A specialist energy consultancy

Appendix 12-1

Construction Noise Report

Carrig Renewables Wind Farm

Carrig Renewable Energy Ltd

IE062-012-R0
11 September 2023

COMMERCIAL IN CONFIDENCE

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TNEI Services Ltd
Company Registration Number: 03891836 **VAT Registration Number: 239 0146 20**

Registered Address		
Bainbridge House	7th Floor West One	7th Floor
86-90 London Road	Forth Banks	80 St. Vincent Street
Manchester	Newcastle upon Tyne	Glasgow
M1 2PW	NE1 3PA	G2 5UB
Tel: +44 (0)161 233 4800	Tel: +44 (0)191 211 1400	Tel: +44 (0)141 428 3180

TNEI Ireland Ltd
Registered Address: 104 Lower Baggot Street, Dublin 2, DO2 Y940
Company Registration Number: 662195 **VAT Registration Number: 3662952IH**

Unit S12, Synergy Centre
TU Dublin Tallaght Campus
Tallaght
D24 A386
Tel: +353 (0)190 36445

TNEI Africa (Pty) Ltd
Registered: Mazars House, Rialto Rd, Grand Moorings Precinct,7441 Century City, South Africa
Company Number: 2016/088929/07

Unit 514 Tyger Lake
Niagara Rd & Tyger Falls Blvd
Bellville, Cape Town
South Africa, 7530

Executive Summary

TNEI Services Limited (TNEI) was commissioned to undertake predictions of noise levels associated with the construction of the proposed Carrig Renewables Wind Farm. The noise predictions were used to assess the potential impact of noise attributable to the construction of the Proposed Development 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 and activities.

There were 61 potential noise sensitive receptors identified within a ~2 km search area of the Wind Farm Site (defined from turbine locations within the Wind Farm Site) and predictions were made at all identified receptors assuming that all items of plant were operating continually in foxed locations, 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 conservative and likely to over-predict the actual sound levels that may be experienced.

The results show that the predicted noise levels at all receptors would be below the most stringent of the noise threshold levels detailed in BS 5228. Accordingly, the assessment concludes that there would be no significant construction noise impacts.

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1 Introduction

1.1 Brief

1.1.1 TNEI was commissioned by MKO to undertake a construction noise assessment for the proposed Carrig Renewables Wind Farm (hereinafter referred to as the Proposed Development). 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 BS5228-1:2009 +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; 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 Development', 'the Site', 'Wind Farm Site' and 'Grid Connection'.

1.3 Site Description

1.3.1 The Proposed Development is located approximately 7 km south west of Birr, Co. Offaly and 10 km to the north east of Borrisokane, Co Tipperary. The approximate Irish Transverse Mercator (ITM) reference for the centre if the site is 606831, 703741 and the proposed layout is composed of 7 wind turbines, 2 construction compounds, met mast, substation and access roads. Figure 1 in Annex A details the site infrastructure.

1.3.2 The Grid Connection includes for underground cable from the proposed onsite 38 kV substation to the existing 110 kV Dallow substation. The underground cabling route, measuring approximately 13.7 km in length, is primarily located within the public road corridor.

1.3.3 The Wind Farm Site will be accessed through an improved entrance off the L5040 local road to the south east of the site. Construction noise impacts from vehicles improving and using this access roads are considered within this assessment, as well as all anticipated noise generating construction activity occurring within the site.

1.3.4 Construction of the Proposed Development would require tree felling, the laying of new roads and upgrades to some existing roads and tracks across the site, establishing a construction compound, excavation of turbine foundations, construction of turbine bases, erection of turbines and the installation of a substation and associated underground electrical cabling route. *EIAR Chapter 4: Description* can be referred to for a detailed description of the Proposed Development and the construction requirements.

1.3.5 Construction is anticipated to last for 12 - 18 months. An indicative construction timeline split out into three-month periods is provided in EIAR Chapter 4 and replicated here as Table 1-1. Activities denoted with blue cells have been included in the noise assessment. Activities denoted with grey cells are considered to be non-contributory to the noise produced from the construction activities.

