

House ID	Description	dB LA90,10min at Various Standardised Wind Speeds (m/s)				
		4	5	6	7	≥8
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R049	Dwelling	24.6	25.7	28.6	30.1	32.2
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R050	Dwelling	24.9	26.3	29	30.5	32.4
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R051	Derelict	25.1	26.5	29.2	30.8	32.7
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R052	Dwelling	24.9	26.3	29	30.6	32.5
	Daytime Criterion	40.0	40.0	45.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R053	Dwelling	24.2	25.6	28.4	29.9	32.0
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R054	Dwelling	23.9	25.3	28.1	29.6	31.7
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R055	Dwelling	25.7	26.9	29.9	31.6	33.7
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R056	Derelict	25.7	26.8	29.9	31.6	33.7
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–

House ID	Description	dB LA90,10min at Various Standardised Wind Speeds (m/s)				
		4	5	6	7	≥8
R057	Dwelling	26	27	30.2	31.8	34.0
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R058	Dwelling	28.9	29.6	33.1	35.1	36.8
	Daytime Criterion	40.0	45.0	45.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R059	Dwelling	29.6	30.4	33.8	35.7	37.5
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R060	Derelict	29.3	30.1	33.5	35.5	37.2
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R061	Dwelling	29.5	30.3	33.7	35.7	37.4
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R062	Derelict	29.8	30.5	34	35.9	37.6
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R063	Derelict	33.7	34.1	37.8	39.7	41.3
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R064	Dwelling	33.8	35.8	38.3	39.4	40.6
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	-	-	-	-	-
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	-	-	-	-	-
R065	Dwelling	37.2	37.4	41.3	43.2	44.6
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0

House ID	Description	dB LA90,10min at Various Standardised Wind Speeds (m/s)				
		4	5	6	7	≥8
	Daytime Excess	–	–	1.3	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	0.2	1.6
R066	Dwelling	24.5	27.7	29.2	30.2	30.9
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R067	Dwelling	24.9	28.1	29.7	30.6	31.2
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R068	Derelict	27.4	30.8	32.3	33.2	33.6
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R069	Dwelling	34.1	34.7	38.4	40.4	41.9
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R070	Dwelling	28.6	30.3	32.8	34	35.7
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R071	Derelict	24.5	26	28.6	30.1	32.0
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R072	Dwelling	24.8	26.7	29	30.3	32.0
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R073	Dwelling	29.7	32.9	34.5	35.5	36.0
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0

House ID	Description	dB L _{A90,10min} at Various Standardised Wind Speeds (m/s)				
		4	5	6	7	≥8
	Night time Excess	–	–	–	–	–
R074	Dwelling	28	31.3	32.9	33.7	34.2
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R075	Dwelling	32.2	35.6	37.2	38.1	38.5
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R076	Dwelling	32.9	36.2	37.8	38.7	39.1
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R077	Derelect	32	34.7	36.6	37.6	38.5
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–
R078	Derelect	29.3	32.7	34.2	35.1	35.5
	Daytime Criterion	40.0	40.0	40.0	45.0	45.0
	Daytime Excess	–	–	–	–	–
	Night time Criterion	43.0	43.0	43.0	43.0	43.0
	Night time Excess	–	–	–	–	–

A noise contour for the omni-directional rated power wind speed (i.e. highest noise emission) for the cumulative scenario and the proposed development in isolation is presented in Appendix 11-5.

The cumulative predicted noise levels at various wind speeds have been compared against the noise criteria curves. The predicted noise levels for the various wind speeds are within the noise criteria curves at all but two no. NSLs. The only two NSLs where there is a predicted potential exceedance of the cumulative noise criteria are at R037 and R065.

At NSL R037, there is a marginal exceedance of magnitude 0.2dB during the night time at 8m/s. Further discussion is provided in Section 11.5.3.1.1.

At R065, there is a potential exceedance of 1dB during the daytime at 6m/s and a potential exceedance of 0.8dB at ≥8m/s during the night time. As referenced above, the potential exceedance is relative to the cumulative noise criteria and the predicted noise level at H065 contains noise contributions from the proposed Croagh wind farm and the existing Garvagh Glebe and Black Banks wind farms to different degrees.

A review of the relative contributions of the various windfarms confirms that the Croagh Wind Farm is significantly lower than the relative contribution of the existing wind farms which are closer in proximity to R065. The specific exceedances are examined as follows:

- At 6 m/s, a potential exceedance of 1.3dB over the daytime criterion is predicted. The relative contribution of the Croagh wind farm at 6m/s is 27.2dB while the relevant noise limit at this wind speed is 40 dB. As such, the predicted contribution of the Croagh turbines is 12.8dB below the noise criteria.
- At 7m/s, a potential exceedance of 0.2dB over the night-time criterion is predicted. As above, the contribution of the Croagh turbines is 28dB which is 15dB below the night-time noise criterion of 43dB.
- At 8 m/s, a potential exceedance of 1.6dB over the night-time criterion is predicted. Likewise, the relative contribution of the Croagh wind farm is 28dB which is 15.1dB below the night-time noise criterion of 43dB.

On this basis, it is demonstrated that the predicted contribution of the Croagh turbines is more than 10dB below the contribution of the existing developments at R065⁹. As a result, the predicted noise levels generated by the proposed Croagh development does not result in an increase in the noise levels experienced at dwelling R065 and therefore is not causing an exceedance of the cumulative noise criteria.

11.5.3.1.1 Consideration of Wind Direction

The preceding section considered omni-directional cumulative noise i.e. assuming all noise locations being downwind of all turbines at the same time. The next step in the assessment is to consider wind directionality and turbine noise propagation in the noise prediction model using the methods outlined in Section 11.3 8 3.

A full suite of directional noise prediction results for all NSLs is presented in Appendix 11-6.

On review of the results of the noise model for dwelling R065, it could be seen that the Croagh turbines were not a significant contributor to the operational noise levels, i.e. the predicted contribution from the Croagh site was 10dB less than other turbines, therefore in line with best practice guidance the Croagh turbines are not predicted to increase the noise level at this location. At dwelling H037, the contribution from turbines on the Croagh site was closer in magnitude to other turbines and therefore has been assessed in more detail below.

Directional noise prediction models have been developed to identify the number and magnitude of potential exceedances to the noise criteria at dwelling R037 with the proposed Croagh turbines operating in standard mode.

The only wind direction where any potential exceedance of the criteria has been found is the southerly wind direction (180°). The predicted potential exceedances are presented in the table below. An exceedance of 0.3 dB has been found at R037, which lies to the north of the proposed turbine T6. This represents the only wind direction where a potential exceedance is predicted.

⁹ A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, Institute of Acoustics (2013).

Table 11-22 Summary of Predicted Exceedances – R037

Dwelling R037		Excesses of Criterion dB LA90,10min at Various Standardised Wind Speeds (m/s)				
Wind Direction	Period	4	5	6	7	8
South	Daytime	–	–	–	–	–
	Night time	–	–	–	–	0.3

This assessment has used a worst-case sound emission envelope of three candidate turbine technologies operating in standard mode. Modern wind turbines can be programmed to run in reduced modes of operation (or low noise modes) in order to achieve noise criteria during certain periods (i.e. day or night) and in specific wind conditions (i.e. wind speed and direction). The turbine technology that will be chosen will offer various low noise modes of operation which typically will have an associated energy output reduction.

It proposed that turbine operation be modified during the wind speed conditions and periods of day or night identified above in order to remove the predicted potential exceedance at dwelling R037.

In summary, since the cumulative predicted noise levels associated with the combined operation of the Croagh Wind Farm and existing developments, will be within best practice noise criteria curves recommended in Irish guidance ‘Wind Energy Development Guidelines there will be no significant effect associated with the development.

While noise levels at low wind speeds will increase due to the development, the predicted levels will remain low, albeit a new source of noise will be introduced into the soundscape. The predicted operational noise effects are summarised as below at the closest noise sensitive locations to the site:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Moderate	Long term

For the majority of locations, further from the Croagh development and in instances where turbine noise from existing wind farms are audible, the effect of the operational turbines can be considered to be as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Slight	Long term

11.5.3.2 Internal Site Roads

Considering that there is no significant traffic expected on site roads during the operational phase and the significant distances from any site road to the nearest NSL; there are no noise and vibration impacts anticipated from site roads during the operational phase.

11.5.3.2.1 Description of Effects

With respect to the EPA criteria for description of effects, the potential worst-case effects at the nearest noise sensitive location associated with the operation of internal roads are described over.

Quality	Significance	Duration
Negative	Imperceptible	Long-term

11.5.3.3 Substation

As part of the development the substation will be operational continuously. The noise emission level associated with a typical substation that would support a development of this nature is 93 dB L_{WA}.

S

MADE BY SIEMENS, S.A.

Transformer type	TLPN7747	Nr.	LEL 111748	Year of manuf.	2013	Specification	IEC 60076
Rated power	40 000 / 50 000 kVA		---	U _m	52 / 24 kV	AC	95 / 50 kV
Vector-group symbol	Dyn11		Continuous	Rated frequency	50 Hz	Cooling method	ONAN/ONAF
Position	Voltage		Current		Impedance voltage		
1	43 890 V		---	526 / 658 A		---	%
10	37 500 V		20 960 V	616 / 770 A		1102 / 1377 A	%
21	29 690 V		---	778 / 972 A		---	%
Max. altitude above sea level	1000 m			Upper limit of overcurrent (HV)	6.7 kA	Duration of short-circuit	2 s
Temp. Rise (oil/winding)	60 / 65 K			Total mass	64 t	Mass of insul. oil	13 t
Number of phases	3			Untaking mass	38 t	Transportation mass	56 t
Sound power level	93 dB (A)			Temp. rise oil / winding	60 / 65 K	Ambient temp. max.	40 °C
Tank and conservator full vacuum resistant					---	Type of oil	Nynas Nytro Taurus
Type of on-load tap changer	VV III 600D-76-12233G			Rated current	600 A	U _m	76 kV
						Revol. of driving shaft per step	33

Figure 11-21 Statement of Lw for Typical Sub Station Used for Assessment

An iteration of the noise model has been developed to consider the expected noise level from the plant at the nearest noise sensitive locations to the proposed substation. The predicted noise levels at the closest 10 no. receivers are presented in Table 11-23.

Table 11-23 Predicted Substation Noise Levels

House ID	Height (m)	Predicted L _{Aeq,T} dB
R037	4	27
R036	4	25
R032	4	21
R031	4	20
R034	4	20
R038	4	20
R064	4	19
R035	4	19

House ID	Height (m)	Predicted L _{Aeq,T} dB
R076	4	19
R022	4	17

The worst case predicted level is expected to be the order of 25 - 27dB(A) at R36 and R037. These noise levels will be in line with or less than prevailing background noise levels. At other locations the predicted level is 21dB or less.

11.5.3.3.1 Description of Effects

The description of the predicted impact is as follows:

Quality	Significance	Duration
Negative	Imperceptible	Long term

11.5.3.4 Grid Connection

There are no noise and vibration impacts anticipated from the operation of the grid connection.

11.5.4 Construction Phase Mitigation

The assessment of potential impacts has demonstrated that the proposed development is predicted to comply with the identified criteria for the construction phase. While no specific mitigation measures are required to achieve construction noise criteria, a schedule of best practice mitigation measures has been developed and is set out in the following sections.

Regarding construction activities, BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise* and BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Vibration* have been taken into account.

11.5.4.1 Construction Phase – Noise

The following best practice measures will be implemented by the contractor for the construction phase:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring typical levels of noise and vibration during critical periods and at sensitive locations;
- keeping site access roads even to mitigate the potential for vibration from lorries.

Furthermore, a variety of practicable noise control measures will be employed. These include:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints, and;
- regular maintenance and servicing of plant items.

The contract documents will clearly specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise. The following list of measures will be implemented on site, to ensure compliance with the relevant construction noise criteria:

- No plant used on site will be permitted to cause an on-going public nuisance due to noise.
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- Any plant, such as generators or pumps, which is required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen.
- During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Section 11.3.2.1.1 . using methods outlined in British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours, rotor/tower deliveries) it will be necessary on occasion to work outside of these hours.

11.5.4.2 Construction Phase – Vibration

It is recommended that vibration from construction activities be limited to the values set out in Table 11-2. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution.

Considering the large distances between locations where piling may take place and the nearest noise sensitive locations, no significant impact will be experienced. Therefore, no mitigation measures are proposed for piling operations.

- Specific to blasting the following mitigation measures will be employed to control the vibration impact during blasts: Trial blasts may be undertaken to obtain scaled distance analysis;
- Ensuring appropriate burden to avoid over or under confinement of the charge;
- Accurate setting out and drilling;
- Appropriate charging;
- Appropriate stemming with appropriate material such as sized gravel or stone chipping;
- Delay detonation to ensure small maximum instantaneous charges;
- Decked charges and in-hole delays;
- Blast monitoring to enable adjustment of subsequent charges;
- Good blast design to maximise efficiency and reduce vibration;
- Avoid using exposed detonating cord on the surface.

