# Calculated FoS of Natural Peat Slopes for Croagh Wind Farm - Drained Analysis

| Turbine No./Waypoint | Slope | Design c' | Bulk unit weight of Peat | Unit weight of Water | 100% Water to height of Peat | Depth of In situ Peat | Friction Angle | Equivalent Total Depth of Peat (m) | Factor of Safety for Load Condition | |
|---|---|---|---|---|---|---|---|---|---|---|
| | α (deg) | c' (kPa) | γ (kN/m$^3$) | $\gamma_w$ (kN/m$^3$) | (m) | (m) | ø' (deg) | Condition (2) | Condition (1) 100% Water | Condition (2) 100% Water |
| TP10A | 8.8 | 4 | 10.0 | 10.0 | 0.4 | 0.4 | 25 | 1.4 | **6.61** | **4.04** |
| TP3A | 6.1 | 4 | 10.0 | 10.0 | 1.1 | 1.1 | 25 | 2.1 | **3.44** | **3.88** |
| TP21A | 4.3 | 4 | 10.0 | 10.0 | 2.9 | 2.9 | 25 | 3.9 | **1.84** | **2.96** |
| TP15A | 9.9 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.36** | **2.52** |
| WP006b | 3.7 | 4 | 10.0 | 10.0 | 2.8 | 2.8 | 25 | 3.8 | **2.22** | **3.53** |
| WP007b | 3.7 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **3.11** | **4.47** |
| WP008b | 6.5 | 4 | 10.0 | 10.0 | 1.9 | 1.9 | 25 | 2.9 | **1.87** | **2.64** |
| WP009b | 1.7 | 4 | 10.0 | 10.0 | 2.8 | 2.8 | 25 | 3.8 | **4.82** | **7.68** |
| WP010b | 2.6 | 4 | 10.0 | 10.0 | 1.8 | 1.8 | 25 | 2.8 | **4.90** | **6.82** |
| WP011b | 1 | 4 | 10.0 | 10.0 | 2.7 | 2.7 | 25 | 3.7 | **8.49** | **13.42** |
| WP012b | 2.6 | 4 | 10.0 | 10.0 | 3.7 | 3.7 | 25 | 4.7 | **2.39** | **4.06** |
| WP013b | 2.5 | 4 | 10.0 | 10.0 | 3.8 | 3.8 | 25 | 4.8 | **2.42** | **4.14** |
| WP014b | 2.5 | 4 | 10.0 | 10.0 | 3.7 | 3.7 | 25 | 4.7 | **2.48** | **4.23** |
| WP017b | 3.1 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **3.70** | **5.34** |
| WP018b | 3.3 | 4 | 10.0 | 10.0 | 2.1 | 2.1 | 25 | 3.1 | **3.31** | **4.85** |
| WP020b | 1.2 | 4 | 10.0 | 10.0 | 2.1 | 2.1 | 25 | 3.1 | **9.10** | **13.34** |
| WP021b | 2.1 | 4 | 10.0 | 10.0 | 2.6 | 2.6 | 25 | 3.6 | **4.20** | **6.57** |
| WP022b | 1.2 | 4 | 10.0 | 10.0 | 3.5 | 3.5 | 25 | 4.5 | **5.46** | **9.19** |
| WP023b | 2.1 | 4 | 10.0 | 10.0 | 4.5 | 4.5 | 25 | 5.5 | **2.43** | **4.30** |
| WP024b | 4.6 | 4 | 10.0 | 10.0 | 2.1 | 2.1 | 25 | 3.1 | **2.38** | **3.48** |
| WP025b | 3 | 4 | 10.0 | 10.0 | 2.2 | 2.2 | 25 | 3.2 | **3.48** | **5.17** |
| WP026b | 4.5 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **2.56** | **3.68** |
| WP027b | 4.7 | 4 | 10.0 | 10.0 | 1.8 | 1.8 | 25 | 2.8 | **2.72** | **3.77** |
| WP028b | 5 | 4 | 10.0 | 10.0 | 2.1 | 2.1 | 25 | 3.1 | **2.19** | **3.21** |
| WP029b | 3.3 | 4 | 10.0 | 10.0 | 0.7 | 0.7 | 25 | 1.7 | **9.94** | **8.85** |
| WP030b | 2.5 | 4 | 10.0 | 10.0 | 1.7 | 1.7 | 25 | 2.7 | **5.40** | **7.36** |
| WP031b | 7.4 | 4 | 10.0 | 10.0 | 0.8 | 0.8 | 25 | 1.8 | **3.91** | **3.73** |
| WP032b | 6.9 | 4 | 10.0 | 10.0 | 0.9 | 0.9 | 25 | 1.9 | **3.73** | **3.79** |
| WP033b | 8.6 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.71** | **2.89** |
| WP034b | 11.7 | 4 | 10.0 | 10.0 | 0.8 | 0.8 | 25 | 1.8 | **2.52** | **2.37** |
| WP035b | 10.5 | 4 | 10.0 | 10.0 | 0.8 | 0.8 | 25 | 1.8 | **2.79** | **2.64** |
| CM379 | 3.5 | 4 | 10.0 | 10.0 | 2.4 | 2.4 | 25 | 3.4 | **2.74** | **4.17** |
| CM380 | 2 | 4 | 10.0 | 10.0 | 2.4 | 2.4 | 25 | 3.4 | **4.78** | **7.30** |
| CM381 | 1.3 | 4 | 10.0 | 10.0 | 2.5 | 2.5 | 25 | 3.5 | **7.05** | **10.91** |
| CM390 | 4.8 | 4 | 10.0 | 10.0 | 2.1 | 2.1 | 25 | 3.1 | **2.28** | **3.34** |
| CM391 | 4.2 | 4 | 10.0 | 10.0 | 1.2 | 1.2 | 25 | 2.2 | **4.56** | **5.38** |
| CM392 | 2.2 | 4 | 10.0 | 10.0 | 1.8 | 1.8 | 25 | 2.8 | **5.79** | **8.06** |
| CM393 | 4.2 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **5.48** | **5.91** |
| CM394 | 1.3 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **8.82** | **12.73** |
| CM397 | 5.1 | 4 | 10.0 | 10.0 | 0.6 | 0.6 | 25 | 1.6 | **7.53** | **6.09** |
| CM398 | 7.9 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.94** | **3.15** |
| CM399 | 5.6 | 4 | 10.0 | 10.0 | 0.2 | 0.2 | 25 | 1.2 | **20.59** | **7.40** |
| CM400 | 6.4 | 4 | 10.0 | 10.0 | 0.5 | 0.5 | 25 | 1.5 | **7.22** | **5.18** |
| CM401 | No peat recorded at location | | | | | | | | | |
| CM422 | 7.2 | 4 | 10.0 | 10.0 | 2.3 | 2.3 | 25 | 3.3 | **1.40** | **2.09** |