Table 1-1: Indicative construction timetable

Task	Additional info	Q1	Q2	Q3	Q4	Q5	Q6
Site Health & Safety							
Site Compounds	Establishing site compound and site access						
Felling	Localised around some turbines, substation and along access tracks						
Site Roads	Construction and upgrades of site tracks						
Turbine Hardstands	Excavate at turbine locations and establish crane pads						
Turbine Foundations	Fix reinforcing steels and pour concrete						
Substation and Electrical Works	Construction of substation and installation of cabling						
Backfilling and Landscaping							
Turbine Delivery & Erection							
Substation Commissioning							
Turbine Commissioning							

1.3.6 TNEI has undertaken noise propagation modelling for each quarterly period, which are referenced throughout this report as Scenarios 01 - 06, respectively. Although no

construction activities are anticipated during the night-time an additional scenario has been assessed (Scenario 07) that considers any potential noise from the operation of generators for lighting and other types of plant that may be left on over-night at the construction compound.

1.3.7 The temporary noise effects that are likely to occur along the length of the underground electrical cabling route are also considered within this assessment.

2 Noise Planning Policy and Guidance

2.1 Overview of Noise Planning Policy and Guidance

2.1.1 There is no published Irish guidance that contains noise limits or assessment methods 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).* Accordingly, in the absence of any other applicable legislation or guidance, this assessment is undertaken in accordance with BS 5228.

2.2 BS 5228:2009+A1:2014

2.2.1 The BS 5228 standard provides useful guidance on practical noise 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 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 would vary continually over time as activities and plant start and stop and move around the site, however, a worst-case 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 Although an indicative timetable has been provided, a specific construction schedule has not been determined at this stage. *Chapter 4: Description* of this EIAR does, however, provide descriptions of some of the likely construction activities that would be undertaken and the type of plant that would be used.

3.2.2 The core hours for construction activity will be 07:00 to 19:00 Monday to 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, from delivery and unloading of abnormal loads or health and safety requirements, or to ensure optimal use is made of fair weather windows for concrete deliveries, the erection of turbine blades and the erection and dismantling of cranes.

3.2.3 To consider the variation in noise levels that would occur throughout the construction period a several scenarios have been modelled. The scenarios are based on the combination of construction tasks detailed in the indicative timetable (**Error! Reference source not found.**), *Chapter 4: Description* and TNEI's knowledge and experience of other similar sites and construction schedules.

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

3.2.5 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 but requiring less vehicles and plant. Accordingly, if noise levels during the construction phases are acceptable, they will also be acceptable during decommissioning.

4 Methodology

4.1 Methodology for the Prediction of Noise

4.1.1 To predict the noise immission levels attributable to the construction of the Proposed Development, 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 NAL, the $L_{Aeq(t)}$ levels have been predicted in accordance with ISO9613-2:1996 *'Acoustics–- Attenuation of sound during propagation outdoors: General method of calculation'*. (2)

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, BS5228 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 4 m above local ground level. Soft ground (G=1) attenuation has been assumed at all locations except for 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, estimating a worst-case source noise level; and
- All mobile plant assumed to be working on 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 would fluctuate as construction plant and activities move around in their activity areas.

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 (represented here as Table 4-1) contains an example of the significance criteria that can be used to assess construction activities.

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 values 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. BS5228 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 specific noise threshold for the locality (set relative to the existing ambient noise levels) for a particular period of the day, rather than an absolute noise level.

4.3.5 It should be noted that exceedance of the limit 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 ~2 km buffer around the Wind Farm Site. Within this study area, 61 Noise Sensitive Receptors (NSRs)s have been identified, of which all are residential properties.

4.4.2 Rather than identifying individual buildings on the underground electrical cabling 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 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 NSRs within the study area have been assessed.

4.4.4 A representative sample of 13 Noise Assessment Locations (NALs) have been chosen to represent the closest NSRs or group of NSRs to the Wind Farm Site and the assessment of these NALs are detailed within this report on the assumption that if noise levels are within acceptable levels at the closest receptors, then it is reasonable to assume they will also be acceptable at more distant locations. Nevertheless, noise level predictions for all identified NSRs in the study area are provided in Annex C for completeness.

4.4.5 Table 4-2 details the NALs considered within the report, which are also shown on Figure 1. Figure 2 (Annex A) presents the NALs and all of the identified NSRs. For clarity, all NALs and NSRs are also labelled as 'H' and numbered to ensure consistency with labelling used within the rest of the EIAR.