11.5.5 Operational Phase Mitigation

An assessment of the operation noise levels has been undertaken in accordance with best practice guidelines and procedures as outlined in Section 11.3.2. The findings of the assessment confirmed that the predicted operational noise levels will be within the relevant best practice noise criteria curves for wind farms at all but one noise sensitive location. Therefore, on a very limited basis, curtailment of turbine operation in certain wind speeds and directions will be required to achieve the noise criteria in line with the WEDGs 2006. This will depend on the turbine technology selected for the Croagh Wind Farm site and the associated noise emissions at the various wind speeds, however the methodology used in this assessment represents a worst case with respect to turbine noise emissions. In the final design, a detailed curtailment strategy matrix will be developed at the detailed design stage in order to achieve the relevant noise criteria at all NSLs

If alternative turbine technologies are considered for the site an updated noise assessment will be prepared to confirm that the noise emissions associated with them will comply with the noise criteria curves as per best practice guidance outlined in Section 11.4.2.1.1 and/or the relevant operational criteria associated with the grant of planning for the proposed development. If necessary suitable curtailment strategies will be designed and implemented for alternative technologies to ensure compliance with the relevant noise criteria curves, should detailed assessment conclude that this is necessary.

An assessment of the operational noise levels has also been undertaken in relation to the predicted operational noise levels from the internal site roads, amenity facilities and substation will be within the relevant best practice noise criteria. Therefore, no mitigation measures are required for these elements.

Mitigation measures for the management of turbine related noise are outlined in the following section.

11.5.5.1 Low Frequency Noise

In the unlikely event that an issue with low frequency noise is associated with the proposed development once operational, it is recommended that an appropriate detailed investigation be undertaken. Due consideration should be given to guidance on conducting such an investigation which is outlined in Appendix VI of the EPA document entitled Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (EPA, 2016). This guidance is based on the threshold values outlined in the Salford University document Procedure for the assessment of low frequency noise complaints, Revision 1, December 2011.

11.5.5.2 Amplitude Modulation

In the unlikely event that a complaint is received which indicates potential amplitude modulation (AM) associated with turbine operation, the operator shall employ an independent acoustic consultant to assess the level of AM in accordance with the methods outlined in the Institute of Acoustics (IoA) Noise working Group (Wind Turbine Noise) Amplitude Modulation Working Group (AMWG) namely, *A Method for Rating Amplitude Modulation in Wind Turbine Noise* (August 2016) or subsequent revisions (August 2016).

The measurement method outlined in the IoA AMWG document, known as the 'Reference Method', will provide a robust and reliable indicator of AM and yield important information on the frequency and duration of occurrence, which can be used to evaluate different operational conditions including mitigation.

11.5.5.3 Monitoring

Construction Phase

Noise and vibration monitoring should be considered in accordance with the guidance contained in British Standard BS5528 during the construction phase.

Operational Phase

Post commissioning operational noise monitoring will be undertaken to ensure compliance with the relevant planning noise criteria. In relation to assessment of operational wind turbine noise, the guidance outlined in the IoA GPG and Supplementary Guidance Note 5: Post Completion Measurements (July 2014) will be followed. Should the assessment identify any exceedances of the appropriate criteria, relevant corrective actions will be taken.

11.5.6 Decommissioning Phase

In relation to the decommissioning phase, lower overall noise levels compared to those calculated for the construction phase would be expected, as roads, hardstands and turbine foundations would be left in situ and no rock breaking or blasting would occur.

The total predicted decommissioning noise levels are predicted to be below the appropriate Category A value (i.e. 65dB $L_{Aeq,1hr}$) and therefore a significant effect is not predicted in relation to the nearest noise sensitive locations in terms of construction and decommissioning noise.

11.5.6.1 Decommissioning Phase Mitigation

The mitigation measures that will be considered in relation to any decommissioning of the site are the same as those best practice measures proposed for the construction phase of the development, i.e. as per Section 11.5.4.

11.6 Description of Residual Effects

11.6.1 Construction and Decommissioning Phase

During the construction phase of the project there will be some effect on nearby noise sensitive properties due to noise emissions from site traffic and other activities. However, given that the construction phase of the development is temporary in nature and the distances between the main construction works and nearby noise sensitive properties, the various noise sources will not be excessively intrusive. Furthermore, the application of binding noise limits and hours of operation with exceptional allowances, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration effect is kept to a minimum.

With respect to the EPA's criteria for description of effects, in terms of these construction activities, the potential worst-case associated residual effects at the nearest noise sensitive locations associated with the various elements of the construction and decommissioning phases are described below.

11.6.1.1 General Construction – Turbines and Hardstands, Substation and Grid Connection

11.6.1.1.1 Turbines and Hardstands

The predicted residual noise and vibration effect associated with this element of the construction phase is described follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Slight	Short-term

The above effects should be considered in terms that the effect is variable, and that this assessment considers the locations of the greatest potential impact.

11.6.1.1.2 Substation and Grid Connection

The predicted residual noise and vibration effect associated with this element of the construction phase is described follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Slight	Short-term

The above effects should be considered in terms that the effect is variable, and that this assessment considers the locations of the greatest potential impact.

11.6.1.1.3 Internal Road Construction

The predicted residual noise and vibration effect associated with the proposed internal road construction operations at NSLs is summarised as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Slight	Short-term

The above effects should be considered in terms that the effect is variable, and that this assessment considers one location with the greatest potential impact.

11.6.1.2 Borrow Pit Activity

The predicted worst-case noise and vibration effects associated with proposed borrow pit operations at NSLs are summarised as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Slight	Temporary

11.6.1.3 Construction Traffic

The effects associated with the overall noise levels from construction traffic is outlined along and has been broken down into the various Stages and are described below.

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Not Significant	Short-term

11.6.2 Operational Phase

11.6.2.1 Noise

11.6.2.1.1 Wind Turbine Noise

At location H037, the predicted turbine noise levels with the operation of the proposed Croagh development are marginally above the relevant criteria. As discussed above, once mitigation is applied in the downwind direction this potential exceedance will be removed. Therefore, the associated effects at H037 are as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Not significant	Long-term

At location H065, the predicted increases in turbine noise levels with the operation of the proposed Croagh development will be an order of magnitude that is inaudible to the human ear. Predicted noise levels at this dwelling are dominated by existing wind turbines. Therefore, any changes to the noise environment will be inaudible and the associated effects at H065 are as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Neutral	Imperceptible	Long-term

At all other noise sensitive locations, the predicted noise levels associated with the proposed development will be within best practice noise criteria curves recommended in Irish guidance ‘Planning Guidelines for Wind Farm Development 2006’ it is not considered that a significant effect is associated with the development.

While noise levels at low wind speeds will increase due to the development the predicted levels will remain low and is not expected to cause any significant changes to the environment.

The predicted operational noise effects can be described as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Not significant	Long-term

The above effect should be considered in terms that the effect is variable and that this assessment considers periods of the greatest potential effect.

11.6.2.1.2 Substation Noise

The associated effect from the day to day operation of the substation is summarised as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Not significant	Long-term

11.6.2.2 Vibration

There are no expected sources of vibration associated with the operational phase of the proposed development. In relation to of vibration the associated effect is summarised as follows:

<i>Quality</i>	<i>Significance</i>	<i>Duration</i>
Negative	Imperceptible	Long-term

11.6.3 Cumulative Effects

Cumulative assessment has been considered in this chapter with due consideration of the proposed development in combination with any existing, approved and permitted wind turbine developments in the wider study area as noted in Section 11.3.6. The effects have been confirmed in Section 11.5.3. The description of effects presented for the operational phase of the proposed development includes cumulative effects.

12. LANDSCAPE AND VISUAL

12.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential landscape and visual impacts of the Croagh Wind Farm. The emphasis in this chapter is on the likely significant effects of the proposed development. It covers the assessment methodology, a description of the proposed development and the existing landscape based on relevant guidance. It includes a description of the landscape policy of Counties Leitrim and Sligo with specific reference to wind energy and the study area in which the proposed development site is located.

The landscape of the area is described in terms of its existing character, which includes a description of landscape values and the landscape's sensitivity to change. The landscape and visual impact assessment of the proposed wind farm uses visibility mapping, representative viewpoints and photomontages as tools to inform the assessment which includes an assessment of landscape value and sensitivity. The potential impacts in both landscape and visual terms are then assessed, including cumulative impacts.

A full description of the proposed development and project is provided in Chapter 4 of this EIAR.

12.2 Statement of Authority

This chapter was prepared by Joanna Mole, a Landscape and Visual Impact Assessment Specialist and Chartered Landscape Architect with McCarthy Keville O'Sullivan Ltd. with over 15 years of experience in both private practice and local authorities. Joanna holds a BSc (Hons) in Landscape Design & Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Beckett University, a MSc in Renewable Energy Systems Technology from Loughborough University. Joanna is a Chartered Landscape Architect with specialist knowledge in Landscape and Visual Impact assessments for projects ranging from individual houses to large windfarms, solar farms, cycle route design and landscape contract management. Joanna holds chartered membership of the British Landscape Institute since 1998 and has been an examiner for British Landscape Institute professional practice exam.

12.2.1 Proposed Development Description

Coillte intends to apply for planning permission to construct a wind farm at Croagh, located on the boundary of Co. Leitrim and Co. Sligo. The proposed wind farm will comprise up to 10 No. turbines with a tip height of up to 170 metres and all associated foundations and hardstanding areas, access roads including upgrade of existing site roads and provision of new roads, 1 no. onsite electrical substation, excavation of 1 No. borrow pit, 2 no. peat repositories, underground electrical and communications cabling connecting the turbines to the proposed onsite substation, underground cabling connecting the onsite substation to the existing Garvagh substation, 2 no. temporary construction compounds, 1 No. permanent met mast, car park, amenity walkways and boardwalk and signage site drainage and all associated works.

Of the proposed turbines, 8 No. turbines and associated infrastructure are located within the functional area of Leitrim County Council and 2 No. turbines and associated infrastructure are located in the functional area of Sligo County Council. A detailed description of the proposed development is included in Chapter 4 of this EIAR.

12.2.1.1 Mitigation by Good Design

Through the iterative project site selection and design process, informed by early-stage impact assessment work, landscape modelling, ZTV mapping and photomontage preparation, every effort has been made to bring forward the optimum site selection and design for the project now proposed with respect to landscape and visual factors. The final project layout that is the subject of this LVIA, already incorporates the following landscape and visual design considerations for good wind farm design:

- The turbines have been located within an area surrounded by lands of high elevations which limits open views of the project, particularly from potentially sensitive receptors such as settlements (Note the ZTV outputs).
- The turbine layout has been designed to create a coherent cluster, contiguous and connected to each other visually and with consistent spacing.
- The turbine layout and scale has been designed to fit with the existing turbines located in the vicinity of the development which are at a higher elevation to the proposed development.
- All turbines have been located greater than 4x tip height from the nearest point of the curtilage of any residential property in order to protect residential visual amenity.
- The internal site road layout makes use of the existing tracks wherever possible (to be upgraded for the delivery of wind turbine components), to minimise the requirement for new tracks within the site; and
- Felling of existing coniferous plantation is predominantly limited to keyhole felling in localised parts of the site, in keeping with existing practices in the commercial forestry plantation on-site.

During the initial site selection process, landscape sensitivity was identified as a key constraint and so landscapes considered to be less sensitive are preferred over sites with more sensitivity to change. During site design process, the potential visibility of the project was reduced by removing two turbines located to the north west of the site which would have extended the spatial extent of the project and the number of visual receptors. The site location and current layout minimises the theoretical potential for visibility and the site visits and assessment tools show that the actual visibility is far less than the theory. Where visibility does occur, the design is in accordance with best practice and a coherent project, sympathetic to its neighbouring wind turbines, is evident.

12.2.2 Scoping Replies/Pre-Planning Meetings

A scoping and consultation exercise has been carried out by MKO., as detailed in Section 2.5 of Chapter 2 of this EIAR. Pre-planning meetings were held with Leitrim County Council on 10th June 2019 and Sligo County Council on 21st June 2019 details of which are outlined in Section 2.6 of Chapter 2 of this EIAR. The issues raised relevant to the LVIA Chapter are set out below.