| CM423 | 6.7 | 4 | 10.0 | 10.0 | 1.1 | 1.1 | 25 | 2.1 | **3.14** | **3.53** |
| CM424 | 8.1 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.87** | **3.07** |
| CM425 | 3.3 | 4 | 10.0 | 10.0 | 1.6 | 1.6 | 25 | 2.6 | **4.35** | **5.79** |
| CM426 | 10.4 | 4 | 10.0 | 10.0 | 1.1 | 1.1 | 25 | 2.1 | **2.05** | **2.28** |
| CM427 | 8 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **1.93** | **2.49** |
| CM429 | 6.5 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **2.37** | **3.06** |
| CM430 | 7.1 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **2.17** | **2.80** |
| PP | 7.1 | 4 | 10.0 | 10.0 | 2.5 | 2.5 | 25 | 3.5 | **1.30** | **2.00** |
| PP10 | 4.9 | 4 | 10.0 | 10.0 | 1.6 | 1.6 | 25 | 2.6 | **2.94** | **3.90** |
| PP11 | 5.7 | 4 | 10.0 | 10.0 | 1.1 | 1.1 | 25 | 2.1 | **3.68** | **4.15** |
| PP12 | 4.2 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **5.48** | **5.91** |
| PP13 | 2.6 | 4 | 10.0 | 10.0 | 2.2 | 2.2 | 25 | 3.2 | **4.01** | **5.97** |
| PP14 | 3.8 | 4 | 10.0 | 10.0 | 2.4 | 2.4 | 25 | 3.4 | **2.52** | **3.84** |
| PP15 | 4.6 | 4 | 10.0 | 10.0 | 2.7 | 2.7 | 25 | 3.7 | **1.85** | **2.92** |
| PP4 | 12.2 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **1.94** | **2.05** |
| PP5 | 4 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **2.87** | **4.14** |
| PP6 | 2.7 | 4 | 10.0 | 10.0 | 2.9 | 2.85 | 25 | 3.9 | **2.98** | **4.78** |
| PP7 | 4.7 | 4 | 10.0 | 10.0 | 2.0 | 2 | 25 | 3.0 | **2.45** | **3.52** |
| PP9 | 4.6 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **3.34** | **4.32** |
| T10 | 8.6 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **1.80** | **2.32** |
| WP001c | 5.3 | 4 | 10.0 | 10.0 | 1.6 | 1.6 | 25 | 2.6 | **2.72** | **3.61** |
| WP002c | 4.4 | 4 | 10.0 | 10.0 | 0.8 | 0.8 | 25 | 1.8 | **6.54** | **6.27** |
| WP003c | 3.3 | 4 | 10.0 | 10.0 | 1.4 | 1.4 | 25 | 2.4 | **4.97** | **6.27** |
| WP004c | 4.9 | 4 | 10.0 | 10.0 | 1.2 | 1.2 | 25 | 2.2 | **3.92** | **4.61** |
| WP005c | 6.2 | 4 | 10.0 | 10.0 | 0.9 | 0.9 | 25 | 1.9 | **4.14** | **4.22** |
| WP006c | 7.6 | 4 | 10.0 | 10.0 | 0.9 | 0.9 | 25 | 1.9 | **3.39** | **3.45** |
| WP009c | 13.1 | 4 | 10.0 | 10.0 | 0.9 | 0.9 | 25 | 1.9 | **2.01** | **2.01** |
| WP010c | 15.1 | 4 | 10.0 | 10.0 | 0.7 | 0.7 | 25 | 1.7 | **2.27** | **1.95** |
| WP011c | 10 | 4 | 10.0 | 10.0 | 1.4 | 1.4 | 25 | 2.4 | **1.67** | **2.08** |
| WP013c | 9.6 | 4 | 10.0 | 10.0 | 0.9 | 0.9 | 25 | 1.9 | **2.70** | **2.73** |
| WP018c | 3.8 | 4 | 10.0 | 10.0 | 2.6 | 2.6 | 25 | 3.6 | **2.33** | **3.63** |
| WP019c | 5.3 | 4 | 10.0 | 10.0 | 1.6 | 1.6 | 25 | 2.6 | **2.72** | **3.61** |
| WP020c | 6.9 | 4 | 10.0 | 10.0 | 1.8 | 1.8 | 25 | 2.8 | **1.86** | **2.57** |
| WP021c | 5.2 | 4 | 10.0 | 10.0 | 1.9 | 1.9 | 25 | 2.9 | **2.33** | **3.30** |
| WP022c | 5.3 | 4 | 10.0 | 10.0 | 1.5 | 1.5 | 25 | 2.5 | **2.90** | **3.75** |
| WP023c | 8 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.90** | **3.11** |
| WP024c | 3.8 | 4 | 10.0 | 10.0 | 1.3 | 1.3 | 25 | 2.3 | **4.65** | **5.68** |
| WP025c | 13.9 | 4 | 10.0 | 10.0 | 0.6 | 0.6 | 25 | 1.6 | **2.86** | **2.25** |
| WP026c | 8.5 | 4 | 10.0 | 10.0 | 0.8 | 0.8 | 25 | 1.8 | **3.42** | **3.25** |
| WP027c | 3.3 | 4 | 10.0 | 10.0 | 1.6 | 1.6 | 25 | 2.6 | **4.35** | **5.79** |
| mk0v3_562 | 12.8 | 4 | 10.0 | 10.0 | 1.2 | 1.2 | 25 | 2.2 | **1.54** | **1.77** |
| mk0v3_563 | 8.2 | 4 | 10.0 | 10.0 | 1.0 | 1 | 25 | 2.0 | **2.83** | **3.03** |
| mk0v3_564 | 3.9 | 4 | 10.0 | 10.0 | 3.5 | 3.5 | 25 | 4.5 | **1.68** | **2.83** |
| mk0v3_565 | 3.3 | 4 | 10.0 | 10.0 | 2.7 | 2.7 | 25 | 3.7 | **2.58** | **4.07** |
| mk0v3_566 | 2.8 | 4 | 10.0 | 10.0 | 2.8 | 2.8 | 25 | 3.8 | **2.93** | **4.67** |
| mk0v3_567 | 2.4 | 4 | 10.0 | 10.0 | 3.0 | 3 | 25 | 4.0 | **3.19** | **5.17** |
| mk0v3_568 | 5.8 | 4 | 10.0 | 10.0 | 3.4 | 3.4 | 25 | 4.4 | **1.17** | **1.95** |
| mk0v3_569 | 6.2 | 4 | 10.0 | 10.0 | 3.4 | 3.4 | 25 | 4.4 | **1.10** | **1.82** |
| | | | | | | | | **Minimum =** | **1.02** | **1.47** |
| | | | | | | | | **Maximum =** | **48.98** | **74.08** |
| | | | | | | | | **Average =** | **4.69** | **5.41** |

