grid Connection Route underground electrical cable trench in more detail.

5.4.2 Where construction activities occur beside a dwelling the noise levels at that location are likely to be in the region of 75 – 80 dB(A) for a short period of time. It should be noted, however, that this would only occur where construction activities are directly opposite a dwelling within approximately 20 m and this would result in an instant noise level increase (i.e. not considering a full construction day). To put this into context, trenching and backfill activities are anticipated to move along the Proposed Grid Connection Route at approximately 150 m to 300 m a day, therefore, the length of time when construction activities will be occurring adjacent to any given receptor is only likely to be for a few hours. For the majority of the time, plant and equipment will be located at greater distances and noise levels will be lower.

5.4.3 It is possible that noise levels from trenching and backfill operations may occasionally exceed the BS 5228 threshold if within 20 m of a dwelling, however this would only occur for a short period of time at any one location. Accordingly, the impact is not deemed significant.

5.4.4 At some watercourses along the Proposed Grid Connection Route, culverts and drain crossings there may be a requirement for Horizontal Directional Drilling (HDD). In particular it is noted that HDD is required for one small water crossing located at ITM reference (562395, 671840), which is approximately 30 m from the centre point of the dwelling denoted by CNAL09 (NSR28), and adjacent to the amenity area.

5.4.5 HDD for large crossings would require the use of multiple items of plant including pumps, mud recyclers, drilling rigs and generators, however, the proposed plant for these small crossings is a small Vermeer D36 x 50 Directional Drill, which is much smaller than many DD rigs and requires less associated plant. As such, DD operations are expected to be lower in noise output than is normal. Additionally, for small crossings, the work would likely be completed within 1 to 2 weeks, therefore is considered a short-term activity.

5.4.6 Calculations of the Vermeer DD rig, assuming a source noise level of 94 dBA at 1 m, indicates that noise levels would be below the 65 dBA threshold at a distance of approximately 30 m. Where activities involving the drilling rig are within 30 m of a dwelling, such as for CNAL09, then noise mitigation measures should be considered in line with the guidance presented in BS 5228. This could include the erection of temporary boarding alongside the drilling rig or use of 'acoustic blanket panels' to hang from Heras fencing or similar. This should be installed as close to the drilling rig as is practicable and fitted so as to interrupt any direct line of site between the drilling rig and the closest residential receptors. Examples of appropriate products include Echo Noise Defender and Soundex DeciBloc.

5.4.7 It is also recommended that construction activities are not undertaken in proximity to CNAL09 outwith normal daytime working hours (Mon-Fri 07:00 – 19:00 and Saturday 07:00 – 13:00).

5.5 Road junctions that may need widening or improvements

5.5.1 Construction works related to road junction improvements may occur outwith the CNALs considered above, in close proximity to residential receptors. It is therefore possible that noise from these activities may at times exceed the guideline levels, however it should be noted that this will be a short-term, temporary impact. Good practice during construction is recommended and will reduce noise levels from these short-term works to minimum levels.

6 Mitigation Measures

6.1.1 No significant effects resulting from construction noise are predicted. Nevertheless, good practice during construction is recommended and will be presented in a Construction Environmental Management Plan (CEMP) (Appendix 4-3 of this EIAR) to minimise any potential noise impacts.

6.1.2 The core hours for the proposed works will be normal construction hours 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturday. There will be no working on Sundays and Public Holidays, however, it should be noted that out of necessity some activity outside of the core hours could arise.

6.1.3 Good site practices for construction of the Proposed Wind Farm, along the Proposed Grid Connection Route and at road junctions, will be implemented to minimise any noise effects. Particular care will be taken at watercourse, culvert and drain crossings along the underground electrical cabling route within 30 m of any residential receptor.

6.1.4 Section 8 of BS 5228-1:2009+A1:2014 recommends a number of simple control measures as summarised below that can be employed onsite:

- Keep local residents informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and be subject to programmed maintenance;
- Select inherently quiet plant where appropriate – all major compressors will be 'sound reduced' models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use;
- All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines will be shut down between work periods (or when not in use) or throttled down to a minimum;
- Regularly maintain all equipment used on site, including maintenance related to noise emissions;
- Vehicles will be loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and
- All ancillary plant such as generators and pumps will be positioned so as to cause minimum noise disturbance and if necessary, temporary acoustic screens or enclosures will be provided.

6.1.5 At any HDD location within 30 m of a residential receptor the installation of temporary boarding or 'acoustic blanket panels' alongside the drilling may be used to mitigate noise emissions.

6.1.6 Construction activities should be avoided wherever possible outside of core daytime hours in the vicinity of properties along the L7080 and in the vicinity of CNAL09.

7 Summary

7.1.1 The noise impact assessment has considered the existing noise environment at local residential receptors to determine appropriate noise threshold levels for construction activities.

7.1.2 Noise propagation modelling has been undertaken and the anticipated noise immission levels presented for scenarios likely to occur throughout the construction period of the Proposed Project. The modelled scenarios consider the 'noisiest' activities that are likely to occur during the construction period and the modelling assumes that the construction activities are occurring at locations within the Proposed Wind Farm that are closest to the NSRs.

7.1.3 There will be short periods of time where noise levels may exceed the BS 5228 threshold levels, however, this will only occur when activities associated with the construction of the Proposed Grid Connection Route occur directly opposite a residential property. The duration of such activities at any given receptor is anticipated to be short, therefore no significant impacts are anticipated. Where HDD activities are required for watercourse, culvert and drain crossings, best practice mitigation measures should be employed in line with recommendations made in BS 5228 to reduce noise emissions.