12.2.2.1 County Leitrim

The following locations were requested to be considered for viewpoint selection:

- a) *Corry Strand on north shore of Lough Allen (amenity point)*
- b) *Parkes Castle on north shore of Lough Gill.*
- c) *Manorhamilton Town*
- d) *Dromahair Village*
- e) *Creevelea Abbey outside Dromahair*

12.2.2.2 County Sligo

The following points were raised with regards to the LVIA Chapter:

- a) *ZTV and visibility from scenic roads and the shore of Lough Gill*
- b) *Important for the LVIA to distinguish between the different landscapes on either side of the hill (the Leitrim side and the Sligo side), and that they will be particularly focusing on cumulative effects and potential perceived differences in scale of the existing and proposed turbines.*
- c) *Size/scale of proposed turbines*

12.3 Brief Methodology and Assessment Criteria

This section broadly outlines the methodology used to undertake the landscape and visual impact assessment of the proposed development, a more detailed description of the methodology is outlined in detail in Appendix 12.1, and the guidance used in the preparation of each section. There are four main sections to this assessment:

- › Landscape Baseline
- › Visual Baseline
- › Cumulative Baseline
- › Likely and Significant Effects – outlining the assessment of landscape, visual and cumulative effects

12.3.1 Scope and Definition of Landscape and Visual Impact (LVIA) Study Area

For the purposes of this EIAR, where the ‘proposed development site’ or ‘the site’ is referred to, this relates to the EIAR site boundary, as delineated in Figure 1.1 of this EIAR. This total area measures approximately 670 hectares. The proposed development site is discussed in some detail in terms of its landscape character.

However, the landscape and visual baseline mapping and viewpoint selection are based on wider study areas. The general study area has been chosen as 20 kilometres for visual and landscape effects. However, for the effects on landscape character 15 kilometres from the proposed wind turbine locations is an appropriate distance. These are the study areas for which the baseline maps and viewpoint locations are produced and are referred to as the ‘study area’. Furthermore, on the basis of desk studies and survey work undertaken, the professional judgement of the assessment team, experience from other relevant projects and policy guidance or standards, the following topic areas have been scoped out of the assessment:

- › Effects on landscape and visual receptors that have minimal or no theoretical visibility (as predicted by the ZTV) and/or very distant visibility, and are therefore unlikely to be subject to significant effects;
- › Effects on designated landscapes beyond a 20km radius from the proposed development, from where it is judged that potential significant effects on key characteristics and/or special qualities, or views are judged unlikely to occur;
- › Effects on landscape character beyond a 15km radius from the proposed development, where it is judged that potential significant effects on landscape character are unlikely to occur;
- › Effects on visual receptors beyond a 20km radius from the proposed development, where it is judged that potential significant effects are unlikely to occur;
- › Cumulative effects in relation to single turbines (except where otherwise stated);

- Cumulative landscape effects beyond a 15km radius and cumulative visual effects beyond a 20km radius from the proposed development, where it is judged that potential significant effects on landscape character are unlikely to occur;
- Areas in County Cavan due to distance from the proposed development and the lack of significant visual or landscape receptors within the small area of the county falling within the study area

12.3.2 Guidelines

Ireland signed and ratified the European Landscape Convention (ELC) in 2002, which introduces a pan-European concept which centres on the quality of landscape protection, management and planning. The Department of Arts, Heritage and the Gaeltacht has published a National Landscape Strategy for Ireland in 2015. The Strategy aims to ensure compliance with the ELC and contains six main objectives, which include developing a national Landscape Character Assessment and Developing Landscape Policies.

In 2000, the Department of the Environment and Local Government published ‘Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities’, which recommended that all Local Authorities adopt a standardised approach to landscape assessment for incorporation into Development Plans and consideration as part of the planning process. However, this DoEHLG 2000 guidance remains in draft form.

This landscape and visual impact assessment was primarily based on the *Guidelines for Landscape and Visual Impact Assessment* or GLVIA (The Landscape Institute/Institute of Environmental Management and Assessment, UK, 2013). A range of other guidelines also inform the preparation of this landscape and visual impact assessment, which include:

- Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, 2006),
- Draft Revised Wind Energy Development Guidelines (Department of the Environment, Heritage and Local Government, 2019),
- Visual Assessment of Wind Farms: Best Practice (Scottish Natural Heritage, 2002).
- Visual Representation of Wind Farms: Version 2.2 (Scottish Natural Heritage, 2017).
- Siting and Designing Wind Farms in the Landscape, Version 3a (Scottish Natural Heritage, 2017).
- Photography and photomontage in landscape and visual impact assessment (Landscape Institute Advice Note 01/11, 2011)
- Visual representation of development proposals (Landscape Institute Technical Guidance Note 02/17, 2017)
- Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities’ (Department of the Environment and Local Government, 2000)
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (Scottish Natural Heritage, 2012)
- Spatial Planning for Onshore Wind Turbines – natural heritage considerations (Scottish Natural Heritage, 2015)
- Siting and Designing Wind Farms in the Landscape Version 3a (Scottish Natural Heritage, 2017)
- Cumulative Impact of Wind Turbines on Landscape and Visual Amenity (Carmarthenshire County Council, 2013)
- Leitrim County Development Plan 2015-2021 (Leitrim County Council, 2015)
- Landscape Assessment of County Leitrim (Leitrim County Council, 2002)
- Sligo County Development Plan 2017-2023 (Sligo County Council, 2017)
- Roscommon County Development Plan 2014 – 2020, Variation No.1 (Roscommon County Council, 2017)

- Landscape Character Assessment of County Roscommon (Roscommon County Council, 2014)

12.3.3 Baseline Landscape and Visual Information

In order to carry out this assessment, an initial desk study was undertaken which identified:

Landscape Baseline

- Policies and objectives contained in the relevant county development plans pertaining to landscape and wind energy
- Identification of Landscape Receptors based on:
 - Landscape designations in the study area
 - Landscape character of the study area
 - Landscape character of the proposed development site based on
 - Site Surveys undertaken in Winter 2018 and Spring and Summer of 2019
 - Landscape Character Types identified in ‘Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities’ (Department of the Environment and Local Government, 2000)

Visual

- Identification of Visual Receptors
- Zone of Theoretical Visibility (ZTV) mapping
- Selection of viewpoints on the ground was assisted by the TrueViewVisuals software

12.3.4 Assessment of Potential Impacts

The methodology includes clearly documented methods based on the GLVIA guidelines, in order to arrive at an assessment of effects. These include consideration of landscape and visual sensitivity balanced with the magnitude of the effect to determine the significance of effects. Mitigating factors are then taken into consideration to arrive at residual landscape and visual effects. Further details on the impact assessment methodology are presented in Appendix 12.1.

12.4 Landscape Baseline

This part of the LVIA focusses on identifying the key landscape receptors that should form part of the assessment. For this purpose, the County Development Plans of Leitrim, Sligo and Roscommon were consulted.

Baseline Landscape Receptors:

- **Landscape Designations** based on:
 - Leitrim County Development Plan 2015-2021
 - Sligo County Development Plan 2017-2023
 - Roscommon County Development Plan 2014-2020
- **Landscape Character of the Proposed Development Site** and its immediate environment based on:
 - Landscape Type identified using DoEHLG Guidelines 2006/ Draft Guidelines 2019
 - Site Visits
- **Landscape Character of the Study Area** based on:

- Landscape Assessment of County Leitrim
- Landscape Character Assessment of County Roscommon
- Provisional Landscape Character Assessment of County Sligo areas within the LVIA study area (prepared by MKO)

12.4.1 Landscape Designations

The County Development Plans (CDPs) of Leitrim, Sligo and Roscommon were consulted to identify landscape designations. Additionally, general landscape policy and landscape policy pertaining to wind energy development identified in the respective CDPs is also listed.

While the policy on designated views and scenic routes is outlined for the respective counties below, the list of views and scenic routes within 20km of the proposed turbines, mapped in Figure 12-1 are set out in Section 12.5 below, as they are in their nature a visual designation. In this section of the landscape and visual impact assessment chapter they are assessed and form part of the basis of viewpoint selection.

12.4.1.1 County Leitrim

Section 3.8.7 of the Leitrim County Development Plan 2015-2021 (CDP) refers to landscape designations including Areas of Outstanding Natural Beauty (AONB), Areas of High Visual Amenity (HVA) and outstanding views and prospects. These designations are all shown on Map 3.12 in the CDP, illustrated on Figure 12-1 of this EIAR. No landscape designations apply to the proposed development site and those falling within the study area as outlined in more detail below.

12.4.1.1.1 Areas of Outstanding Natural Beauty (AONB) and High Visual Amenity (HVA)

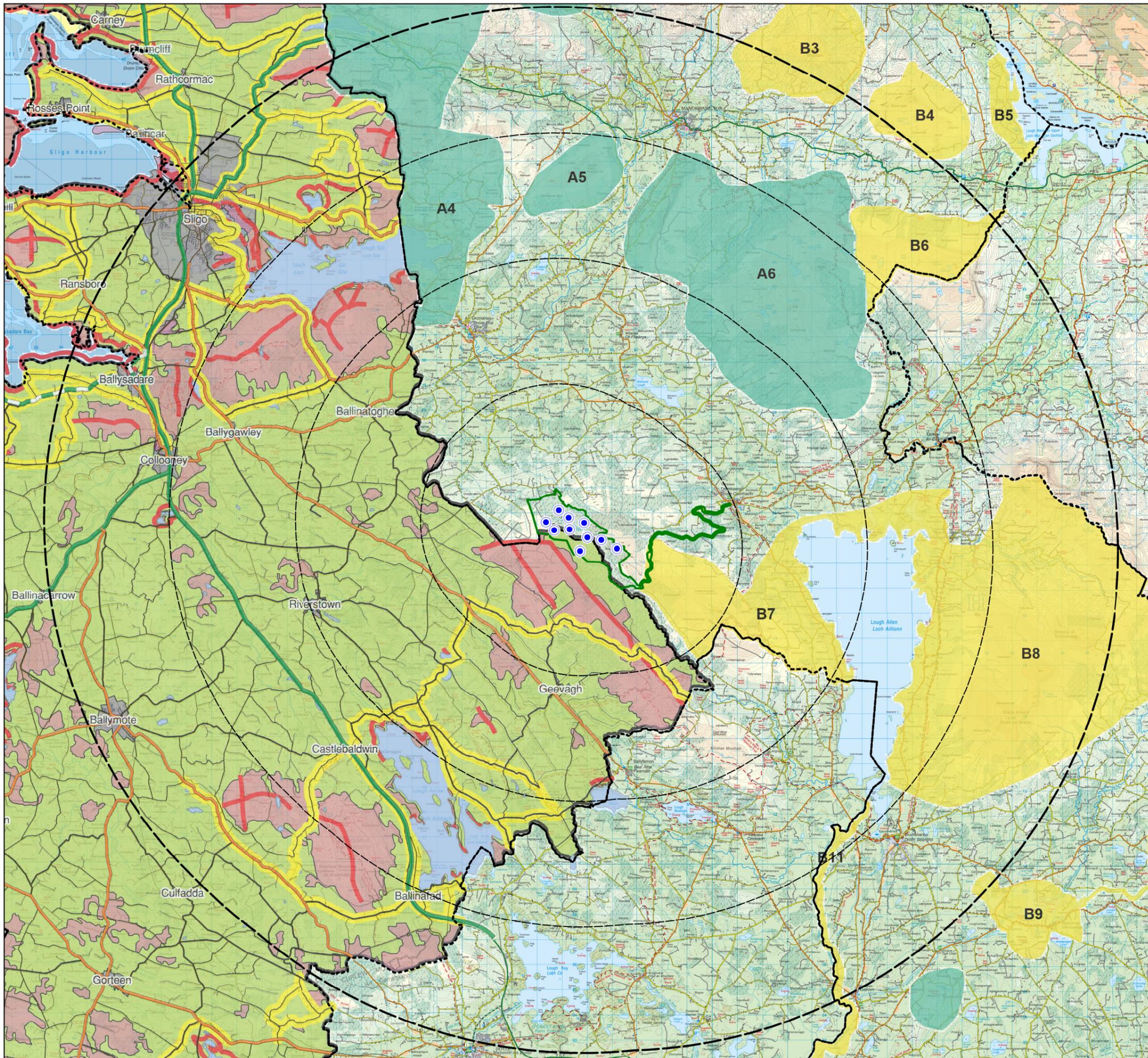
The CDP recognises that “the capacity to absorb developments varies greatly from one area of AONB/HVA to another AONB/HVA and even within these areas of AONB/HVA also”. It notes that the “capacity of the landscape to absorb development will include consideration of the topography, vegetation, and the nature and extent of existing development”.

To this end 7 AONBs and 14 HVA areas were designated in Co. Leitrim, as set out in objectives 80 and 81 and listed in Tables 18 and 19 of the CPD. Furthermore, the following policies apply to AONBs and HVAs:

Policy 100: *It is the policy of the Council to permit development in an Area of Outstanding Natural Beauty where the applicant can satisfy the planning authority that it is not practicable to develop in a less-sensitive location and where it is demonstrated that the development will not impinge in any significant way on the character, integrity or uniformity of the landscape.*

Policy 101: *It is the policy of the Council to permit development in an area of High Visual Amenity only where the applicant has demonstrated a very high standard of site selection, site layout and design and where the planning authority is satisfied that the development could not be accommodated in a less-sensitive location.*

The proposed development site is neither in an AONB nor a HVA, the closest AONB is A6 - O'Donnell's Rock and Boleybrack, located approximately 8.1 kilometres north-east and the closest HVA is B7 - Corry Mountain, located approximately 1.2 kilometres east of the proposed development site. The AONBs and HVAs falling within the study area are shown in Figure 12-1 and listed in Table 12-1 below.