**Notes:**

(1) Assuming a bulk unit weight of peat of 10 (kN/m$^3$)
(2) Assuming a surcharge equivalent to fill depth of 1.0m.
(3) Slope inclination (β) based on site readings and contour survey plans of site.
(4) FoS is based on slope inclination and shear test results obtained from published data.
(5) Peat depths based on probes carried out by FT, Coillte, HES and MKO.
(6) For load conditions see Report text.
(7) Minimum acceptable factor of safety required of 1.3 for first-time failures based on BS: 6031:1981 Code of practice for Earthworks.

# Appendix G

## Methodology for Peat Stability Risk Assessment

## Methodology for Peat Stability Risk Assessment

A peat stability risk assessment was carried out for each of the main infrastructure elements at the proposed wind farm development. This approach takes into account guidelines for geotechnical/peat stability risk assessments as given in PLHRAG (2017) and MacCulloch (2005). The degree of risk is determined as a Risk Rating (R), which is the product of probability (P) and impact (I). How these factors are determined and applied in the analysis is described below.

The main approaches for assessing peat stability include the following:

(a) Geomorphological

(b) Qualitative (judgement)

(c) Index/Probabilistic (probability)

(d) Deterministic (factor of safety)

Approaches (a) to (c) listed above would be considered subjective and do not provide a definitive indication of stability; in addition, a high level of judgement/experience is required which makes it difficult to relate the findings to real conditions. FT apply a more objective approach, the deterministic approach. As part of FT's deterministic approach, a qualitative risk assessment is also carried out taking into account qualitative factors, which cannot necessarily be quantified.

### Probability

The likelihood of a peat failure occurring was assessed based on the results of both the quantitative results of stability calculations (deterministic approach using factors of safety) and the assessment of the severity of several qualitative factors which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability.