7.1.4 The predicted levels for the construction of the Proposed Wind Farm (as opposed to the Proposed Grid Connection Route) are below the Category A Daytime and Evening and Weekend Threshold Levels, as detailed within BS 5228:2009, for all receptors except CNAL04 and 05. At CNAL04 and 05, noise levels will be above the evening and weekend 55 dBA threshold levels. Whilst this is unlikely to result in a significant impact, as duration of exposure will be limited, it is recommended that construction activities are not undertaken in proximity to these properties outwith normal daytime working hours (Mon-Fri 07:00 – 19:00 and Saturday 07:00 – 13:00).

7.1.5 Accordingly, construction noise impacts are below the indicator for a potential significant effect. For some periods, it is unavoidable that construction activities and plant will be located directly outside a property. On these occasions, noise immission levels may be higher than predicted for a short time, resulting in instantaneous noise levels which may exceed 65 dB(A) for short periods of time. Nevertheless, noise levels will vary throughout the construction phase as activities, plant and locations vary and for much of the working day the noise associated with construction activities will be less than predicted - the assessment assumes all equipment is operating simultaneously, concurrently and at full power, whereas in practice, equipment load and location will vary throughout the day.

7.1.6 No significant effects resulting from construction noise are predicted, nevertheless, good practice during construction is recommended following guidance from BS 5228.

8 References

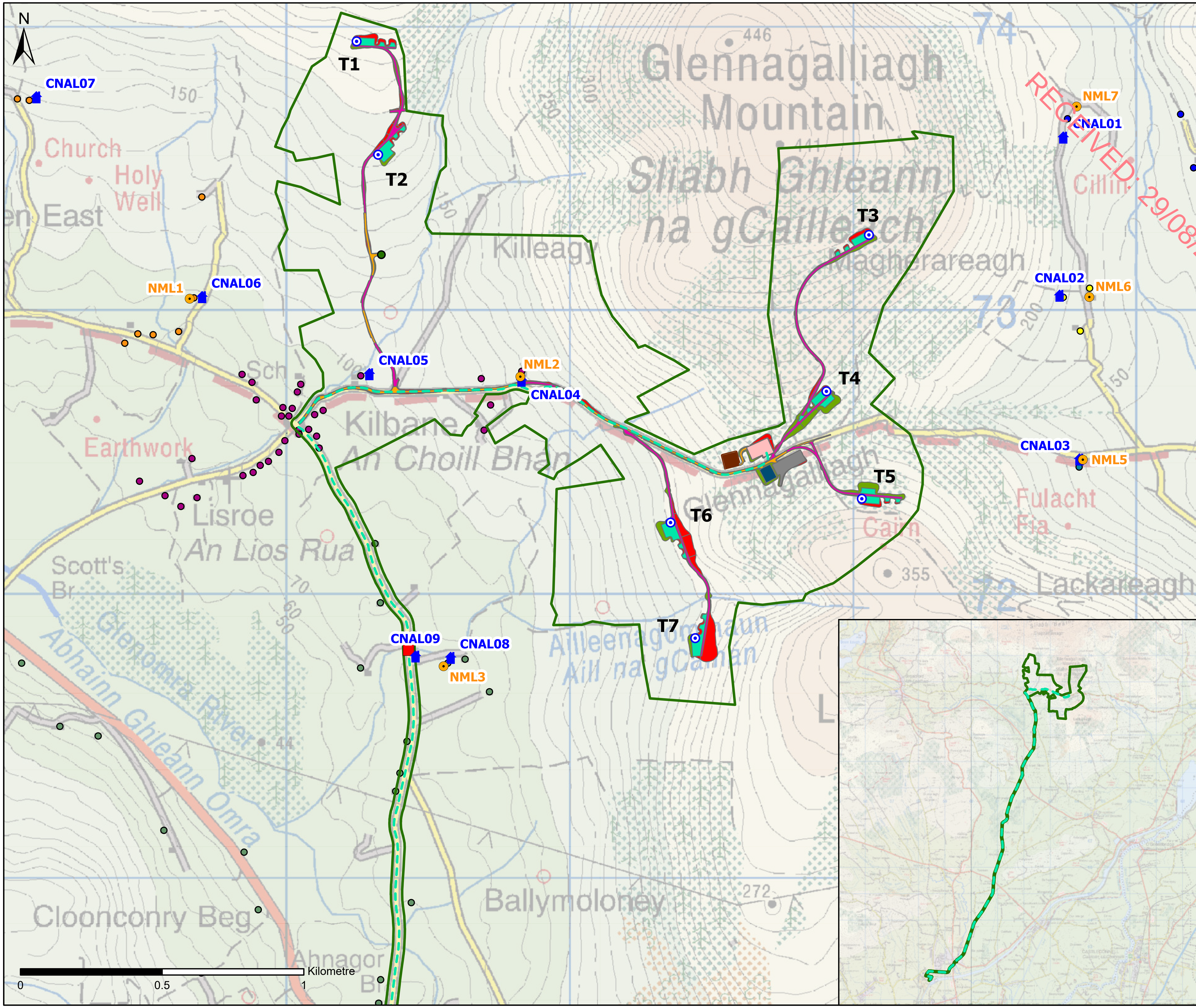
1. **British Standards Institute.** *Code of practice for noise and vibration control on construction and open sites. Noise.* UK : BSI, 2014. BS 5228-1:2009+A1:2014 .