Map Legend

- EIAR Site Boundary
- Landscape Designations Study Area
- Proposed Turbines

County Leitrim Landscape Designations

- Areas of Outstanding Natural Beauty
- Areas of High Visual Amenity

Drawing Title:						12-1 Landscape Designations
Project Title:						180511 - Croagh Wind Farm EIAR
Drawn By:	Checked By:	Scale:	Date:	Project No:	Drawing No.:	
JM	EM	1:150,000	30/06/2020	180511	Figure 12-1	

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Table 12-1 ANOBs and HVAs within 20 kilometres of the proposed development (Co. Leitrim)

Map Ref.	Area
Areas of Outstanding Natural Beauty (AONBs)	
5 to 10 km	
A4	The Doons, Lough Gill and environs
A6	O'Donnell's Rock and Boleybrack
10 to 15 km	
A5	Benbo
15 to 20 km	
A3	Aroo, Glenade, Truskmore, Glencar and environs.
High Visual Amenity Areas (HVAs)	
Up to 5 km	
B7	Corry Mountain
5 to 10 km	
B8	Lough Allen, Sliabh an Iarainn, Bencroy and environs
10 to 15 km	
B6	Cloonclare
B11	River Shannon, Derrycarne and environs
15 to 20 km	
B3	Dough Mountain
B4	Thur Mountain
B9	Lough Scur, St. John's Lough and environs

The CDP proposes to adopt a positive approach to development proposals outside AONBs and HVAs, which support the *'living countryside'* philosophy of Leitrim County Council. However, even here the highest standards of design will be sought, and care must be taken to minimise negative visual impacts.

12.4.1.1.2 Views and Prospects

A number of outstanding views and prospects are identified on Map 3.12 and listed in Table 20 in Section 3.8.9 of Chapter 3 of the CPD. Objectives and policies set out in the CPD in relation to views and prospects are as follows:

Policy 102 - It is the Council’s policy to protect these views from intrusive development and enhance them by the removal of dereliction and eyesores. Lay-bys and viewing areas will be developed, as appropriate and as funds allow.

Objective 82 - It is an objective of the Council to protect the following Views and Prospects, Table 20 refers.

Views within 20km of the proposed turbines are mapped in Figure 12-1. As outlined above they are listed in Table 12-5 in Section 12.5 *Visual Baseline* and assessed in that part of the landscape and visual impact assessment chapter.

12.4.1.1.3 Landscape Policy pertaining to Wind Energy

County Leitrim does not currently have a Wind Energy Strategy. However, Sections 3.11.4 and 3.11.5 of the CDP refer to wind farm development. The following objective refers to the council’s future plan regarding energy strategy:

Objective 126 It is an objective of the Council to prepare an Energy Strategy for the County over the lifetime of the County Development Plan and the Council will have regard to such a Plan in determining applications for developments relating to renewable and other energy projects.

Section 3.11.4 notes that guidance can be found in the Landscape Character Assessment “on the integration of wind farms into the landscape” and further states in Section 3.11.5 that while being disposed towards wind farm development “strict development management measures will operate and the Council will only permit such developments where it can be clearly demonstrated, to the satisfaction of the Planning Authority, that such developments are in accordance with National and Regional Guidance and in particular the criteria set out herein.”

Furthermore, “in deciding on the suitability of an area to accommodate windfarm development, the Council will be guided by the Department of Environment, Heritage and Local Government Wind Energy Guidelines 2006 or any updated version of the Guidelines”. A number of ‘environmentally sensitive areas’ are listed, these include AONBs, HVAs and Outstanding Views and Prospects. County Leitrim’s approach to wind energy is summarised in the CDP as follows:

“In summary, development that can clearly demonstrate, to the satisfaction of the Planning Authority, that they would not have a significant adverse impact on the amenities of a dwelling or a building occupied, or capable of being occupied, by people, or would not compromise the integrity of an environmentally sensitive area, will be ‘open for consideration’.”

12.4.1.2 County Sligo

12.4.1.2.1 Landscape Characterisation Map

Much of the landscape policy of County Sligo is broadly based on the Landscape Characterisation Map (LC Map), see Figure 12-2 below, based on a study commissioned by Sligo County Council. The LC Map classifies the county according to its visual sensitivity and capacity to absorb new development without compromising the scenic character of certain areas. It designates the following:

Normal Rural Landscapes: areas with natural features (e.g. topography, vegetation) which generally have the capacity to absorb a wide range of new development forms – these are largely farming areas and cover most of the County. At the same time, certain areas located within normal rural landscapes may have superior visual qualities, due to their specific topography, vegetation pattern, the presence of traditional farming or residential structures.

‘Sensitive Rural Landscape’ within one kilometre of the proposed turbines. It should be noted however that these designations refer mainly to the capacity of the land to absorb development within these areas and as the turbines and proposed development site itself are outside an area of ‘Sensitive Rural Landscape’ and away from ‘Visually Vulnerable Areas’ the proposal complies with the requirements of the Sligo CDP.

The Sligo CDP also sets out the following landscape policies relevant to this project in Section 7.4:

PLCAP-1 Protect the physical landscape, visual and scenic character of County Sligo and seek to preserve the County’s landscape character. Planning applications that have the potential to impact significantly and adversely upon landscape character, especially in Sensitive Rural Landscapes, Visually Vulnerable Areas and along Scenic routes, may be required to be accompanied by a visual impact assessment using agreed and appropriate viewing points and methods for the assessment.

PLCAP-2 Discourage any developments that would be detrimental to the unique visual character of designated Visually Vulnerable Areas.

PLCAP-4 Strictly control new development in designated Sensitive Rural Landscapes, while considering exceptions that can demonstrate a clear need to locate in the area concerned. Ensure that any new development in designated Sensitive Rural Landscapes:

- does not impinge in any significant way on the character, integrity and distinctiveness of the area;
- does not detract from the scenic value of the area;
- meets high standards of siting and design;
- satisfies all other criteria with regard to, inter alia, servicing, public safety and prevention of pollution.

PLCAP-5 Protect the historic and archaeological landscapes of the County.

12.4.1.2.2 Scenic Routes

Appendix E of the Sligo CDP sets out the counties approach to scenic routes and lists the scenic routes in hierarchical order of national primary roads, national secondary roads, regional roads and local roads. Furthermore, the following policy item relates to scenic routes:

PLCAP-3 Preserve the scenic views listed in Appendix E and the distinctive visual character of designated Scenic Routes by controlling development along such Routes and other roads, while facilitating developments that may be tied to a specific location or to the demonstrated needs of applicants to reside in a particular area. In all cases, strict location, siting and design criteria shall apply, as set out in Section 13.4 Residential development in rural areas (development management standards).

Scenic routes within 20km of the proposed turbines are mapped in Figure 12-1. As outlined above they are listed in

Table 12-5 in Section 12.7 *Visual Baseline* and assessed in that part of the landscape and visual impact assessment chapter.

12.4.1.2.3 Landscape Policy with regard to Wind Energy

Chapter 11 sets out the council’s policy with regard to energy. The wind energy policy relevant to landscape is listed below:

SP-EN 1 Support the sustainable development, upgrading and maintenance of energy generation, transmission, storage and distribution infrastructure, to ensure the security of energy supply and provide for future needs, as well as protection of the landscape, natural, archaeological and built heritage, and residential amenity and subject to compliance with the Habitats Directive.

SP-EN-2 Facilitate the sustainable production of energy from renewable sources, energy conversion and capture in forms such as wind power, hydro-power, wave-generated energy, bioenergy, solar technology and the development of Waste to Energy/Combined Heat and Power schemes at appropriate locations and subject to compliance with the Habitats Directive. All such development proposals will be assessed for their potential impact on urban and rural communities, Natura 2000 sites, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes and scenic views, as well as in accordance with strict location, siting and design criteria.

SP-EN 5 Collaborate with urban and rural communities in the development of community level energy efficiency and renewable energy projects, subject to visual landscape, heritage, environmental and amenity considerations and subject to compliance with the Habitats Directive.

SP-EN 7 Protect significant landscapes from the visual intrusion of large-scale energy infrastructure.

SO-EN-2 Undertake an analysis of suitable areas for wind energy and prepare a map showing County Sligo's Landscape Suitability for Wind Energy Developments, in accordance with Section 3.5 of the Wind Energy Guidelines (2006) and any subsequent revisions.

12.4.1.3 County Roscommon

12.4.1.3.1 Landscape Policy

The Roscommon County Development Plan 2014-2020 has outlined numerous policies and objectives with regard to its landscape. These are set out below:

Core Policy 2.10: To identify and protect the unique and diverse natural heritage of County Roscommon in terms of landscape, natural resources such as rivers and lakes and waterways along with the built environment of historical, architectural and cultural value.

Core Policy 2.9: To identify and recognise the potential, in economic and social terms, of the county's natural resources such as its arable agricultural land, clean environment, lands with forestry potential, aggregate reserves and tourism opportunities. To support the utilisation of alternative energy provision in a sustainable and harmonious way in terms of impacts on landscapes and habitats over the broad spectrum of its potential sources, including wind, solar, and alternative fuel sources. Any such development will be cognisant of the need to protect, conserve and enhance the county's biodiversity and the requirement for screening to determine if a full Appropriate Assessment of the likely impact on integrity on Natura 2000 sites is required.

Objective 7.37 Seek to minimise visual impacts on areas categorised within the Co. Roscommon LCA including "moderate value", "high value" "very high value" and with special emphasis on areas classified as "exceptional value" and where deemed necessary, require the use of visual impact assessment where proposed development may have significant effect on such designated areas.

Objective 7.38 Take into account the detailed landscape character analysis which forms part of the Lough Key Local Area Plan when assessing development proposals in this area.

12.4.1.3.2 Scenic Routes and Scenic Views

While most detail on scenic routes and scenic views is provided in Appendix 1 of the *Landscape Character Assessment of County Roscommon*, the following policies and objectives are included in the Roscommon CDP:

Policy 3.49 *Assessment of visual impacts of proposals will have regard to the LCA and in particular to; immediate visual impact and long-distance views, **Scenic Routes and Scenic Views** depicted in Appendix 1 of the LCA report, sites of special value (i.e. the bog land north of Castlerea (LCA 27) and Upper Lough Ree (LCA 6) which has been identified as of particular importance for their sense of isolation and tranquillity.)*

Objective 7.40 *Seek to protect important views and prospects in the rural landscape and visual linkage between established landmarks, landscape features and views in urban areas.*

The County Roscommon scenic routes and scenic views within 20km of the proposed turbines are mapped in Figure 12-1. As outlined above they are listed in

Table 12-5 in Section 12.7 *Visual Baseline* and assessed in that part of the landscape and visual impact assessment chapter.

12.4.1.3.3 Landscape Policy pertaining to Wind Energy

Roscommon has included the following wind energy policies relevant to landscape in its CDP:

Policy 3.47 *All Applications for wind farm developments shall have regard to the Wind Energy Planning Guidelines 2006 regarding landscape impact of associated development (including roads and tracks, power lines, the control building, wind measuring mast and the compound.)*

Policy 3.51 *Ensure that applications for wind turbines are assessed in accordance with the SEI Wind Speed Atlas, Accessibility to the National Electricity Transmission and Distribution Grid, the suitability of the site having regard to other land use policies and objectives to protect all aspects of the landscape including visual, cultural, and environmental. All wind turbine proposals, irrespective of size shall be subject to full Environmental Assessment (EIA).*

Policy 4.53 *Encourage the development of renewable energy sources such as wind, biomass and solar energy as well as energy conservation measures such as energy efficient building design and servicing. All such development proposals will be assessed for their potential impact on the environment, Landscape Character Assessment designations, compliance with the habitats directive and other normal planning considerations. Seek to integrate climate change considerations into development proposals.*

Policy 4.59 *Facilitate the sustainable infrastructural development of energy generation and transmission networks, to ensure the security of energy supply and provide for future needs whilst also ensuring the preservation of scenic or otherwise significant landscapes from the visual intrusion of large-scale energy infrastructure.*

Objective 4.55 *Designate areas of the county, as recommended in the LCA, which may be suitable for wind energy development in line with the national guidelines on wind energy, take account of cumulative and in-combination environmental effects and take a proactive role in encouraging applications in these areas.*

12.4.1.4 Summary of Landscape Designations

12.4.1.4.1 County Leitrim

Five Areas of Outstanding Natural Beauty (AONB) and seven High Visual Amenity Areas (HVAs) fall within the 20km study area. County Leitrim also designates views and prospects, which will be assessed in Section 12.5 *Visual Baseline*.