Table 4-2: Construction Noise Assessment Locations

NAL - NSR	ITM Coordinates	
	Eastings	Northings
NAL01 (H8)	599220	700514
NAL02 (H52)	598521	700638
NAL03 (H51)	597987	700819
NAL04 (H3)	596246	701962
NAL05 (H61)	597063	703194
NAL06 (H60)	597452	703742
NAL07 (H24)	599875	703112
NAL08 (H21)	600767	702732
NAL09 (H4)	600097	701616
NAL10 (H42)	600193	701449
NAL11 (H49)	600469	700586
NAL12 (H54)	600129	700098
NAL13 (H25)	600449	699641

4.5 Baseline Noise Levels

4.5.1 Baseline noise level monitoring was carried out as part of the operational noise assessment undertaken for the Proposed Development (see Appendix 12-2 for more information).

4.5.2 At all noise monitoring locations the ambient sound levels were below the BS 5228 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 at the NSRs around the Proposed Development, 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 level limits:

- Daytime weekdays 07:00 – 19:00: 65 dB $L_{Aeq\ (12\ hours)}$
- Saturday 07:00 – 13:00: 65 dB $L_{Aeq\ (6\ hours)}$

- Evenings and Weekends 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 would 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 this assessment assumes all equipment is continually operating at full power and in locations closest to the NSRs, whereas in practice, equipment load and precise location may vary throughout the day. This approach has been adopted to represent a worst-case assessment.

5.1.2 A 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 B: 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* [3] (Forestry Commission). No octave band data is available therefore modelling has been undertaken using the 500 Hz octave band data, as recommended in ISO 9613. Noise levels for the Harvester and Forwarder are given at the operator position inside a Q Cab. In order to estimate external levels 10 dB has been added to the quoted levels and the sound power level for each item of plant has been calculated within CadnaA assuming the quoted sound pressure levels (SPLs) have been measured at a 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 suitable for the estimation of noise immission levels.

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 For both mobile and static plant, activity noise levels would be transient in nature due to changes in location, on/off periods, and fluctuations of load on any individual machine.

5.1.7 All static items of plant and activities have been modelled as single point sources. All mobile plant (excavators, dozers, dumpers etc.) have been modelled as either a moving point source (line source) along their anticipated movement paths or as a stationary point source located at the closest point of its anticipated work area to any given NAL.

5.2 Modelling of Construction Activities.

5.2.1 The assessment considers seven construction scenarios based on the key construction activities detailed in Chapter 4: Description and the indicative timetable (**Error! Reference source not found.** of this report).

5.2.2 Noise propagation modelling has been undertaken considering the key activities that are likely to occur throughout the construction period. Details of the items of plant assumed to

be operating in each modelled scenario, as well as noise data for each modelled noise source, are included in Annex B: Noise Model Data.

5.2.3 The modelled scenarios represent the following construction activities;

- Scenario 01 (Q1): Construction and upgrading of tracks from the site entrance up to the construction compound is occurring. Preparation of the construction compound is underway and felling activities are occurring in the areas of T2, T3, T6, T7, the construction compound and substation areas, as well as along the main access track.

- Scenario 02 (Q2): Construction compound is now complete and construction/upgrading of tracks from the compound to the base of the turbines is occurring. The construction compounds are now in operation and lorries are passing along the site access track with deliveries to the now operational construction compounds. Construction of the turbine hardstanding at T3 and T6 is underway, and construction of the substation and cabling works have begun.

- Scenario 03 (Q3): As for Scenario 02, however, construction of turbine hardstanding and has progressed to T2 and T4.

- Scenario 04 (Q4): As for Scenario 02 however, construction of turbine hardstanding is occurring at T5 and T7, whilst work on the foundations is occurring at T2, T3, T4 and T6.

- Scenario 05 (Q5): Works on tracks is now complete. Deliveries to the compounds are still occurring, as well as the delivery of the turbines themselves. Turbine hardstanding is being constructed at T1 and turbine foundations are being constructed at T1, T5 and T7. Backfill and landscaping is being undertaken in the areas of the other turbines. In addition, turbine erection is underway.