2. **Ireland, Association of Acoustic Consultants of.** *Association of Acoustic Consultants of Ireland.* [Online] 2021. [Cited: 06 June 2024.] http://aaci.ie/wp-content/uploads/2022/07/Noise-Guidelines-for-Local-Authorities-v1.pdf.

3. **(ISO), International Organisation for Standardisation.** *Acoustics – Attenuation of Sound During Propagation Outdoors: Part 2 – General Method of Calculation.* Geneva : ISO, 1996. ISO 9613-2:1996.

4. **Forestry Commission.** *Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment.* Edinburgh : The Crown, 2003.

Annex 1 – Figure



LEGEND

- Proposed EIAR Site Boundary
- Noise Monitoring Locations (NMLs)
- Construction Noise Assessment Locations (CNALs)
- Proposed Turbine Locations
- Proposed Met Mast location
- Horizontal Directional Drilling (HDD) Location
- Proposed Grid Connection Route
- Proposed Onsite 38 kV Substation and Battery Storage Energy Compound
- Proposed Storage Area
- Proposed Passing Bays
- Proposed Hardstand Area
- Proposed Turbine Foundations
- Proposed Upgrades to Existing Roads
- Proposed New Roads
- Fill
- Cut
- Proposed Borrow pit
- Proposed Temporary Construction Compound

Noise Sensitive Receptors (NSRs)

- NSRs Represented by NML1
- NSRs Represented by NML2
- NSRs Represented by NML3
- NSRs Represented by NML4
- NSRs Represented by NML5
- NSRs Represented by NML6
- NSRs Represented by NML7

Rev.	Date	Amendment Details	Drawn	Approved
2	31/07/2024	FINAL ISSUE	AD	GC
1	02/07/2024	CLIENT COMMENTS	AD	GC
0	09/05/2024	FIRST ISSUE	JCM	AD

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Client: EDF renewables

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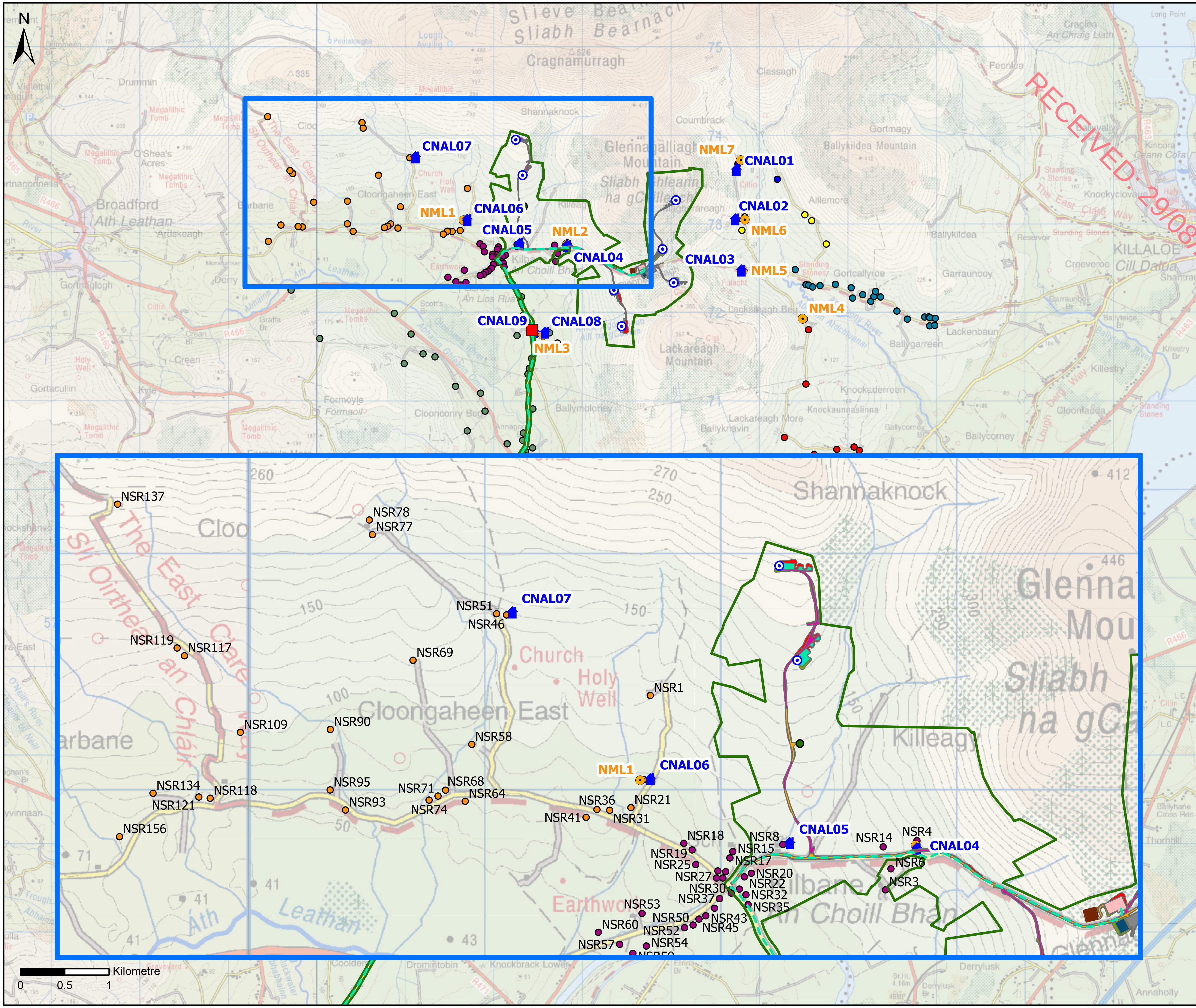
Project Title: LACKAREAGH WIND FARM, CO. CLARE