The qualitative factors used in the risk assessment are outlined in Table A and have been compiled based on FT's experience of assessments and construction in peat land sites and peat failures throughout Ireland and the UK.

**Table A Qualitative Factors used to Assess Potential for Peat Failure**

| Qualitative Factor | Type of Feature/Indicator for each Qualitative Factor [1] | Explanation/Description of Qualitative Factor |
|---|---|---|
| Evidence of sub peat water flow | No | Based on site walkover observations. Sub peat water flow generally occurs in the form of natural piping at the base of peat. Where there is a constriction or blockage in natural pipes a build-up of water can occur at the base of the peat causing a reduction in effective stress at the base of the peat resulting in failure; this is particularly critical during periods of intense rainfall. |
| | Possibly | |
| | Probably | |
| | Yes | |
| Evidence of surface water flow | Dry | Based on site walkover observations. The presence of surface water flow indicates if peat in an area is well drained or saturated and if any additional loading from the ponding of surface water onto the peat is likely. |
| | Localised/Flowing in drains | |
| | Ponded in drains | |

| Qualitative Factor | Type of Feature/Indicator for each Qualitative Factor [1] | Explanation/Description of Qualitative Factor |
|---|---|---|
| | Springs/surface water | |
| Evidence of previous failures/slips | No | Based on site walkover observations. The presence of clustering of relict failures may indicate that particular pre-existing site conditions predispose a site to failure. |
| | In general area | |
| | On site | |
| | Within 500m of location | |
| Type of vegetation | Grass/Crops | Based on site walkover observations. The type of vegetation present indicates if peat in an area is well drained, saturated, etc. Vegetation that indicates wetter ground may also indicate softer underlying peat deposits. |
| | Improved Grass/Dry Heather | |
| | Wet Grassland/Juncus (Rushes) | |
| | Wetlands Sphagnum (Peat moss) | |
| General slope characteristics upslope/downslope from infrastructure location | Concave | Based on site walkover observations. Slope morphology in the area of the infrastructure location is an important factor. A number of recorded peat failures have occurred in close proximity to a convex break in slope. |
| | Planar to concave | |
| | Planar to convex | |
| | Convex | |
| Evidence of very soft/soft clay at base of peat | No | Based on inspection of exposures in general area from site walkover. Several reported peat failures identify the presence of a weak layer at the base of the peat along which shear failure has occurred. |
| | Yes | |
| Evidence of mechanically cut peat | No | Based on site walkover observations. Mechanically cut peat typically cut using a 'sausage' machine to extract peat for harvesting. Areas which have been cut in this manner have been linked to peat instability. The mechanical cuts can notably reduce the intrinsic strength of the peat and also allow ingress of rainfall/surface water. |
| | Yes | |
| Evidence of quaking or buoyant peat | No | Based on site walkover observations. Quaking/buoyant peat is indicative of highly saturated peat, which would generally be considered to have a |

| Qualitative Factor | Type of Feature/Indicator for each Qualitative Factor (1) | Explanation/Description of Qualitative Factor |
|---|---|---|
| | Yes | low strength. Quaking peat is a feature on sites that have been previously linked with peat instability. |
| Evidence of bog pools | No | Based on site walkover observations. Bog pools are generally an indicator of areas of weak, saturated peat. Commonly where there are open areas of water within peat these can be interconnected, with the result that there may be sub-surface bodies of water. The presence of bog pools have been previously linked with peat instability. |
| | Yes | |
| Other | Varies | In addition to the above features/ indicators and based on site recordings the following are some of the features which may be identified: Excessively deep peat, weak peat, overly steep slope angles, etc. |

Note (1) The list of features/indicators for each qualitative factor are given in increasing order of probability of leading to peat instability/failure.

It should be noted that the presence of one of the qualitative factors alone from Table A is unlikely to lead to peat instability/failure. Peat instability/failure at a site is generally the combination of a number of these factors occurring at the same time at a particular location. The probability rating assigned to the quantitative and qualitative factors is judged on a 5-point scale from 1 (indicating negligible or no probability of failure) to 5 (indicating a very likely failure), as outlined in Table B.

**Table B Probability Scale**

| Scale | Factor of Safety | Probability |
|---|---|---|
| 1 | 1.30 or greater | Negligible/None |
| 2 | 1.29 to 1.20 | Unlikely |
| 3 | 1.19 to 1.11 | Likely |
| 4 | 1.01 to 1.10 | Probable |
| 5 | ≤1.0 | Very Likely |

| Scale | Likelihood of Qualitative Factor leading to Peat Failure | Probability of Failure |
|---|---|---|
| 1 | Negligible/None | Least |
| 2 | Unlikely | |
| 3 | Probable | |
| 4 | Likely | |
| 5 | Very Likely | Greatest |

## Impact

The severity of the risk is also assessed qualitatively in terms of impact. The impact of a peat failure on the environment within and beyond the immediate wind farm site is assessed based on the potential travel distance of a peat failure. Where a peat failure enters a water course it can travel a considerable distance downstream. Therefore the proximity of a potential peat failure to a drainage course is a significant indicator of the likely potential impact.

The risk is determined based on the combination of hazard and impact. A qualitative scale has been derived for the impact of the hazard based on distance of infrastructure element to a watercourse (Table C).