- Scenario 06 (Q6): Most construction work has been completed but backfill and landscaping operations are still occurring around T1, T5 and T7 and on the main track by the site entrance.

- Scenario 07 (Night-time): Diesel generators are operating at the construction compound to provide power to the site cabins and for lighting rigs.

5.3 Calculated Noise Immission Levels

5.3.1 Table 5-1 presents the calculated noise immission levels at each NAL for each scenario.

Table 5-1: Predicted Construction Noise Immission Levels, dB $L_{Aeq(t)}$

NAL	Scenario						
	1	2	3	4	5	6	7
NAL 01	50	43	44	47	50	44	21
NAL 02	43	42	42	48	51	39	25

NAL	Scenario						
	1	2	3	4	5	6	7
NAL 03	40	39	39	45	49	37	23
NAL 04	30	27	26	33	37	24	12
NAL 05	32	30	29	36	39	25	15
NAL 06	32	29	28	35	38	24	14
NAL 07	37	34	35	41	43	28	19
NAL 08	35	31	32	38	40	25	15
NAL 09	45	48	48	51	52	37	25
NAL 10	43	44	44	48	50	36	24
NAL 11	42	33	34	39	43	36	17
NAL 12	51	35	35	40	43	45	15
NAL 13	41	30	31	36	39	36	12

5.3.2 For all NALs the predicted noise levels for all scenarios are below the weekday and Saturday daytime Category A threshold level of 65 dBA and are also below the evening and weekend Category A threshold level of 55 dBA.

5.3.3 No construction activities are anticipated during the night-time, however, some generation plant or similar may operate during night-time hours within the construction compounds. The predicted noise levels for the modelled night-time scenario are below the night-time Category A threshold levels of 45 dBA.

5.4 Grid Connection

5.4.1 For the Grid Connection underground electrical cabling 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. Section 4.7.7.1 in Chapter 4 of the EIAR describes the construction of the underground electrical cable trench in more detail.

5.4.2 Where construction activities occur directly besides a dwelling the noise levels at that location are likely to be in the region of 75 – 80 dBA for a short period of time. This noise level is deemed representative of any receptor that lies adjacent to the Grid Connection underground electrical cabling route. It should be noted, however, that this would only occur where construction activities are directly opposite a dwelling i.e. within approximately 20 m. To put this into context, trenching and backfill activities are anticipated to move along the underground electrical cabling 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 Although noise levels from trenching and backfill operations may occasionally exceed the BS 5228 threshold levels during the daytime, 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 up to three watercourse, culvert and drain crossings there may be a requirement for Directional Drilling (DD), as delineated in Chapter 4 of the EIAR and also shown on Figure xxx of the EIA. DD typically requires the use of multiple items of plant including pumps, mud recyclers, drilling rigs and generators, however, the proposed plant for these water crossings is a 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.

5.4.5 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 65dBA threshold from a distance of approximately 30m. This is the potential for DD to be required at the water crossing in the village of Carrig (ITM coordinates 701293, 601783). Where DD is identified as the preferred water crossing solution and will occur within 30m of a residential dwelling then mitigation measures will be considered in line with the guidance presented in BS 5228. Mitigation measures include include the erection of temporary boarding alongside the drilling rig or the 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. At all other water crossings there are no houses within 30 m and noise impacts will be minimal.

5.5 Turbine Delivery Route Accommodation Works

5.5.1 Accommodation works, to facilitate the delivery of turbine components and other abnormal loads, are required at two locations along the N52 National Secondary Route. .

5.5.2 This consists of the creation of temporary access tracks using layers of aggregate material spread across existing grassland/fields and widening of the N52/L5040 junction within the public road corridor. Once the accommodation areas are no longer required, the temporary areas are left to naturally revegetate.

5.5.3 Given the works are only likely to require small number of construction plant, are temporary in their nature and are only due to occur at two locations, they have not been accounted for within the noise model as the impacts are expected to be negligible. As such, there is no significant effect anticipated.

6 Summary

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

6.1.2 Noise propagation modelling has been undertaken in accordance with ISO 9613-2:1996 and the anticipated noise immission levels presented for scenarios likely to occur during the construction period. The modelled scenarios consider the 'noisiest' activities that are likely to occur across a number of scenarios and the modelling assumes that activities are occurring at the locations within the development site that are closest to the NSRs.