Drawing Title: FIGURE A1.1a - CONSTRUCTION NOISE MONITORING AND ASSESSMENT LOCATIONS

Scale:	Original Size:	Spatial Reference:
1:12,500	A3	IRENET95 Irish Transverse Mercator

Drawing Number: IE00101-011



LEGEND

- Proposed EIAR Site Boundary
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- Proposed Met Mast location
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Noise Sensitive Receptors (NSRs)

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- NSRs Represented by NML2
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- NSRs Represented by NML4
- NSRs Represented by NML5
- NSRs Represented by NML6
- NSRs Represented by NML7

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1	02/07/2024	CLIENT COMMENTS	AD	GC
0	09/05/2024	FIRST ISSUE	JCM	AD

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Client: EDF renewables

Drawing Status: FOR PLANNING

Project Title: LACKAREAGH WIND FARM, CO. CLARE

Drawing Title: FIGURE A1.1b -CONSTRUCTION NOISE MONITORING AND ASSESSMENT LOCATIONS

Scale: 1:40,000 | Original Size: A3 | Spatial Reference: IRENET95 Irish Transverse Mercator

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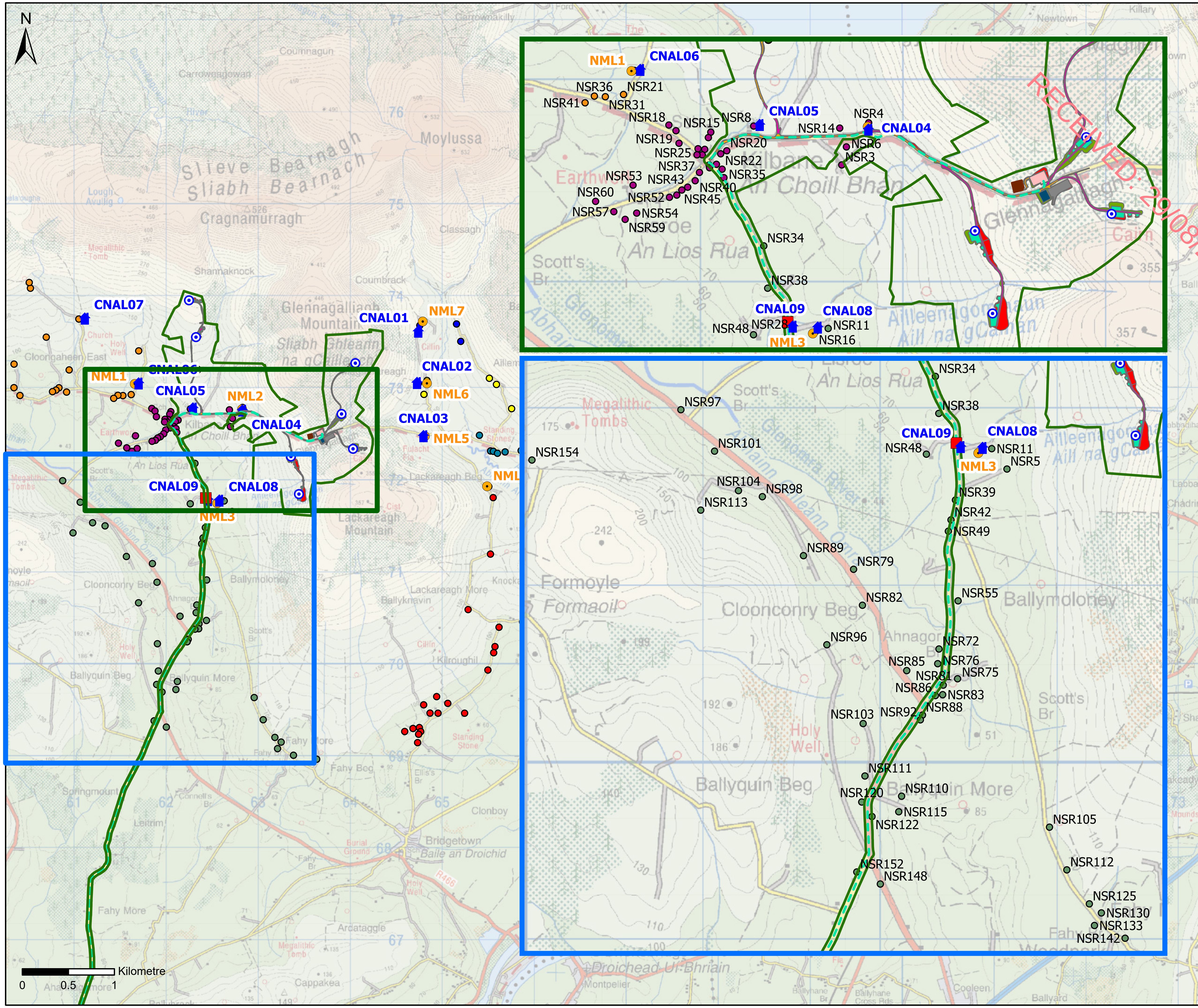