12.4.1.4.2 **County Sligo**

County Sligo as part of its Landscape Characterisation Map (LC Map), classifies the county according to its visual sensitivity and capacity to absorb new development without compromising the scenic character of certain areas. Classifications are Normal Rural Landscapes, Sensitive Rural Landscapes and Visually Vulnerable Areas as well as Scenic Routes. These areas are more akin to landscape zonings relating to their capacity to absorb development rather than landscape designations that would also be affected by development outside these areas. Scenic Routes are covered in Section 12.5 *Visual Baseline*.

12.4.1.4.3 **County Roscommon**

County Roscommon has no landscape designations other than scenic views and routes, which will be dealt with under Section 12.5 *Visual Baseline*.

12.4.2 **Landscape Character of the Proposed Development Site**

12.4.2.1 **DoEHLG ‘Wind Energy Development Guidelines’ (2006)**

These guidelines offer guidance for the siting and design of wind energy developments in various landscape contexts by defining six landscape character types that represent most situations where wind turbines may be proposed. The guidance is intended to be indicative and general and notes that it, represents the ‘best fit’ solutions to likely situations.

The six landscape character types include Mountain Moorland and Transitional Marginal landscape character types. The guidelines note that where a wind energy development is located in one landscape character type but is visible from another, it will be necessary to decide which might more strongly influence the approach adopted for the assessment.

Despite the fact that the majority of the proposed development site is covered in commercial forestry, the original landcover will have been moorland. Furthermore, as the proposed development site is an upland area the ‘mountain moorland’ landscape character type applies.

Many areas in the study area can be described as ‘hilly and flat farmland’ and there are some areas of ‘transitional marginal land’ particularly on the lower slopes of Carrane Hill and Corry Mountain to the east. In certain areas the turbines will be viewed from these landscapes. It is considered however, that in terms of the siting and design, the ‘mountain moorland’ landscape type most strongly influences the siting and design of the proposed development. Further details of these landscape character types are provided below.

12.4.2.1.1 Mountain Moorland



Plate 12-1 View showing mountain moorland within the proposed development site

The key characteristics of the mountain moorland landscape type are:

- peaked, ridged or rolling mountains and upland with steep sides or gently formed valleys;
- generally unenclosed;
- landcover comprising blanket bog, a mottling of heather, wild grasses and some rush in wet flushes; and
- a landscape type of relative remoteness and often comprising pristine, unspoilt and remote landscapes.

Most of the landscape’s characteristics are described by the text above. However, while there are characteristics of remoteness, it is not regarded as pristine as it comprises areas of coniferous plantation as well as numerous existing wind turbines.

Location

The DoEHLG guidelines state that it may be acceptable to locate wind energy developments on ridges and peaks and, in certain circumstances, on a saddle between two peaks. Another acceptable location is lower down on sweeping mountainsides.

Spatial Extent

Spatial extent is the area covered by a wind energy development within the view or landscape, reflecting the number of turbines involved and their spacing. The DoEHLG guidelines state that the spatial extent of a wind energy development should be balanced and in scale with its landscape context. With regards to areas of mountain moorland, larger wind energy developments can generally be accommodated because they correspond in terms of scale, given the typical extensive areas of continuous unenclosed ground.

Spacing

The guidelines state that all spacing options are usually acceptable within this landscape character type. Where a wind energy development is clearly visible on a crest or ridge, there is considerable scope to vary the rhythm, though on simple ridges, regular spacing may be more appropriate. On sweeping and continuously even areas of mountain moorland or upland plateaux, regular spacing may be preferable.

Layout

All layout options are usually acceptable within a mountain moorland landscape character type. The DoEHLG guidelines state that the best solutions would either be a random layout, and clustered where located on hills and ridges, or a grid layout on sweeping and continuously even areas of moorland or plateaux.

Height

There is generally no height restriction on mountain moorlands as the scale of the landscape is so great. Shorter turbines may be more appropriate where they are located on small peaks and outcrops in order to maintain an appropriate scale. Profile, whether even or uneven, is dependent on topography: the more rugged and undulating, the more uneven it will be. The profile of the wind energy development should not necessarily run in parallel to that of the topography.

Cumulative Effect

With regards to cumulative effect, the DoEHLG guidelines state that the open expanse of such landscape types as mountain moorland can absorb a number of wind energy developments, depending on their proximity. The cumulative impact will also depend on the actual visual complexity of the landform, whether steeply rolling, undulating or gently sweeping. The more varied and undulating an area is topographically, the greater its ability to absorb and screen wind energy developments. The aesthetic effect of wind energy developments in these landscapes is acceptable where each one is discrete, standing in relative isolation.

The proposed development addresses the above guidance in terms of location (in a saddle between two peaks) spatial extent (moderate and well within keeping of the surrounding landscape scale) spacing (regular), layout (largely clustered) height (in keeping with the landscape scale) and cumulative effect (varied and undulating topography, with the exception of Garvagh Glebe all other existing and permitted wind farms are not in visual proximity with the proposed development).

12.4.2.2 Landscape Character of the Proposed Development Site

The landscape character of the proposed development site is based on site surveys undertaken in Winter 2018 and Spring and Summer of 2019.

12.4.2.2.1 Topography

Present-day landscapes owe their form to the geological materials from which they were carved. Topography is the term used to describe the spatial and formal arrangement of landscape components as a natural product of geological and geomorphologic processes in the past.

There are two local upland areas spreading in two long ridges from north-west to south-east, Carrane Hill that merges into Kilonan Mountain towards the south-east and parallel to this Corry Mountain. They are separated by the Arigna River Valley in the south-east that rises north-westwards and culminates in a saddle between these two uplands.

The centre of the proposed development site sits on this saddle and is visually obscured in a number of directions due to the two more elevated and elongated ridges. To the south-east the saddle follows the Arigna River that follows the most southern site boundary. East of the Arigna River the site slopes up steeply on the south-westerly slope of Corry Mountain to the highest point of 338 m O.D. (Ordnance Datum), which is just below the peak of one of the north-western foothills of Corry Mountain at just above 340 m OD. Corry Mountain itself is at a height of 428m O.D. and Carrane Hill is at a height of

458 m O.D. Turbine T9 will be the turbine located at the highest level at approximately 323 m O.D, while turbine T2 will be positioned at a ground level of approximately 240 m O.D.

The northern part of the site slopes down in a north-north-westerly direction from the central saddle to the lowest point in the most north-western point of the proposed development site of 186 m O.D.

In the wider landscape away from Carrane Hill and Corry Mountain the land to the north slopes down at first steeply finishing in an undulating plain that very gradually slopes down to Bonet River at around 30 m O.D. in Dromahair Village. To the east the land on the eastern slopes of Corry Hill slopes down to Lough Allen, which is followed to the east by Slieve Anierin and Bencroy Mountains. To the south and west Carrane Hill slopes downwards steeply at first and then levels out around the Feorish River. South westerly of this land rises again before descending to Lough Arrow.

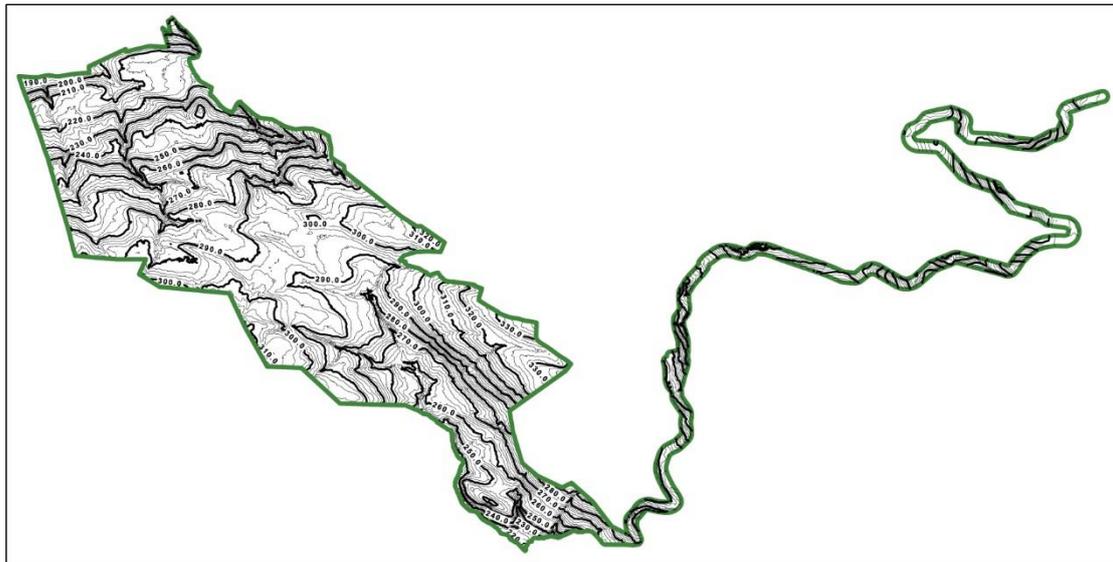


Figure 12-3 Topography: 10-metre contour lines within the site boundary (not to scale for illustrative purposes only)

12.4.2.2.2 **Drainage**

There are a number of watercourses traversing the site. There is a watershed in the centre of the site, hence in the northern part of the site the general direction of flow is north-westwards and south-eastwards in the south. The southern part of the site can be described as the upper catchment area of the Arigna River with many tributaries of the Arigna crossing this part of the site and the Arigna itself forming the southern site boundary. The Arigna River flows in a valley between Carrane Hill and Corry Mountain and discharges into the southern part of Lough Allen.

There is one small lake, Lough Nacroagh near the centre of site that along with other streams in the northern part of the site drains north-westwards as tributaries to the River Bonet, which discharges into Lough Gill.

12.4.2.2.3 **Landcover**

Figure 12-4 below shows an aerial view of the proposed development site and gives an overview of the different types of landcover present on site.

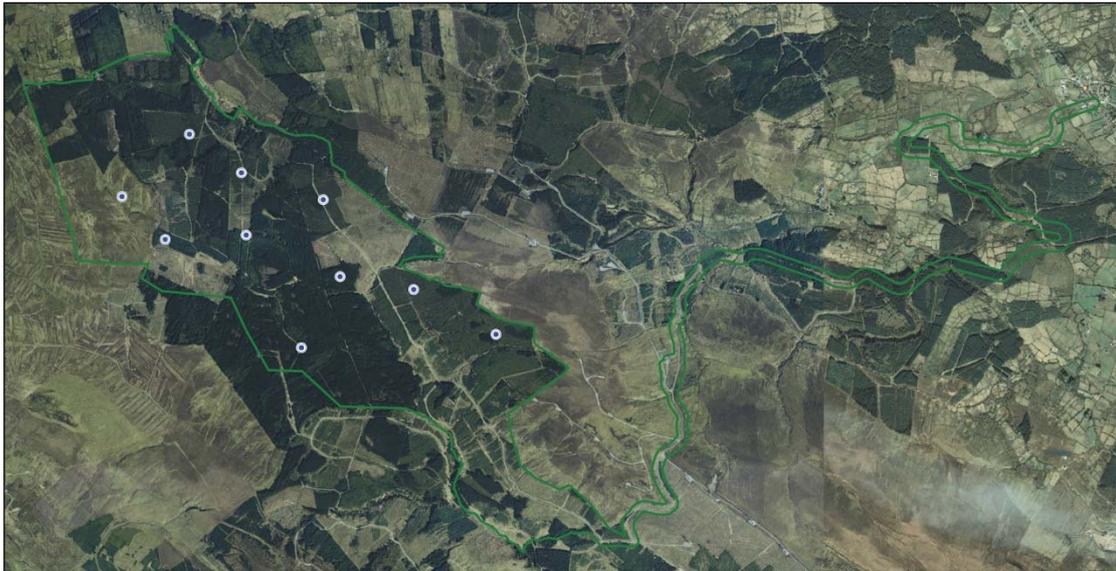


Figure 12-4 Aerial Image illustrating landcover (based on aerial imagery taken 2019, not to scale for illustrative purposes only)



Plate 12-2 View of firebreak corridor between two mature stands of coniferous trees

As can be seen in Figure 12-4, overall, the site is predominantly dedicated to commercial coniferous forestry. Sitka spruce and lodgepole pine are the dominant species. The coniferous plantation is dense with occasional access tracks or firebreaks, a typical view of this is shown in Plate 12-2 above. Alongside the forested areas are recently felled or replanted areas as can be seen in Plate 12-3 below.



Plate 12-3 Recently felled area of coniferous plantation

Although the site is relatively ubiquitously covered in conifers, there are some pockets of moorland particularly in the far west as seen in Plate 12-4 below. Figure 12-4 indicates that these areas have not recently been subject to peat cutting.



Plate 12-4 Area of extensive mountain moorland in the western part of the site

Plate 12-5 below shows Lough Nacroagh the only lake on site. The lough is surrounded by coniferous plantation forestry to the north and a wide strip of lake-side vegetation to the south.