6.1.3 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 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 DD 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. If DD activities are required for the watercourse crossing in the village of Carrig then temporary noise barriers, or similar, should be installed to reduce noise levels at the nearest dwellings.

6.1.4 The predicted levels for the construction of the Wind Farm Site (as opposed to the Grid Connection) are below the Category A Daytime and Evening and Weekend Threshold Levels, as detailed within BS 5228:2009, for all receptors. Accordingly, construction noise impacts are below the indicator for a potential significant effect.

6.1.5 An assessment of noise levels that may occur during the night-time, for example, from the use of generators to power on-site lighting, has indicated that levels will remain below the Category A Night-time Threshold Levels.

6.1.6 The assessment concludes that construction noise levels would remain below the indicator for a potential significant effect.

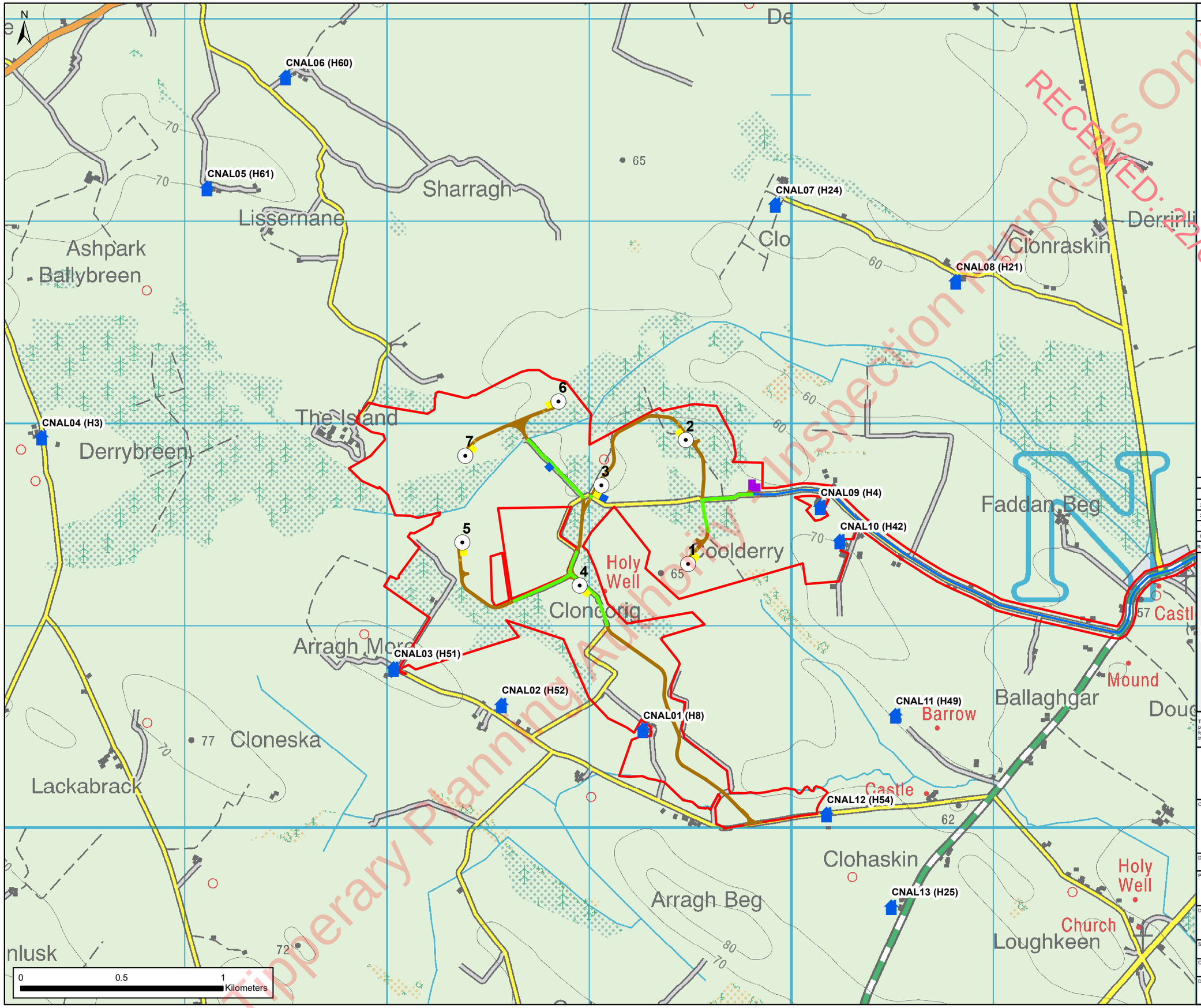
7 References

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. **(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.