LEGEND

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- Proposed Turbine Locations
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Noise Sensitive Receptors (NSRs)

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- NSRs Represented by NML4
- NSRs Represented by NML5
- NSRs Represented by NML6
- NSRs Represented by NML7

Rev.	Date	Amendment Details	Drawn	Approved
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1	02/07/2024	CLIENT COMMENTS	AD	GC
0	09/05/2024	FIRST ISSUE	JCM	AD

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Drawing Status:
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Project Title:
LACKAREAGH WIND FARM, CO. CLARE

Drawing Title:
FIGURE A1.1c - CONSTRUCTION NOISE MONITORING AND ASSESSMENT LOCATIONS

Scale:	Original Size:	Spatial Reference:
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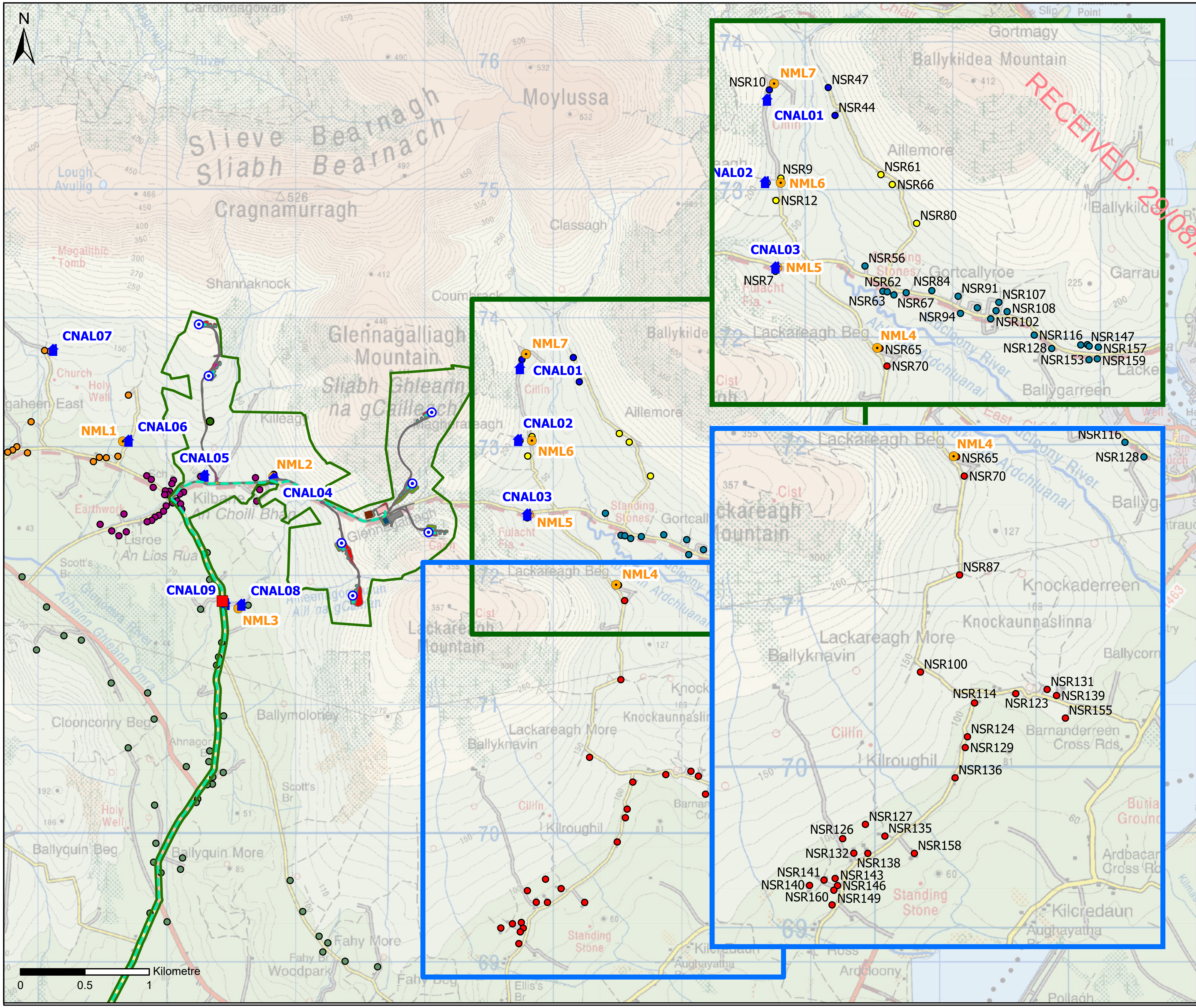
Drawing Number:
IE00101-013



LEGEND

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- NSRs Represented by NML4
- NSRs Represented by NML5
- NSRs Represented by NML6
- NSRs Represented by NML7

Rev.	Date	Amendment Details	Drawn	Approved
2	31/07/2024	FINAL ISSUE	AD	GC
1	02/07/2024	CLIENT COMMENTS	AD	GC
0	09/05/2024	FIRST ISSUE	JCM	AD

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Project Title: LACKAREAGH WIND FARM, CO. CLARE