The location of watercourses is based on topographic maps and supplemented by site observations from walkover survey. Note that not all watercourses are shown on maps.

**Table C Impact Scale**

| Scale | Criteria | Impact |
|---|---|---|
| 1 | Proposed infrastructure element greater than 150m of watercourse | Negligible/None |
| 2 | Proposed infrastructure element within 150 to 101m of watercourse | Low |
| 3 | Proposed infrastructure element within 100 to 51m of watercourse | Medium |
| 4 | Proposed infrastructure element within 50 m of watercourse | High |
| 5 | Proposed infrastructure element within 50 m of watercourse, in an environmentally sensitive area | Extremely High |

## Risk Rating

The degree of risk is determined as the product of probability (P) and impact (I), which gives the Risk Rating (R) as follows:

The Risk Rating is calculated from: $R = P \times I$

Due to the 5-point scales used to assess Probability and Impact, the Risk Rating can range from 1 to 25 as shown in Table D.

**Table D Qualitative Risk Rating**

| Impact \ Probability | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **5** | 5 | 10 | 15 | 20 | 25 |
| **4** | 4 | 8 | 12 | 16 | 20 |
| **3** | 3 | 6 | 9 | 12 | 15 |
| **2** | 2 | 4 | 6 | 8 | 10 |
| **1** | 1 | 2 | 3 | 4 | 5 |

| Risk Rating & Control Measures | |
|---|---|
| 17 to 25 | High: avoid working in area or significant control measures required |
| 11 to 16 | Medium: notable control measures required |
| 5 to 10 | Low: only routine control measures required |
| 1 to 4 | Negligible: none or only routine control measures required |

The risk rating is calculated individually for each contributory factor. Control measures are required to reduce the risk to at least a 'Low' risk rating. The control measures in response to the qualitative risk ratings are included in the peat stability risk registers for each main infrastructure element in Appendix E.

# APPENDIX 9-1

***FLOOD RISK ASSESSMENT***

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# PROPOSED WINDFARM DEVELOPMENT AT CROAGH, CO. LEITRIM

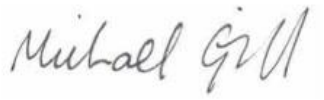
## SITE SPECIFIC FLOOD RISK ASSESSMENT

## FINAL REPORT

Prepared for:
**Coillte**

Prepared by:
**Hydro-Environmental Services**

## DOCUMENT INFORMATION

| | |
|---|---|
| **DOCUMENT TITLE:** | **PROPOSED WINDFARM DEVELOPMENT AT CROAGH, CO. LEITRIM – SITE SPECIFIC FLOOD RISK ASSESSMENT** |
| **ISSUE DATE:** | **26TH JUNE 2020** |
| **PROJECT NUMBER:** | **P1459-1** |
| **PROJECT REPORTING HISTORY:** | **P1459-0** |
| **CURRENT REVISION NO:** | **P1459-1_FRA FINAL_REV F0** |
| **AUTHOR(S):** | **MICHAEL GILL**<br>**ADAM KEEGAN** |
| **SIGNED:** |  <br>**Michael Gill B.A., B.A.I., M.Sc., MIEI**<br>**Managing Director – Hydro-Environmental Services** |

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*This report has been prepared by HES with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client, and others in respect of any matters outside the scope of the above. The flood risk assessment undertaken as part of this study is site-specific, and the report findings cannot be applied to other sites outside of the survey area which is defined by the site boundary. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.*

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# 1. INTRODUCTION

## 1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO Ireland, on behalf of Coillte, to undertake a site specific Stage II Flood Risk Assessment (FRA) for a proposed windfarm development at Croagh, Co. Leitrim. A site location map is shown below as **Figure A.**

This FRA is carried out in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DoEHLG, 2009).