Plate 12-5 View of Lough Nacroagh looking north-westwards across the lake

This landscape pattern is replicated in areas surrounding the site. Further afield on the lower slopes of the Carrane Hill and Corry mountain there is primarily agricultural grassland mixed with coniferous plantation and scattered dwellings.

12.4.2.2.4 Land Use

As described in Section 12.4.3.6 most of the site is currently used for commercial forestry, There are also some small pockets of open spaces interspersed throughout the forest plantation. The existing uses of the site would continue in conjunction with the proposed wind energy development. Land-use in the wider landscape comprises a mix of agriculture, low density residential development and commercial forestry as well as many existing wind farms.

12.4.3 Indications of Landscape Value

12.4.3.1 Landscape Value

To summarise the findings in the sections above and determine the landscape sensitivity, and ultimately the likely significance of the effects, assessments of landscape value for the proposed development site were assessed (Table 12-2). Landscape value includes designations such as scenic views and sensitivity designations found in development plans, as well as values which are attached to undesignated landscapes. A number of criteria were developed to assess the landscape values of the study area. These, combined with susceptibility, contribute to the assessment of landscape sensitivity.

Table 12-2 Summary of landscape policy and elements to determine the landscape value and sensitivity of the site

Indicator	Description
Landscape Designations	No landscape designations apply to the proposed development site. Within the study area (20km around the site) there are five scenic views, four AONBs and seven HVAs designated in the Leitrim CDP as well as Sensitive Rural Landscapes and Visually Vulnerable Areas in Co. Sligo, further details can be found in Section 12.4.1 and on Figure 12-1 of this chapter.
Landscape Quality/Condition	This refers to the physical state of the landscape and the condition of individual elements. The undisturbed bog areas are in good condition, otherwise the landscape quality has been degraded visually due to commercial forestry activity.
Aesthetic Qualities	There are some attractive areas around the Lough Nacroagh and on the mountain moorland as well as some good long-distance views.
Wildness/naturalness	The landscape of the site is predominantly used for commercial forestry and as such has been largely modified by human activity, however the areas of mountain moorland are natural areas and have a sense of wildness.
Rarity/ Conservation Interests	There are no visual or landscape designations located within the site. Designated areas are located within the wider area around the site. See Chapter 6 on Biodiversity, Flora and Fauna for a description of these sites.
Cultural Meaning/Associations	There are no evident cultural associations or monuments within the site itself, for more details see Chapter 13 Cultural Heritage.
Recreation Value	There is no formal amenity use of the proposed development site, however, onsite tracks may be used for walking. There are also numerous amenity

Indicator	Description
	routes within the study area as outlined in Section 12.5 below and shown in Figure 12-6 of this chapter and some of these may have visibility of the proposed turbines along parts of the routes.

12.4.4 Landscape Character of the Study Area

Landscape character refers to the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how people perceive this. It reflects combinations of geology, landform, soils, vegetation, land use and human settlement, and creates the sense of place found in different areas.

While the appropriate radius for landscape effects on landscape character in the relevant guidelines varies, the 2013 Landscape Institute *Guidelines for Landscape and Visual Impact Assessment* state the study area for landscape effects should ‘include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner’. As landscape character is primarily reflected by the elements within a certain area rather than those outside it and due to the nature of landscape character areas covering large areas of land within Counties Leitrim, Sligo and Roscommon, all landscape character areas or parts of falling within 15 kilometres from the proposed wind turbines are included in this assessment.

The *Landscape Assessment of County Leitrim* (2002) and *Landscape Character Assessment of County Roscommon* (2014) have identified Landscape Character Areas (LCAs) and those falling within the LVIA study area will be described below. There is no published Landscape Character Assessment for County Sligo, instead a landscape characterisation and appraisal study was commissioned, which resulted in the County Sligo Landscape Characterisation Map. However, a full landscape character assessment has not been carried out and LCAs were not been identified in County Sligo by Sligo County Council. Therefore, for the purpose of this Landscape and Visual Impact Assessment and in order to have parity in the assessment of landscape character between the three counties, a provisional landscape character assessment for the LVIA study area was carried out by MKO, which is presented Section 12.4.4.2 below.

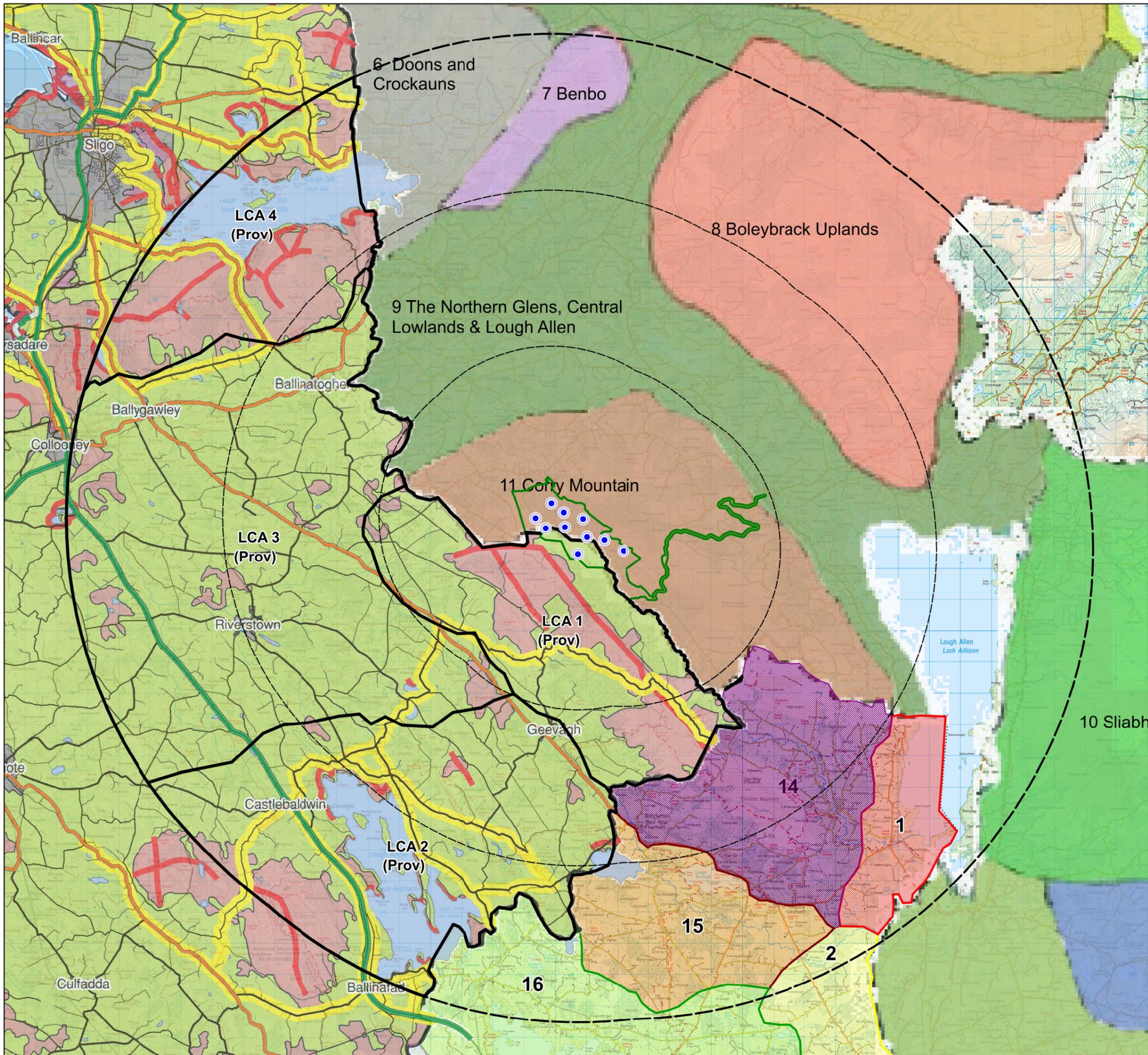
12.4.4.1 County Leitrim Landscape Character Areas

The *Landscape Assessment of County Leitrim* (LLCA) published in 2002 identifies 14 landscape character areas. Eight of the turbines are proposed to be located in *LCA11 Corry Mountain* and LCAs 6, 7, 8, 9 and 10 also fall within the study area. Key characteristics are outlined for each LCA as well as any information given on wind development provided in the LLCA.

12.4.4.1.1 LCA 11 Corry Mountain

Key Characteristics:

- Extensive, mountainous uplands bordering Lough Allen.
- Rough grazing on moorland hills and plateau.
- Extensive areas of coniferous forestry.
- Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.
- Impressive views from higher ground.
- Moorland plateau retains sense of isolation despite access roads and infrastructure.
- Field boundaries create strong patterns on lower hill slopes but show signs of dereliction in places.
- Distinctive upland valleys sheltering small farming communities.
- Semi-natural woodlands on steeper slopes and around farms.



Map Legend

- EIAR Site Boundary
- Landscape Character Study Area
- Proposed Turbines

Drawing Title: **12-5 Landscape Character Areas**

Project Title: **180511 - Croagh Wind Farm EIAR**

Drawn By:	Checked By:	Scale:	Date:	Project No:	Drawing No.:
JM	EM	1:120,000	30/06/2020	180511	Figure 12-5

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Wind farms are listed as one of three *Key Issues for Corry Mountain* and one of the *Principles for Landscape Management* states that ‘*site new wind farms/ communication masts close to existing development on the plateau to minimise impact on more remote areas of upland*’. The proposed development is located in a contiguous way to the existing wind turbines on the ridge and is essentially the last potential wind farm site on the ridge.

12.4.4.1.2 **LCA 6 Doons and Crockauns**

Key Characteristics:

- Varied limestone geology has created distinctive landform features, mountain profiles and scree slopes.
- Contrasting land uses including extensive grazing, coniferous plantations and areas of both upland and lowland peat bog.
- Semi-natural woodlands fringing Lough Gill.
- Sparse settlement pattern of isolated farmhouses amongst areas of rush infested pasture.
- Scrub encroachment and coniferous plantations obscure distinctive landform features.
- Parkes Castle in an attractive lough side setting.
- Lough Gill and its shores noted for their nature conservation value.

12.4.4.1.3 **LCA 7 Benboo**

Key Characteristics:

- Ancient and hard metamorphic rocks shaped by glacial ice flows form rugged heather-clad hills and a distinctive mountain profile.
- Smooth upland slopes are covered with heath and natural grassland.
- Underlying bedrock is exposed where peaty soils are thinnest.
- Streams occupying shallow valleys drain the hillsides and flow off the lower slopes into rivers which encircle the hard rock outcrop.
- Gorges and streams shelter linear clusters of scrub and woodland.
- The lower slopes are fringed by marginal, rushy pastures largely enclosed by post and wire fences and coniferous plantations. Distinctive low stone walls are evident stretching up some hillsides forming long rectangular fields.
- Roads encircle the mountain along which are located small, isolated farm cottages, often occupying sheltered locations and are surrounded by small copses. There is no settlement on the mountain itself.
- Distinct lack of archaeological monuments.
- Panoramic views over the adjacent lowlands.

12.4.4.1.4 **LCA 8 The Boleybrack Uplands**

Key Characteristics:

- Extensive, mountainous uplands retain a sense of isolation.
- Rough grazing on moorland hills and plateau.
- Extensive areas of coniferous forestry.
- Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.
- Impressive panoramic views from higher ground of surrounding mountains and lowlands.
- Field boundaries creating strong patterns on lower hill slopes showing signs of dereliction in places.
- Distinctive upland valley sheltering small farming communities.
- Semi-natural woodlands on steeper slopes above O’Donnell’s Rock.

12.4.4.1.5

LCA 9 The Northern Glens, Central Lowlands & Lough Allen

Key Characteristics:

- Undulating, drumlin covered lowlands and glens confined by sharp break in slope and mountainous areas.
- Meandering rivers and loughs fed by streams from the surrounding hills, fringed by trees and extensive areas of wet pasture contrast with the surrounding patchwork of drumlin fields.
- Small blocks of deciduous woodland and some coniferous plantations.
- Linear settlements strung out along roads winding through the lowlands.
- Local geological and topographical conditions give each glen its own particular character.
- Major communication routes through the mountains. Major towns often sited where several routes meet.
- Sense of enclosure within the drumlin swarms with occasional long views to the surrounding uplands providing orientation.
- Castles are important local landmarks and an indication of the strategic importance of these landscapes in history.

12.4.4.1.6

LCA 10 Sliabh An Iarainn

Key Characteristics:

- Extensive, mountainous uplands bordering Lough Allen.
- Rough grazing on moorland hills and plateau.
- Extensive areas of coniferous forestry.
- Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.
- Impressive views from higher ground.
- Moorland plateau retains sense of isolation despite access roads and infrastructure.
- Field boundaries creating strong patterns on lower hill slopes showing signs of dereliction in places.
- Distinctive upland valleys sheltering small farming communities.
- Semi-natural woodlands on steeper slopes and around farms.
- Concentration of sweathouses on some of the lower farmed slopes.