Drawing Title: FIGURE A1.1d - CONSTRUCTION NOISE MONITORING AND ASSESSMENT LOCATIONS

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Drawing Number: IE00101-014

Annex 2 – Noise Model Data

Modelled Construction Noise Scenarios – Noise Sources

Noise Source Activity	Assumed working location	Plant (BS5228 Reference)	Data Source
Scenario 01			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86) Wheeled Excavator (C4.10)	BS 5228-1:2009+A1:2014
Provision of new roads	Section of the L7080 from Kilbane to the just beyond the temporary construction compound (line source, 2 of)	Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14) Vibratory roller (C5.20)	BS 5228-1:2009+A1:2014
Felling	Along the eastern edge of where T3, T4, and T5 will be sited (point source, 3 of)	Harvester Forwarder Skidder	Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Scenario 02			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86) Wheeled Excavator (C4.10)	BS 5228-1:2009+A1:2014
Upgrades to existing roads and provision of new roads	All four access tracks from L7080 to T1, T3, T5, and T7, respectively (line source, 4 of)	Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14) Vibratory roller (C5.20)	BS 5228-1:2009+A1:2014
Operation of the borrow pit	Borrow pit (point source, 1 of)	Excavator mounted rock breaker (C9.12) Tracked semi-mobile crusher (C9.15) Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14)	BS 5228-1:2009+A1:2014
Scenario 03			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86) Wheeled Excavator (C4.10)	BS 5228-1:2009+A1:2014
Operation of the borrow pit	Borrow pit (point source, 1 of)	Excavator mounted rock breaker (C9.12) Tracked semi-mobile crusher (C9.15)	BS 5228-1:2009+A1:2014

Noise Source Activity	Assumed working location	Plant (BS5228 Reference)	Data Source
		Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14)	
Construction of foundations for the proposed substation and BESS	Proposed Substation/ BESS	Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14) Concrete mixer truck + truck mounted concrete pump + boom arm (C4.32)	BS 5228-1:2009+A1:2014
Construction of turbine hardstands and foundations	T3, T4, and T5 Hardstands and Foundations (point source, 3 of)	Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14) Concrete mixer truck + truck mounted concrete pump + boom arm (C4.32) Vibratory roller (C5.20)	BS 5228-1:2009+A1:2014
Scenario 04			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86) Wheeled Excavator (C4.10)	BS 5228-1:2009+A1:2014
Operation of the borrow pit	Borrow pit (point source, 1 of)	Excavator mounted rock breaker (C9.12) Tracked semi-mobile crusher (C9.15) Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14)	BS 5228-1:2009+A1:2014
Installation of plant for the proposed substation and BESS	Proposed Substation/ BESS (point source, 1 of)	Road lorry (full) (C6.21) Mobile telescopic crane (C4.45)	BS 5228-1:2009+A1:2014
Construction of turbine hardstands and foundations	T1, T2, T6, and T7 Hardstands and Foundations (point source, 4 of)	Dumper (C4.3) Dozer (C2.12) Tracked Excavator (C2.14) Concrete mixer truck + truck mounted concrete pump + boom arm (C4.32) Vibratory roller (C5.20)	BS 5228-1:2009+A1:2014
Erection of turbines	T3, T4, and T5 (point source, 3 of)	Road lorry (full) (C6.21) Mobile telescopic crane (C4.45)	BS 5228-1:2009+A1:2014

Noise Source Activity	Assumed working location	Plant (BS5228 Reference)	Data Source
		Mobile telescopic crane (C4.45)	
Scenario 05			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86) Wheeled Excavator (C4.10)	BS 5228-1:2009+A1:2014
Erection of turbines	T1, T2, T6, and T7 (point source, 3 of)	Road lorry (full) (C6.21) Mobile telescopic crane (C4.45) Mobile telescopic crane (C4.45)	BS 5228-1:2009+A1:2014
Scenario 06 (Night)			
Operation of the temporary construction compound	Construction Compound (point source, 1 of)	Diesel Generator (C.84) Diesel Generator (C.86)	BS 5228-1:2009+A1:2014

Noise Source Library – Sound Power Levels

Name	BS5228 Reference	31.5	63	125	250	500	1k	2k	4k	8k	A	lin	Source
Harvester	-					103					103		Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Forwarder	-					101					101		Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Skidder	-					108					108		Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Tracked Excavator	C2. 14	28	113	106	105	105	101	99	96	91	107	115	BS 5228-1:2009+A1:2014
Dumper	C4. 3	28	112	109	102	101	100	96	89	81	104	115	BS 5228-1:2009+A1:2014
Wheeled Excavator	C4. 10	28	92	88	91	92	90	85	79	73	94	98	BS 5228-1:2009+A1:2014
Concrete mixer truck	C4. 20	28	111	102	94	97	98	106	88	83	108	113	BS 5228-1:2009+A1:2014
Concrete mixer truck + truck mounted concrete pump + boom arm	C4. 32	28	101	101	105	104	100	98	93	90	106	110	BS 5228-1:2009+A1:2014
Mobile telescopic crane	C4. 45	28	118	109	106	102	105	104	97	89	109	119	BS 5228-1:2009+A1:2014
Diesel generator	C4. 84	28	103	100	104	98	97	93	84	75	102	108	BS 5228-1:2009+A1:2014
Diesel generator	C4. 86	28	106	99	94	90	87	83	84	77	94	107	BS 5228-1:2009+A1:2014