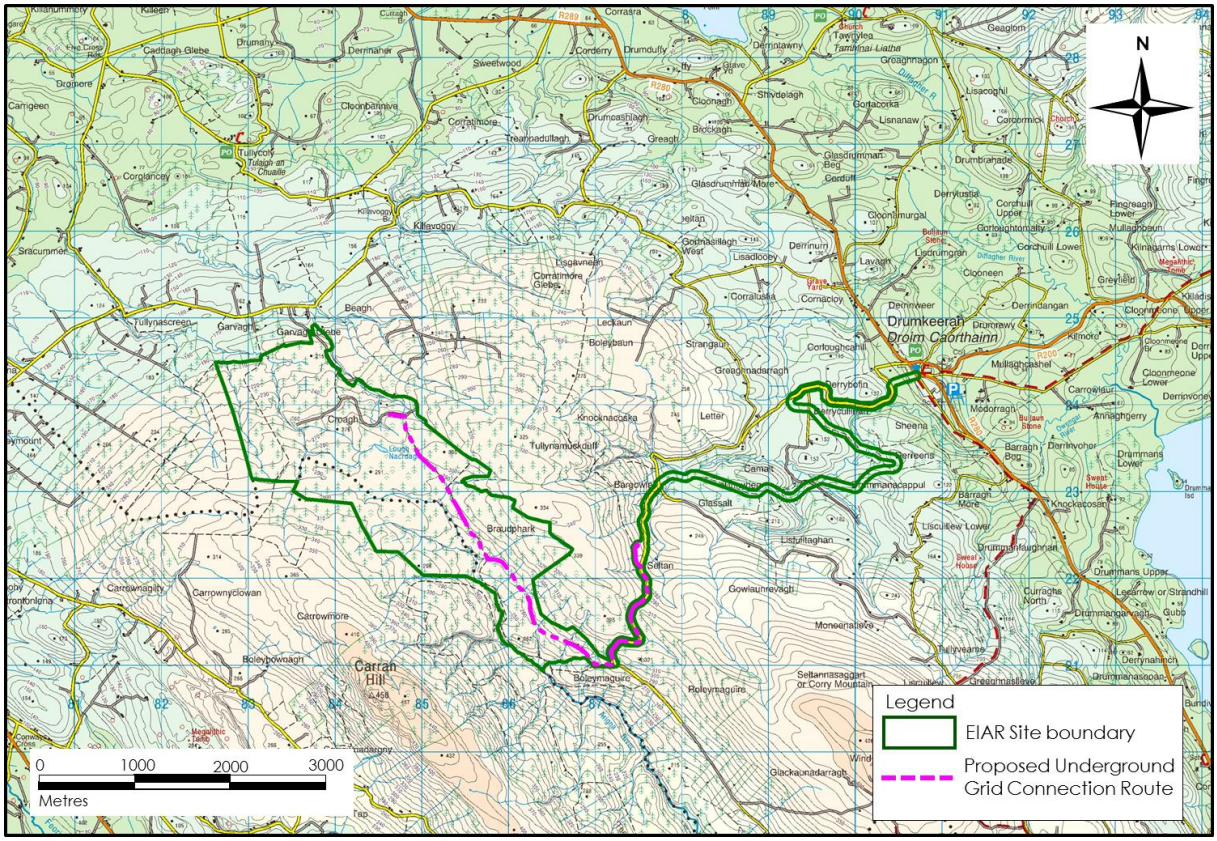


**Figure A: Site Location Map**

## 1.2 STATEMENT OF EXPERIENCE

Hydro-Environmental Services ("HES") are a specialist hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core area of expertise and experience is hydrology and hydrogeology, including flooding assessment and surface water modelling. We routinely work on surface water monitoring and modelling, and prepare flood risk assessment reports.

Michael Gill is an Environmental Engineer with 18 years environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological assessments for various developments across Ireland. Michael has significant experience in surface water drainage issues, SUDs design, and flood risk assessment.

Adam Keegan is a junior hydrogeologist with 2 years' experience in the environmental/engineering sector.

## 1.3 REPORT LAYOUT & METHODOLOGY

This FRA report has the following format:

- Section 2 describes the proposed site setting and details of the proposed development;
- Section 3 outlines the hydrological and geological characteristics of the local surface water catchment in the vicinity of the proposed development site;
- Section 4 deals with a site-specific flood risk assessment (FRA) undertaken for the proposed development which was carried out in accordance with the above-mentioned guidelines;
- Section 5 completes a Justification Test for the development; and,
- Section 6 presents the FRA report conclusions.

As stated above this FRA is carried out in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' (DoEHLG, 2009). The assessment methodology involves researching and collating flood related information from the following data sources:

- Base maps – Ordnance Survey of Ireland;
- Flood Hazard Maps and flooding information for Ireland, www.floodmaps.ie;
- Office of Public Works (OPW);
- Geological Survey of Ireland (GSI) maps on superficial deposits;
- EPA hydrology maps;
- Preliminary Flood Risk Assessment Maps; and,
- Site Walkover and drainage mapping.

# 2. BACKGROUND INFORMATION

## 2.1 INTRODUCTION

This section provides details on the topographical setting of the proposed site along with a description of the proposed development.

## 2.2 SITE LOCATION AND TOPOGRAPHY

The Proposed Development site is located approximately ~1.3 kilometres west of Drumkeeran, Co. Leitrim. The total study area/landholding is approximately 653 ha (~6.53km$^2$). Current access to the site is via a small local road which runs from Drumkeeran towards the site. This road then turns south towards Boleymaguire and the southern tip of the site, where access can be gained at various forestry barriers.

The southern section of the wind farm site covers a topographically high area close (approximately 1.5km) to the peak of Carrane Hill. The ground slopes in a northeasterly direction from this southern section and from along the western flank of the site, towards the east and north. The ground continues to slope in a northward direction towards the local road which wraps around the base of Carrane Hill.

The land use within the site areas comprises mainly of commercial coniferous forestry. A site location map is shown as **Figure A** above.

## 2.3 PROPOSED DEVELOPMENT DETAILS

The proposal consists of a windfarm of 10 no. turbines and associated access roads and infrastructure, grid cable route, substation, construction compound, borrow pits, peat deposition areas and amenity walkways/boardwalks. It is proposed that the road construction will utilise the cut and fill construction method. Scour protection, which is detailed further below, will be provided along sections of access tracks as an erosion protection measure from fluvial flooding. There will also be a requirement to upgrade bridges and culverts at the streams that are intersected by the proposed access track alignments and create new bridges and culverts on new access tracks that cross watercourses.