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

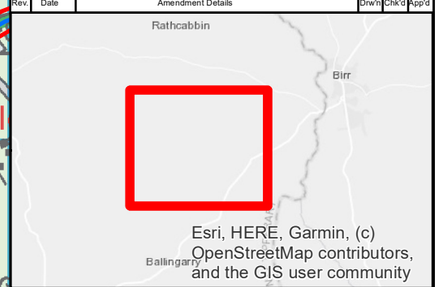
Annex A – Figures



NOTES

- EIAR Site Boundary
- Turbines
- Construction Noise Assessment Locations
- Proposed Upgrades to Existing Roads
- Proposed New Roads
- Construction Compounds
- Crane Pad
- Onsite Substation
- Grid Connection Route

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
3	29/08/23	FINAL ISSUE	EW	EW	MC
2	02/08/22	THIRD ISSUE	EW	EW	MC
1	31/05/23	SECOND ISSUE	CB	EW	MC
0	31/05/23	FIRST ISSUE	JCM	EW	EW



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Client: CARRIG RENEWABLES WIND FARM LTD

Drawing Status: FOR PLANNING

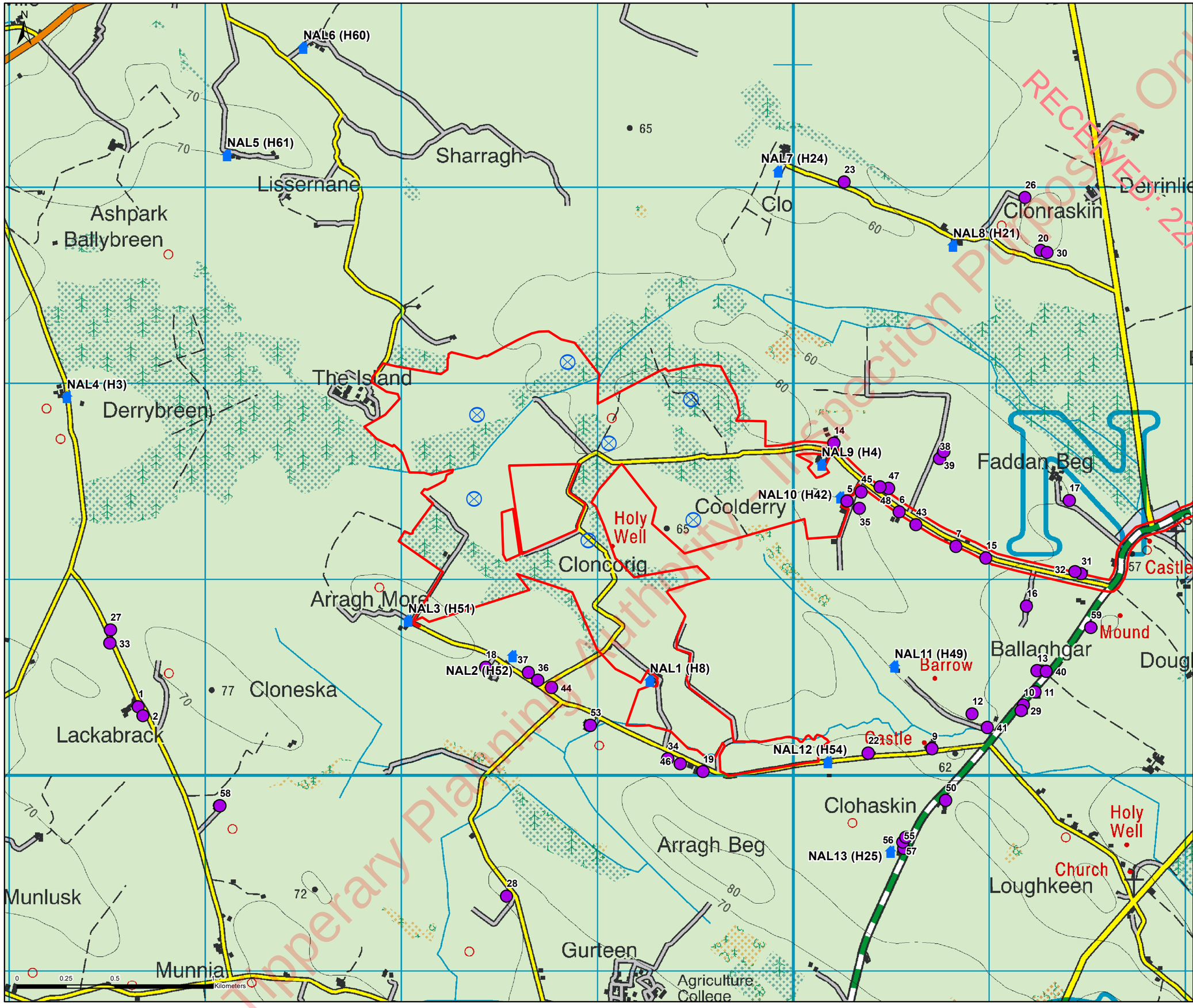
Project Title: CARRIG RENEWABLE ENERGY DEVELOPMENT