Noise Source Library – Sound Power Levels

Name	BS5228 Reference	31.5	63	125	250	500	1k	2k	4k	8k	A	lin	Source
Vibratory roller	C5. 20	28	118	110	101	100	98	93	87	82	103	119	BS 5228-1:2009+A1:2014
Road lorry (full)	C6. 21	28	124	110	102	101	105	100	99	92	109	124	BS 5228-1:2009+A1:2014
Excavator mounted rock breaker	C9. 12	28	119	117	113	117	115	115	112	108	121	125	BS 5228-1:2009+A1:2014
Tracked semi-mobile crusher	C9. 15	28	119	119	116	115	113	111	106	96	118	124	BS 5228-1:2009+A1:2014
Lorry	C11. 14	28	121	107	104	102	101	100	97	94	107	121	BS 5228-1:2009+A1:2014

Annex 3 – Noise Predictions at NSRs

Predicted Construction Noise Immission Levels, dB $L_{Aeq(t)}$ at all NSRs

RECEIVED: 29/08/2024

NSR / CNAL	Coordinate (ITM)		Scenarios Modelled					
	X	Y	1	2	3	4	5	6 (Night)
NSR01 (Derelict)	561661	673439	-	-	-	-	-	-
NSR02 (CNAL02)	564701	673085	34	32	39	41	17	12
NSR03	562657	672616	48	46	45	47	45	23
NSR04 (CNAL04)	562790	672824	57	47	47	48	45	24
NSR05	562676	671693	35	43	42	45	44	20
NSR06	562680	672705	56	47	46	47	45	23
NSR07 (CNAL03)	564757	672486	34	31	37	39	19	6
NSR08 (CNAL05)	562222	672808	57	50	40	43	43	19
NSR09	564794	673117	33	31	38	40	17	12
NSR10 (CNAL01)	564716	673715	26	22	28	30	14	2
NSR11	562590	671808	36	43	42	45	44	20
NSR12	564761	672966	34	33	39	40	21	18
NSR13 (CNAL06)	561633	673083	35	37	35	40	40	14
NSR14	562647	672798	58	46	45	46	44	22
NSR15	562010	672778	53	44	38	42	42	17
NSR16 (CNAL08)	562529	671794	36	42	41	44	43	19
NSR17	561998	672751	53	43	38	42	42	17
NSR18	561803	672813	41	39	36	40	40	16
NSR19	561838	672785	41	39	37	40	40	16
NSR20	562089	672686	58	44	39	42	43	18
NSR21	561579	672964	36	37	35	39	39	14
NSR22	562059	672671	61	43	39	42	42	18
NSR23	561980	672693	54	41	38	42	42	17
NSR24	561947	672696	48	40	38	41	40	17
NSR25	561853	672723	43	40	37	41	40	16
NSR26	561968	672666	54	41	38	41	42	17
NSR27	561942	672666	50	41	38	41	41	17
NSR28 (CNAL09)	562416	671818	35	41	40	43	42	19
NSR29	562038	672619	56	42	39	42	42	17
NSR30	562002	672616	56	42	38	42	42	17
NSR31	561489	672953	36	36	34	39	39	14
NSR32	562066	672595	52	42	39	42	42	18
NSR33	562004	672602	54	42	38	42	42	17
NSR34	562272	672216	39	42	41	43	42	19
NSR35	562075	672553	49	42	39	42	42	18
NSR36	561435	672956	35	36	34	38	38	14
NSR37	561954	672579	49	41	38	41	41	17
NSR38	562291	672007	37	41	40	43	42	18
NSR39	562385	671518	33	39	39	42	41	17
NSR40	561933	672538	45	40	38	41	40	17
NSR41	561389	672923	34	36	33	38	38	13
NSR42	562360	671406	33	38	38	41	40	17
NSR43	561896	672506	41	39	37	41	41	16
NSR44	565161	673542	29	29	34	36	20	16
NSR45	561867	672492	40	39	37	40	40	16
NSR46 (CNAL07)	561052	673780	28	32	30	36	36	10
NSR47	565115	673731	28	27	33	35	20	14
NSR48	562221	671777	35	39	39	41	40	17
NSR49	562345	671342	31	38	38	41	39	16
NSR50	561842	672467	39	39	37	40	40	16
NSR51	561010	673785	27	31	30	35	35	10
NSR52	561806	672456	38	38	36	39	39	16
NSR53	561626	672516	36	37	35	39	38	15
NSR54	561644	672378	35	37	35	39	39	15
NSR55	562400	670949	29	36	36	39	37	15
NSR56	565364	672522	29	29	35	37	20	12
NSR57	561531	672385	34	36	35	38	38	14
NSR58	560905	673232	25	29	28	32	31	11
NSR59	561587	672347	34	36	35	38	38	14
NSR60	561441	672436	34	35	34	37	37	13
NSR61	565472	673141	28	31	35	38	22	16
NSR62	565485	672351	28	28	33	36	20	10
NSR63	565515	672347	27	28	33	36	20	10
NSR64	560877	672991	27	32	31	34	33	11
NSR65	565466	671964	26	25	30	33	18	5
NSR66	565549	673074	28	31	35	38	22	15
NSR67	565560	672326	27	28	33	36	20	10
NSR68	560794	673038	27	31	30	34	35	10
NSR69	560656	673588	27	30	29	34	35	9
NSR70	565513	671844	26	24	30	32	18	5
NSR71	560762	673013	25	28	27	32	30	10
NSR72	562292	670677	28	34	34	37	36	13
NSR73	565643	672341	27	28	33	35	20	12
NSR74	560724	672996	24	28	27	31	30	10
NSR75	562397	670509	27	33	33	36	36	13
NSR76	562285	670594	28	33	33	36	36	13
NSR77	560484	674120	25	29	27	33	32	8
NSR78	560471	674182	25	28	27	33	32	8
NSR79	561810	671127	29	34	34	37	36	13
NSR80	565714	672811	27	30	34	36	21	15
NSR81	562316	670473	27	33	33	36	35	12
NSR82	561860	670924	28	33	33	36	35	12
NSR83	562313	670419	26	33	32	36	35	12
NSR84	565817	672355	26	28	32	35	20	13
NSR85	562110	670555	26	32	32	35	34	12
NSR86	562272	670414	27	32	32	35	35	12
NSR87	565484	671230	21	21	24	25	16	0
NSR88	562199	670304	26	32	32	35	34	11
NSR89	561527	671204	29	33	33	36	35	13
NSR90	560306	673295	26	29	28	32	33	8
NSR91	565995	672317	25	28	31	34	20	13
NSR92	562187	670277	26	32	31	35	34	11
NSR93	560370	672954	26	29	28	32	33	9
NSR94	566011	672201	24	27	31	33	20	12
NSR95	560305	673039	24	29	28	32	32	8
NSR96	561659	670701	28	32	31	35	34	12
NSR97	560835	672028	28	31	31	34	34	10
NSR98	561295	671537	30	33	32	36	35	12