12.4.4.2 County Sligo Landscape Character Areas (provisionally prepared by MKO)

As stated above for the sake of parity in the assessment of landscape effects on landscape character in the study area, provisional landscape character areas were identified by a qualified landscape architect in the absence of a landscape character assessment for County Sligo.

12.4.4.2.1

LCA1 Carrane Hill

This LCA includes the upland area surrounding Carrane Hill and its south-western slopes. There are extensive mountain moorland areas covering the summit. While it is apparent that Carrane Hill Bog has been subject to turf-cutting there are large areas of undisturbed moorland. Commercial conifer plantation is spread throughout this LCA and fields occupy most of the lower slopes. There are no settlements and it is sparsely populated. There are a number of scenic routes in this LCA.

12.4.4.2.2 **LCA2 Lough Arrow and Environs**

The shores of Lough Arrow are mainly forested with a mixture of conifer and deciduous trees with generally well-maintained fields beyond. Away from the lough there are pockets of commercial forestry. Either side of Lough Arrow are elevated areas. To the south-west are the Bricklieve Mountains with panoramic views over Lough Arrow from Carrowkeel Megalithic Cemetery. Although the area is not highly populated there is some ribbon development

12.4.4.2.3 **LCA3 Eastern Lowlands**

Characterised by extensive farmland, the pattern of the landscape is shaped by the tree lines and hedgerows of the field boundaries. Although, there is also some forestry plantation. This area is a gently undulating drumlin landscape with many watercourses running through it including the Unshin, Douglas and Owenmore Rivers

12.4.4.2.4 **LCA4 Lough Gill and Environs**

The banks of Lough Gill are densely forested with mainly broadleaf trees. On the northern shore the land undulates until Crockauns, Keelogyboy and Cope’s Mountain. To the south the land rises steeply from the banks of Lough Gill to Killery Mountain, Slieve Dangan and Slieve Daene, where there are panoramic views over the lake. Apart from the lake shore and Lough Gill itself there are also recreation trails in Hazelwood Forest and Union Wood

12.4.4.3 **County Roscommon Landscape Character Areas**

The *Landscape Character Assessment of County Roscommon* (RLCA) published in 2008 identifies 36 landscape character areas. The closest Roscommon LCA is *LCA14: Arigna Mountains*, however, either all or parts of LCAs 1, 2 15 and 16 also fall within the study area and a description of the LCAs taken from the RLCA is provided below for each LCA.

The RLCA assigned the following landscape values to each of the LCAs:

- > Exceptional Value
- > Very High Value
- > High Value
- > Moderate Value

The values generally refer to the sensitivity of the LCAs to forces of change and development, whereby LCAs of exceptional value would be considered the most sensitive. Due to ‘*aesthetic and amenity qualities*’ LCA 16 has been classified as of exceptional value. LCAs 1 and 2 along the Shannon System have been assigned very high value due to ‘*high aesthetic and ecological quality*’ and the upland LCAs 14 and 15 also fall into this class as they ‘*provide important scenic amenities*’.

12.4.4.3.1 **LCA 1 Lough Allen and Arigna Foothills**

This LCA is a quiet, sparsely populated broad valley defined by high mountains overlooking a very large lake.

Value: Very High

12.4.4.3.2 **LCA 2 Upper Shannon and Derreenannagh Drumlin Belt**

The overall image of this LCA is one of a sparsely populated wooded drumlin landscape sloping down to the Upper Shannon.

Value: Very High

12.4.4.3.3 **LCA 14 Arigna Mountains**

Arigna Mountains LCA is set on a rugged mountain steeped in mining history and providing some of the best views in the county.

Value: Very High

12.4.4.3.4 **LCA 15: Lough Meelagh Drumlins**

Lough Meelagh Drumlins LCA is of a gently undulating forested drumlin lakeland.

Value: Very High

12.4.4.3.5 **LCA 16 Lough Key and Boyle River Network**

The overall image of this landscape is one of an extensive organically shaped lakeland fringed by broadleaf forest.

Value: Exceptional

12.4.5 **Landscape Receptor Preliminary Assessment**

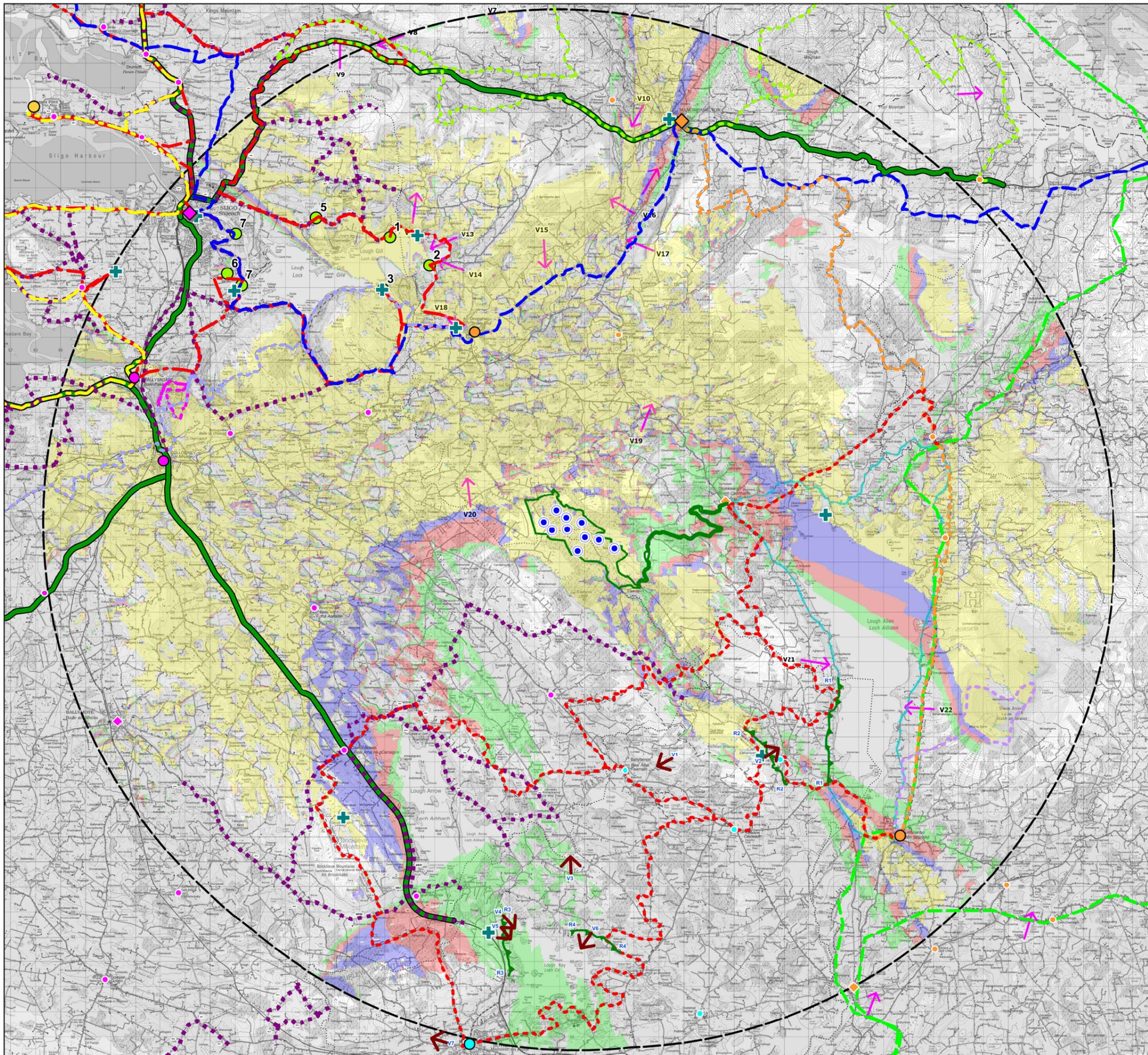
After identifying the landscape receptors in the study area based on landscape designations derived from the respective CDPs and Landscape Character Areas (LCAs) taken from the Leitrim and Roscommon Character Assessments and compiled for Sligo by MKO, a preliminary assessment is carried out to screen out landscape receptors that will not be impacted by the proposed development.

Using the Zone of Theoretical Visibility mapping shown on Figure 12-6 the landscape receptors that will have no theoretical visibility are screened out as shown in Table 12-3 below.

Table 12-3 Landscape Receptors Screened Out -**No visibility** indicated by ZTV map

Landscape Receptor Category	County	Landscape Receptor with no visibility shown on ZTV
Landscape Designations	Leitrim	AONBs: A3 HVAs: B4, B6, B9, B11
Landscape Character Areas	Roscommon	LCA 2 and LCA 15

Following the pre-assessment exercise the landscape receptors shown in Table 12-4 have been selected for full assessment due to their significance with in the study area and the potential landscape effects they may experience due to the proposed wind energy development.



Map Legend

- Proposed Turbine
- EIAR Site Boundary
- Visual Baseline Study Area
- Settlements**
- County Leitrim**
 - Tier 2A Centres
 - Tier 2B Centres
 - Tier 3 Centres
 - Tier 4 Centres
- County Sligo**
 - Gateway City
 - Gateway Sattellites
 - Key Support Towns
 - Villages
- County Roscommon**
 - Tier 2
 - Tier 4
- Scenic Routes and Views**
- County Leitrim**
 - Protected Views and Prospects
- County Sligo**
 - Scenic Routes
- County Roscommon**
 - Scenic Views
 - Scenic Routes
- OSi Viewing Points**
 - Viewing Point marked on OSi map
- Routes & Destinations**
- Walking Routes**
 - Miners Way
 - Sligo Way
 - Leitrim Way
 - Union Rock Trail / Oak Wood Trail
 - Slabh an Iarainn Loop
 - Northern Glens Trail
- Cycle Trails**
 - Northwest Cycle Trail
 - Kingfisher Cycle Loop
- Scenic Drives**
 - Wild Atlantic Way Discovery Point
 - Wild Atlantic Way
 - Lough Gill Scenic Drive
 - Lough Allen Scenic Drive
- Recreation Destinations**
 - Recreation Destinations
- Transport Routes**
- Zone of Theoretical Visibility (ZTV)**
 - 1 to 3 turbines
 - 4 to 6 turbines
 - 7 to 8 turbines
 - 9 to 10 turbines

Drawing Title: **Figure 12-6 Half Blade ZTV & Visual Baseline**

Project Title: **180511 - Croagh Wind Farm EIAR**

Drawn By:	Checked By:	Scale:	Date:	Project No:	Drawing No.:
JM	EM	1:150,000	30/06/2020	180511	Figure 12-6



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Table 12-4 Landscape receptors screened in for full assessment

Landscape Receptor Category	County		Landscape Receptor
Landscape Designations	Leitrim	AONBs	A4
			A5
			A6
		HVAs	B3
			B7
			B8
Landscape of Proposed Development Site	Leitrim/Sligo		Landscape of Proposed Development Site
Landscape Character Areas	Leitrim	LCA 11 Corry Mountain	
		LCA 6 Doons and Crockauns	
		LCA 7 Benboo	
		LCA 8 The Boleybrack Uplands	
		LCA 9 The Northern Glens, Central Lowlands & Lough Allen	
		LCA 10 Sliabh An Iarainn	
	Sligo	LCA1 Carrane Hill	
		LCA2 Lough Arrow and Environs	
		LCA3 Eastern Lowlands	
		LCA4 Lough Gill and Environs	
	Roscommon	LCA 1 Lough Allen and Arigna Foothills	
		LCA 14 Arigna Mountains	

12.5 Visual Baseline

12.5.1 Visual Receptors

The main purpose of establishing the visual baseline is to identify the key visual receptors that should be considered for viewpoint selection. To this end the following have been identified:

- > Designated Scenic Routes and Scenic Views
- > Settlements and house clusters
- > Recreational and Tourist Destinations
- > Recreational Routes
 - Waymarked Walking Routes
 - Cycle Routes
 - Scenic Drives
 - Tourist Routes (e.g. Wild Atlantic Way)
- > Viewing Points (e.g. marked on OS Maps)
- > Transport Routes

These visual receptors are listed in tables in the following sections along with theoretical visibility at those locations indicated by the ZTV maps. All visual receptors are shown on Figure 12-6.

12.5.1.1 Designated Scenic Routes and Scenic Views

The designated scenic routes and views are listed separated by counties and were taken from the respective county development plans. There are no scenic routes or designations on or adjacent the site.

12.5.1.1.1 County Leitrim

Protected views and prospects within the study area designated in the Leitrim County Development Plan 2015-2021 are listed in

Table 12-5 below. The table lists the view number, the focus of the view stated in the CDP, whether the view is directed towards the proposed turbine and if there is theoretical visibility indicated by the ZTV map.