Drawing Title: FIGURE 1 - CONSTRUCTION NOISE ASSESSMENT: SITE LAYOUT

Scale	Designed	Drawn	Checked	Approved
1:17,500	JCM	EW	EW	MC
Original Size	Date	Date	Date	Date
A3	29/08/2023	29/08/2023	29/08/2023	29/08/2023

Drawing Number: IE62 - 014

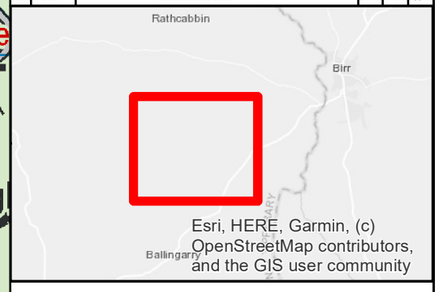
Revision: 3



NOTES

- EIAR Site Boundary
- Proposed Turbine Location
- Construction Noise Assessment Location (CNAL)
- Noise Sensitive Receptor (NSR)

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
2	29/08/23	FINAL ISSUE	EW	MC	MC
1	02/08/23	SECOND ISSUE	EW	MC	MC
0	22/05/23	FIRST ISSUE	EW	MC	MC



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Client: CARRIG RENEWABLES WIND FARM LTD

Drawing Status: FOR PLANNING

Project Title: CARRIG RENEWABLE ENERGY DEVELOPMENT

Drawing Title: FIGURE 2 - CONSTRUCTION NOISE STUDY AREA

Scale	Designed	Drawn	Checked	Approved
1:18,000	EW	EW	MC	MC
Original Size	Date	Date	Date	Date
A3	29/08/2023	29/08/2023	29/08/2023	29/08/2023

Drawing Number: IE62-013

Revision: 2

Annex B – Noise Model Data

Noise Source	Octave Band Sound Power Levels, dBZ								Sound Power Level		BS5228 Reference
	63	125	250	500	1000	2000	4000	8000	dBA	dBZ	
Lorry	121	107	104	102	101	100	97	94	106.9	121.4	Annex C 1.14
Dozer	113	102	104	101	100	106	90	84	108.7	114.8	Annex C 2.12
Tracked Excavator	113	106	105	105	101	99	96	91	107	115.1	Annex C 2.14
Dump Truck (empty)	114	107	107	107	107	112	97	88	114.7	117.9	Annex C 2.31
Wheeled Excavator	92	88	91	92	90	85	79	73	93.9	98.1	Annex C 4.10
Concrete mixer truck	111	102	94	97	98	106	88	83	108	112.9	Annex C 4.20
Dumper	112	109	102	101	100	96	89	81	104.3	114.5	Annex C 4.3
Concrete mixer truck + truck mounted concrete pump + boom arm	101	101	105	104	100	98	93	90	105.8	110	Annex C 4.32
Mobile telescopic crane	118	109	106	102	105	104	97	89	109.4	119.2	Annex C 4.45
Diesel generator for site cabins	103	100	104	98	97	93	84	75	101.7	108.3	Annex C 4.84
Diesel generator for lighting	106	99	94	90	87	83	84	77	93.5	107.2	Annex C 4.86
Vibratory roller	118	110	101	100	98	93	87	82	103	118.8	Annex C 5.20
Excavator Mounted Rock Breaker	119	117	113	117	115	115	112	108	121	124.5	Annex C 9.12
Harvester	-	-	-	103	-	-	-	-	103	106.2	-
Forwarder	-	-	-	101	-	-	-	-	101	104.2	-
Skidder	-	-	-	108	-	-	-	-	108	111.2	-