The proposed construction site entrance access road/turbine delivery road for the wind farm commences from the R280 at Drumkeeran village, approximately 4.8km to the northeast (as the crow flies) of the main site area and traverses private land, a public road and Coillte property (with some short sections in third party lands) before emerging onto the local road that approaches the core wind farm site.

There is 1 no. proposed grid route being assessed, along with 1 no. proposed substation. The proposed substation is located approximately 330 metres east of Turbine No. 4 along an existing access road. From here, the proposed underground grid connection cabling route runs southeast along existing forestry roads for ~ 4.1 km before turning north and following the public road for ~ 1.9km and connecting with the existing Garvagh Glebe 110kV substation.

# 3. EXISTING ENVIRONMENT AND CATCHMENT CHARACTERISTIC

## 3.1 INTRODUCTION

This section gives an overview of the hydrological and geological characteristics in the area of the proposed forest access road.

## 3.2 BASELINE HYDROLOGY

### 3.2.1 Regional and Local Hydrology

On a regional scale, the proposed site is located within Hydrometric Area 26 (Upper Shannon) and 35 (Sligo Bay & Drowse) within the (WRBD). The proposed site is located within the Bonet (35_6) and the Arigna (26A_4).

There are four main rivers which drain the Proposed Development site, namely the upper reaches of the Killanummery River (IE_WE_35K030600) which drains the north-western section of the site. The Killanummery River continues to flow northwest, before meeting the River Bonet just south of Dromahair, approximately 7.5 km north of the site. The smaller Tullynascreen Stream (IE_WE_35K030600) runs parallel to this river, and flows northwest, meeting the Killanummery River approximately 2 km north of the site. The Tullynascreen Stream emanates from Lough Nacroagh, a small lake with an area of ~0.01 $km^2$.

The Cashel Stream drains the north-eastern section of the proposed site. The Cashel Stream is fed from several smaller streams which converge near Kilavoggy Bridge ~1.5km north of the site. The stream then flows north/northeast, meeting the River Bonet approximately 1 km southeast of Dromahair.

The southern section of the proposed site is drained by the Arigna River. The Arigna River runs south through the site and delineates much of the southwestern boundary of the site. It flows through a steep valley between Carrane Hill and Corry Mountain, and the drainage network suggest it is fed primarily from surface waters draining from the peaked ridge of Carrane Hill, which runs parallel to the river, approximately 1 km southwest of the river. The Arigna River continues to flow south before discharging into the southern tip of Lough Allen, some 3km northwest of Drumshanbo.

The site construction access road is drained by several headwater streams that flow easterly to form the Owengar River which flows into Lough Allen which is located 2km east of the site entrance.

**Table A: Summary of Local Hydrology and Proposed Infrastructure**

| Hydrometric Area | Sub-catchment | Main Development Infrastructure | Primary Drainage Features |
|---|---|---|---|
| Upper Shannon | Arigna | 4 no. turbines, 1 no. borrow pit, 1 no. peat repository area,1 no. construction compound and 1.4km of the grid connection route and boardwalk | Arigna River |
| | Owengar | 3.95km of the grid connection route and 8.5km of the construction site access road | Owengar River |
| Garvogue | Bonet | 6 no. turbines, substation, 1 no. peat repository area, 1 no. construction compound, 0.6km of the Garvagh grid connection route and met mast | Killanummery River, Cashel Stream |

A local hydrology map of the area which shows the WFD sub-catchments is shown as **Figure B** below.