Table 12-5 Views and Prospects within 20 kilometres (Co. Leitrim)

Map Ref.	View	Theoretical visibility (ZTV)	Direction
Up to 5 km			
V19	View towards Bellhavel Lake from Local Road LT42461	No	No
V20	View from Gleaghnafernagh from Local Road LT42533	Yes	No
5 to 10 km			
V18	View of Creevelea Abbey from the R288	Partial	Yes
V21	View towards Lough Allen from the R280	No	No
10 to 15 km			

Map Ref.	View	Theoretical visibility (ZTV)	Direction
V12	View of Fivemilebourne and Carrickanurroo	No	No
V13	View of Lough Gill from Carrickanurroo	No	No
V14	View of Lough Gill from R286	No	No
V15	View towards Carrigeencor Lake from Local Roads LS08162 and LS08164	Yes	Yes
V16	View of Benbo, Thur and Dough Mountains from R280	No	No
V17	View from O'Donnell's Rock	Yes	No
V22	View towards Lough Allen from the R200	No	No
15 to 20 km			
V8	View towards Glencar Lake from Local Road LP04145	No	No
V10	View towards Benbo Mountain from Local Road LP02136	Partial	Yes

Overall, there is limited potential for any effects on Views and Prospects in Co Leitrim.

12.5.1.1.2 County Sligo

The scenic routes listed in Appendix E of Sligo County Development Plan 2017-2023 can be found in

Table 12-6 below and are shown on Figure 12-1 above and Figure 12-6 below. Extracted from the CDP are the view number, the stretch of road the view is located on and the focus of the view. Additionally, there are columns indicating whether the view is directed towards the proposed turbine and if there is theoretical visibility indicated by ZTV mapping. It is important to emphasise that there is only one scenic route within 5km of the site and this is on the opposite side of Carrane Hill to the Proposed Development.

Table 12-6 Scenic Routes within 20 kilometres (Co. Sligo)

No.	Location of View	Focus of View	ZTV	Direction
Up to 5 km				
66	L-1101 from north of Conways Cross extending along southside of Carran Hill to Roscommon County boundary	Views of Carran Hill	Partial	Yes
5 to 10 km				
56	Lakeshore drive around Lough Arrow from Castlebaldwin to	Views of Lough Arrow and Bricklieve Mountains	Partial	No

No.	Location of View	Focus of View	ZTV	Direction
	Roscommon County boundary (L-1404, L-1403 & L-1905)			
61	Heapstown Crossroads to Killadoon and Crossroads (L-1901) Bricklieve Mountains	Views of Lough Arrow	No	No
62	Ballindoon Crossroads to Killadoon Crossroads (L-1904)	Views of Lough Arrow and Bricklieve Mountains	No	No
63	Highwood road (L-1904) from Ballindoon Crossroads to junction with L-5902 & L-59021 north of Kilmactranny	Views of Lough Arrow, Bricklieve Mountains and Kesh Corran	No	No
65	Killadoon Crossroads to junction with L-1101 north of Conways Cross (L-1901)	Views of Lough Arrow, Lough Nasool and Lough Bo	Partial	No
10 to 15 km				
3	N4 Castlebaldwin to Ballinafad	Views of Bricklieve Mountains, Lough Arrow and Curlew Mountains	Partial	Partial
12	R284 from Carrowroe to junction with road L-3605 north of Ballygawley	Views of Ballygawley Lough, Slieve Dargan and Slieve Daeane	Partial	Partial
13	R286 from Sligo to Leitrim County boundary	Views of Lough Gill and Colgagh Lough	Yes	Yes
14	R287 from Carrowroe to junction with road L-3605 at Correagh	Views of Lough Gill, Slieve Wood, Slieve Dargan, Slieve Daeane and Killery Mountain	No	Partial
23	R278 from Calry (Doonally road junction) to Leitrim County boundary at Carrickoneileen.	Views of Keelogyboy Mountain	Yes	No
37	From junction of L-3409 and R286 at Ballynamona, northwards through Loughanelteen to Keelogyboy (L-3409 & L-7418), then south to R278 via Fermoy (L-7420 & L-3407)	Views of Keelogyboy Mountain, Cope's Mountain, Lough Anelteen, Killery Mountain, Lough Gill, Ox Mountains, Slieve Daeane, Slieve Dargan, Kings Mountain, Ben Bulbin, Knocknarea, the coast, Sligo Bay and Atlantic Ocean	Yes	Yes
55	L-3605, south of Slieve Daeane and Slieve Dargan, between junctions with R284 and R287	Views of Slieve Dargan, Slieve Daeane and Lough Dargan	Yes	Partial

No.	Location of View	Focus of View	ZTV	Direction
57	Old N4 along western shore of Lough Arrow from Aghanagh through Ballinafad village to junction with new N4 south of Ballinafad	Views of Lough Arrow, Bricklieve Mountains and Curlew Mountains	Partial	Partial
60	From Castlebaldwin southwards to junction with R295, southwest of Templevanny Lough (L-1404 & L-5801)	Views of Bricklieve Mountains, Kesh Corran and Lough Arrow	Partial	No
64	L-18011 south of Lough Arrow and L-18012 through Lecarrow (Aghanagh ED) to junction with Curlew Bypass (N4)	Views of Lough Arrow, Bricklieve Mountains and Carran Hill (north-east of Lough Arrow)	Partial	Yes
71	L-1906 from junction with L-1905 to junction with L-5904, north of Kilmactranny	Views of Lough Arrow, Bricklieve Mountains and Keash Corran	No	No
15 to 20 km				
1	N15 from Bunduff Bridge (Leitrim County boundary) to Sligo	Views of Atlantic Ocean, Ben Bulbin, Kings Mountain and Benwiskin	No	Partial
2	N16 from Leitrim County boundary to Sligo	Views of Glencar Lake, Ben Bulbin and Atlantic Ocean	Partial	No
4	N4 Collooney By-Pass from northern roundabout at Collooney to Carrowroe	Views of Ballysadare Bay, Knocknarea, Union Wood, Slieve Daeane, Slieve Dargan	Partial	Partial
5	N4 Curlew By-Pass from Roscommon County boundary to Ballinafad	Views of Lough Arrow, Bricklieve Mountains and Curlew Mountains	Partial	Yes
6	N59 Beltra to Ballysadare	Views of Ballysadare Bay, Slieveward and Knocknarea	Yes	No
11	R291 from Sligo to Rosses Point	Views of Sligo Bay and Harbour, Coney Island, Knocknarea and Coolera Peninsula, Slieve Dargan, Slieve Daeane, Killery Mountain and Ox Mountains	No	Partial
20	R295 from Carrowmaclenany Crossroads to Carrowcroy Crossroads	Views of Kesh Corran and the Bricklieve Mountains	No	Partial
36	L-3602 along Garvoge River and Lough Gill from Sligo to junction with R287	Views of Garavoge River and Lough Gill	No	Partial

No.	Location of View	Focus of View	ZTV	Direction
38	L-7417 from junction with L-7418 north to junction with L-7416 at Glackbaun and along L-7416 from its eastern extremity near Leitrim County boundary to junction with N16 at Drumkilsellagh	Views of Cope’s Mountain, Keelogyboy Mountain, Lough Gill, Slieve Dargan, Kings Mountain, Knocknarea, Ox Mountains, Sligo Bay and Atlantic Ocean	Partial	Yes
43	L-6101 from junction with N59 at Corhawnagh Church extending westward to Streamstown and south to N59 via Lisduff	Views of Ballysadare Bay, Knocknarea and Slieveard (Little Ox Mountains)	Yes	Yes
44	L-6101 between junction with N59 at Corhawnagh Church and junction with R290 (old N4) south of Ballysadare	Views of Slieveard (Little Ox Mountains)	Yes	No
54	L-6102 from junction with N59 west of Cooney Lough, continuing on L-2101 to junction with L-2801 south of Tullaghan Hill	Views of Ox Mountains, Atlantic Ocean and Cooney Lough	Partial	Yes
58	Carrowcroy crossroads to Ballinafad (L-1806)	Views of Bricklieve Mountains, Curlew Mountains and Lough Arrow	Partial	Partial

12.5.1.1.3 County Roscommon

The designated scenic routes and views are listed in Appendix 1 of the Landscape Character Assessment of County Roscommon (RLCA). The RLCA distinguishes between proposed and existing scenic routes and views. Within the study area all the scenic routes are proposed new routes, while some of the views are existing with many new views proposed, as shown in Table 12-7 below, which also lists a description of scenic route as well as focus of scenic routes and views. Additionally, there are columns indicating whether the view is directed towards the proposed turbine and if there is theoretical visibility indicated by ZTV mapping. There are no scenic routes or views with the potential for significant effects as shown in Table 12-7.

Table 12-7 Scenic Routes and Views within 20 kilometres (Co. Roscommon)

No.	Description and focus	ZTV	Direction
Scenic Routes			
R1 (Proposed)	Scenic route along R280 with views across Lough Allen and Slieve Anierin and views from R280 up to Kilronan Mountain and the Arigna Mines.	No	No
R2 (Proposed)	Elevated scenic route along third class road overlooking Lough Allen and Slieve Anierin.	Partial	No
R3 (Proposed)	Elevated scenic route along third class road overlooking Lough Key, its islands and Lough Key Forest & Activity Park.	Partial	No

No.	Description and focus	ZTV	Direction
R4 (Proposed)	Scenic route along third class road overlooking Lough Key, it's islands and Lough Key Forest & Activity Park.	No	No
Views			
V1 (Existing View No 1 in CDP)	Elevated view of Lough Skean and rolling farmland and forestry to the south. Tranquil and sparsely populated.	No	No
V2 (Existing View No 2 in CDP)	Elevated panoramic view over Lough Allen and Slieve Anierin. Long distance views of rolling drumlins and farmland. Sheemore Hill and beyond in far distance.	No	No
V3 (Proposed)	View of Derrynasallagh Lough with naturally occurring birch woodland and heath. Long moorland ridge to north in distance.	No	Yes
V4 (Existing View No 3 in CDP)	Elevated, extended views over Lough Key Forest & Activity Park. Extensive natural woodland, inlets & islands. Castle on islands in distance. Highly sensitive landscape.	No	No
V5 (Proposed)	Elevated, extended views over Lough Key Forest & Activity Park. Extensive natural woodland, inlets & islands. Castle on islands in distance. Highly sensitive landscape.	Partial	No
V6 (Proposed)	View to south west over Lough Key Forest & Activity Park and islands. Intimate viewshed. Highly sensitive.	No	No

12.5.1.2 Settlements

In order to identify which settlements within the study area should be considered for viewpoint selection the settlement strategies and hierarchies set out in the core strategies of the CDPs of Leitrim, Sligo and Roscommon were consulted. The settlement hierarchies are presented by county below.

The hierarchy of towns, villages and other centres within Leitrim is shown in *Map 2.1 - Core Strategy of Leitrim County Development Plan 2015 - 2021* as follows:

- > Tier 1 - Principal Town
- > Tier 2A - Key Towns
- > Tier 2B – Centres/Support Towns
- > Tier 3 Centres
- > Tier 4 Centres

The settlement hierarchy for Sligo is listed in section 3.2 and shown in Fig. 3.A *County Sligo – Core Strategy Map* in Sligo County Development Plan 2017-2023 as follows:

- > Gateway City
- > Gateway Satellites
- > Key Support Towns
- > Villages sustaining rural communities

The settlement hierarchy listed below was taken from Section 2.3 of the Roscommon County Development Plan 2014-2020 and shown in Map 4 – *Roscommon Settlement Hierarchy*:

- > Tier 1 – County Towns
- > Tier 2 - Key Support Towns/Settlements
- > Tier 3 – Tertiary Growth Centres
- > Tier 4 -Serviced & Unserviced Villages and the Countryside

Table 12-8 below lists the settlements identified from the respective CDPs within the LVIA study area also noting their county status within the settlement strategy and whether there is theoretical visibility indicated by the ZTV.

Table 12-8 Significant Settlements within the Study Area

Settlement	County	Settlement Hierarchy	Theoretical Visibility (ZTV)
Up to 5 km			
Drumkeeran	Leitrim	Tier 3	Partial
5 to 10 km			
Ballintogher	Sligo	Village	Full
Ballyfarnon	Roscommon	Tier 4	No
Dromahair	Leitrim	Support Town - Tier 2B	Full
Geevagh	Sligo	Village	No
Killarga	Leitrim	Tier 4	Full
Riverstown	Sligo	Village	Partial
10 to 15 km			
Arigna	Roscommon	Tier 4	No
Ballinagleragh	Leitrim	Tier 4	Full
Ballygawley	Sligo	Village	Full
Castlealdwin	Sligo	Village	No
Collooney	Sligo	Gateway Satellite	Full
Dowra	Leitrim/Cavan	Tier 4/Tier 6 Small Village	Partial
Keadue	Roscommon	Tier 4	No
15 to 20 km			
Ballinafad	Sligo	Village	Partial
Ballymote	Sligo	Key Support Town	No