NSR / CNAL	Coordinate (ITM)		Scenarios Modelled					
	X	Y	1	2	3	4	5	06 (Night)
NSR99	566125	672239	24	27	30	33	20	12
NSR100	565241	670627	18	19	22	24	18	2
NSR101	561025	671794	29	32	31	35	35	11
NSR102	566216	672164	23	26	28	30	19	12
NSR103	561864	670256	26	31	30	34	33	10
NSR104	561160	671571	29	32	32	35	35	12
NSR105	562916	669671	21	27	27	30	26	10
NSR106	566252	672219	23	26	28	30	19	12
NSR107	566271	672276	23	27	30	32	19	12
NSR108 (Derelict)	566327	672213	-	-	-	-	-	-
NSR109	559925	673283	24	27	26	30	29	7
NSR110	562081	669846	24	29	29	32	32	9
NSR111	561874	669960	25	29	29	32	32	9
NSR112	563014	669430	21	26	26	28	25	10
NSR113	560947	671461	28	31	30	34	34	11
NSR114	565577	670435	18	20	23	24	18	0
NSR115	562065	669758	24	29	29	32	32	9
NSR116	566511	672054	22	25	28	31	18	10
NSR117	559688	673607	20	24	24	28	26	6
NSR118	559797	673004	22	26	26	30	28	7
NSR119	559657	673640	23	26	25	30	30	6
NSR120	561856	669813	23	29	29	32	31	9
NSR121	559749	673009	23	26	26	29	28	7
NSR122	561914	669731	24	29	28	32	31	9
NSR123	565833	670493	18	21	23	24	16	2
NSR124	565533	670225	18	20	23	23	16	0
NSR125	563141	669238	19	25	25	28	27	9
NSR126	564758	669592	19	24	25	26	19	4
NSR127	564899	669681	18	24	25	26	19	3
NSR128	566629	671963	21	25	28	31	18	10
NSR129	565519	670158	18	20	22	23	16	0
NSR130	563209	669187	19	24	25	28	24	9
NSR131	566028	670519	19	22	24	25	16	4
NSR132	564827	669502	18	23	25	26	19	4
NSR133	563170	669116	19	24	25	28	26	8
NSR134	559555	673025	23	26	25	29	30	6
NSR135	565020	669608	18	23	24	25	18	3
NSR136	565456	669970	17	20	23	24	17	1
NSR137	559405	674249	21	25	24	29	29	5
NSR138	564914	669501	18	23	24	26	19	4
NSR139	566086	670481	19	22	24	25	16	5
NSR140	564552	669302	19	24	25	26	20	6
NSR141	564642	669335	18	24	25	26	19	6
NSR142	563343	669044	18	24	25	27	22	8
NSR143	564711	669345	18	24	25	26	19	5
NSR144	566826	671987	20	24	26	27	16	9
NSR145	563595	669001	19	23	25	26	22	8
NSR146	564726	669301	18	23	25	26	19	5
NSR147	566871	671989	20	23	25	26	16	9
NSR148	561961	669350	22	27	27	31	30	7
NSR149	564703	669272	18	23	25	26	19	5
NSR150	559670	672291	21	26	26	29	29	6
NSR151	566883	671979	20	23	25	26	14	9
NSR152	561828	669418	23	27	27	31	30	7
NSR153	566882	671887	20	23	25	26	16	9
NSR154	559994	671744	22	27	27	30	29	9
NSR155	566141	670341	18	22	24	24	14	4
NSR156	559413	672841	22	25	25	29	29	5
NSR157	566945	671972	18	17	21	23	5	nil
NSR158	565203	669501	17	23	24	25	17	4
NSR159	566938	671893	18	17	21	23	4	nil
NSR160	564692	669181	17	17	22	22	9	6