Annex C – Noise Sensitive Receptor Results

Sound Pressure Levels Calculated at the Nearest Identified NSRs, dB LAeq(t)

NAL/NSR	Scenario						
	1 (Q1)	2 (Q2)	3 (Q3)	4 (Q4)	5 (Q5)	6 (Q6)	7 (Night)
H01	30	27	27	34	37	24	12
H02	30	27	27	34	37	24	11
H03 (NAL04)	30	27	26	33	37	24	12
H04 (NAL09)	45	48	48	51	52	37	25
H05	42	41	42	47	49	35	23
H06	39	37	38	42	45	32	18
H07	37	33	34	39	42	30	16
H08 (NAL01)	50	43	44	47	50	44	21
H09	38	30	30	36	39	32	13
H10	34	28	29	35	38	28	12
H11	34	28	29	35	38	27	12
H12	36	30	30	36	39	30	13
H13	34	29	29	35	38	27	12
H14	45	47	47	50	52	38	24
H15	36	32	32	38	41	28	15
H16	34	30	30	36	39	27	13
H17	33	30	30	36	38	25	12
H18	42	41	41	47	50	38	24
H19	54	41	41	43	47	50	17
H20	32	29	29	36	38	23	12
H21 (NAL08)	35	31	32	38	40	25	15
H22	46	33	33	38	42	40	15
H23	36	33	33	40	42	28	16

NAL/NSR	Scenario						
	1 (Q1)	2 (Q2)	3 (Q3)	4 (Q4)	5 (Q5)	6 (Q6)	7 (Night)
H24 (NAL07)	37	34	35	41	43	28	19
H25 (NAL13)	41	30	31	36	39	36	12
H26	32	29	29	35	37	23	12
H27	30	27	27	34	37	25	12
H28	35	29	30	36	39	29	14
H29	34	28	29	35	38	28	12
H30	32	29	29	36	38	23	12
H31	33	29	29	35	38	25	12
H32	33	29	29	35	38	26	12
H33	30	27	27	34	37	24	12
H34	50	40	40	43	46	45	18
H35	41	40	41	46	48	34	21
H36	43	40	40	47	49	37	24
H37	43	40	41	47	49	38	24
H38	38	35	36	41	43	29	17
H39	38	35	35	41	43	29	17
H40	34	28	29	35	38	27	12
H41	35	29	29	35	38	29	12
H42 (NAL10)	43	43	43	48	50	36	24
H43	39	36	36	41	44	31	17
H44	43	39	40	46	49	36	24
H45	41	40	41	46	48	34	21
H46	51	40	40	43	46	46	17
H47	40	40	40	45	47	33	21

NAL/NSR	Scenario						
	1 (Q1)	2 (Q2)	3 (Q3)	4 (Q4)	5 (Q5)	6 (Q6)	7 (Night)
H48	41	41	41	46	48	33	22
H49 (NAL11)	42	33	34	39	43	36	17
H50	37	28	29	35	38	31	12
H51 (NAL03)	40	39	39	45	49	37	23
H52 (NAL02)	43	42	42	48	51	39	25
H53	44	37	38	44	46	38	20
H54 (NAL12)	51	34	35	40	43	45	15
H55	41	30	30	35	39	35	13
H56	41	30	31	36	39	35	13
H57	41	30	31	36	39	35	13
H58	31	27	27	34	37	25	12
H59	32	28	28	34	37	25	11
H60 (NAL06)	32	29	28	35	38	24	14
H61 (NAL05)	32	30	29	36	39	25	15