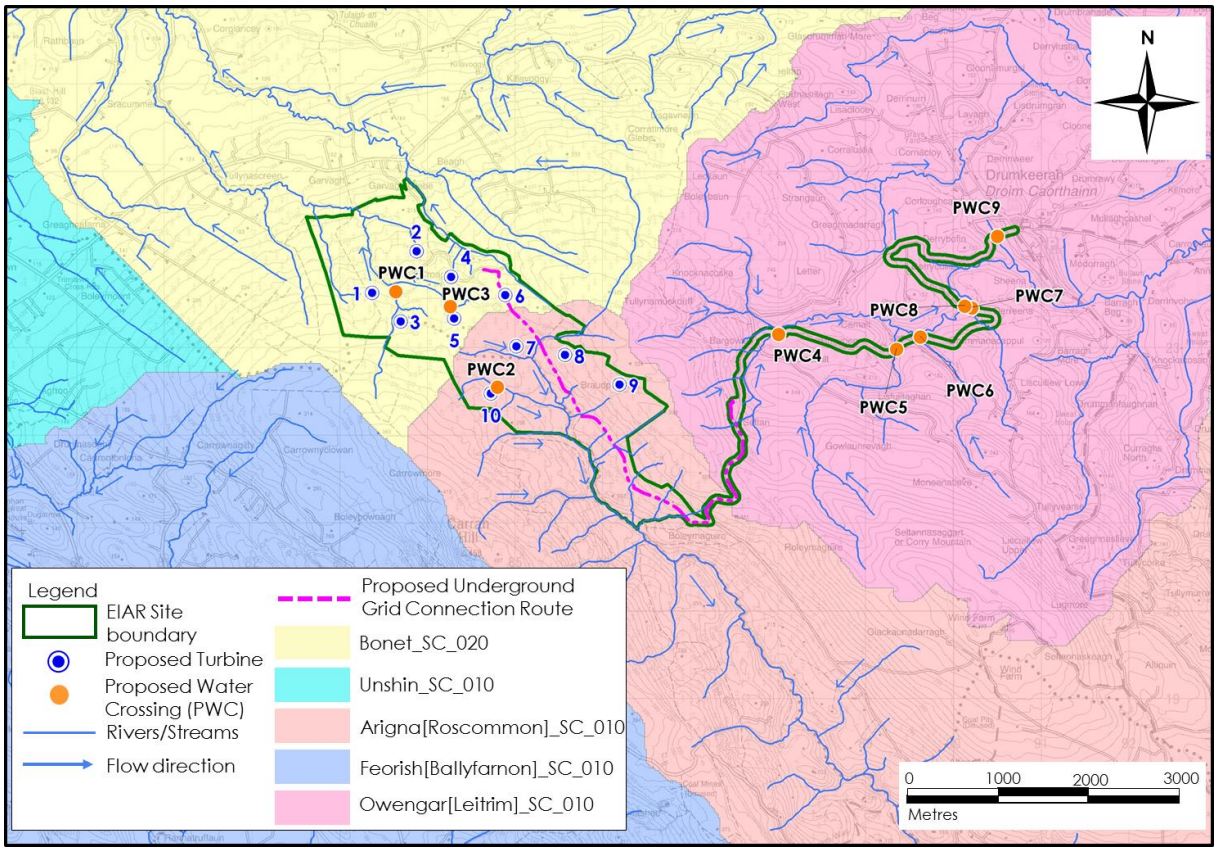


**Figure B: Local Hydrology Map**

### 3.2.2 Rainfall and Evaporation

The SAAR (Standard Average Annual Rainfall) recorded at Dromahair, approximately 4km east of the proposed site, is 1231mm (www.met.ie). The average potential evapotranspiration (PE) at Mullingar, approximately 80km southeast of the proposed site, is 446mm/yr (www.met.ie). The actual evapotranspiration ("AE") is calculated to be 423mm (95% PE).

Using the above figures the effective rainfall ("ER")[1] for the area is calculated to be (ER = SAAR – AE) 808mm.

Based on recharge coefficient estimates from the GSI (www.gsi.ie), an estimate of 5% recharge is taken for the site as an overall average. This value is for "Peat" with a "High" vulnerability rating. Areas where peat is absent may have slightly higher recharge rates, but on this site, these areas are generally on sloping ground. The high stream density in the area would also suggest that recharge rates are very low.

The lowest value in the available range was chosen to reflect the large coverage of blanket peat and high drainage density. Therefore, annual recharge and runoff rates for the site are estimated to be 40mm/yr and 768mm/yr respectively.

**Table B** below presents return period rainfall depths for the area of the proposed Croagh wind farm site. These data are taken from https://www.met.ie/climate/services/rainfall-return-periods and they provide rainfall depths for various storm durations and sample return periods (1-year, 5-year, 30-year, 100-year). These extreme rainfall depths will be the basis of the proposed wind farm drainage hydraulic design as described further below.

**Table B**: **Rainfall return period depths for Croagh WF site**

| | Return Period (Years) | | | |
|---|---|---|---|---|
| **Duration** | **1** | **5** | **30** | **100** |
| **5 mins** | 4.2 | 7.0 | 11.7 | 16.1 |
| **15 mins** | 7.0 | 11.5 | 19.2 | 26.4 |
| **1 hour** | 11.9 | 18.5 | 29.0 | 38.3 |
| **6 hours** | 23.9 | 34.2 | 49.4 | 62.0 |
| **12 hours** | 31.2 | 43.3 | 60.7 | 74.8 |
| **24 hours** | 40.9 | 55.0 | 74.6 | 90.1 |
| **2 days** | 52.8 | 69.0 | 90.8 | 107.7 |

## 3.3 GEOLOGY

According to GSI mapping (**www.gsi.ie**), soils are mapped generally as predominantly blanket peat, with areas of poorly drained mineral soils with peaty topsoil derived from mainly acidic parent material (AminPDPT) towards the north of the site and along the southern and eastern edges of the site. A small area of shallow reasonably drained mineral soil (AminSRPT) is mapped also.

The GSI subsoils map (www.gsi.ie) shows the majority of the site mapped as Blanket peat. An area of the site is mapped as Tills derived from Namurian sandstones and shales (TNSSs), this is mainly around the banks of the Killanummery and Cashel stream at the north of the site and also along the construction access road. A subsoils map of the area is shown as **Figure C** below.

The underlying bedrock at the Proposed Development site is mapped by the GSI as being broadly Namurian shales. The Dergvone Formation encompasses the majority of the site, consisting of a number of shale facies with occasional thin beds of ironstone and flaggy sandstone.

The northwestern tip of the site is underlain by rocks which are Dinantian in age. They are part of the Carraun Shale Formation consisting of grey to black fossiliferous shales and mudstones with thin subordinate limestones and dolomites.

[1] *ER – Effective Rainfall is the excess rainfall after evaporation which produces overland flow and recharge to groundwater.*

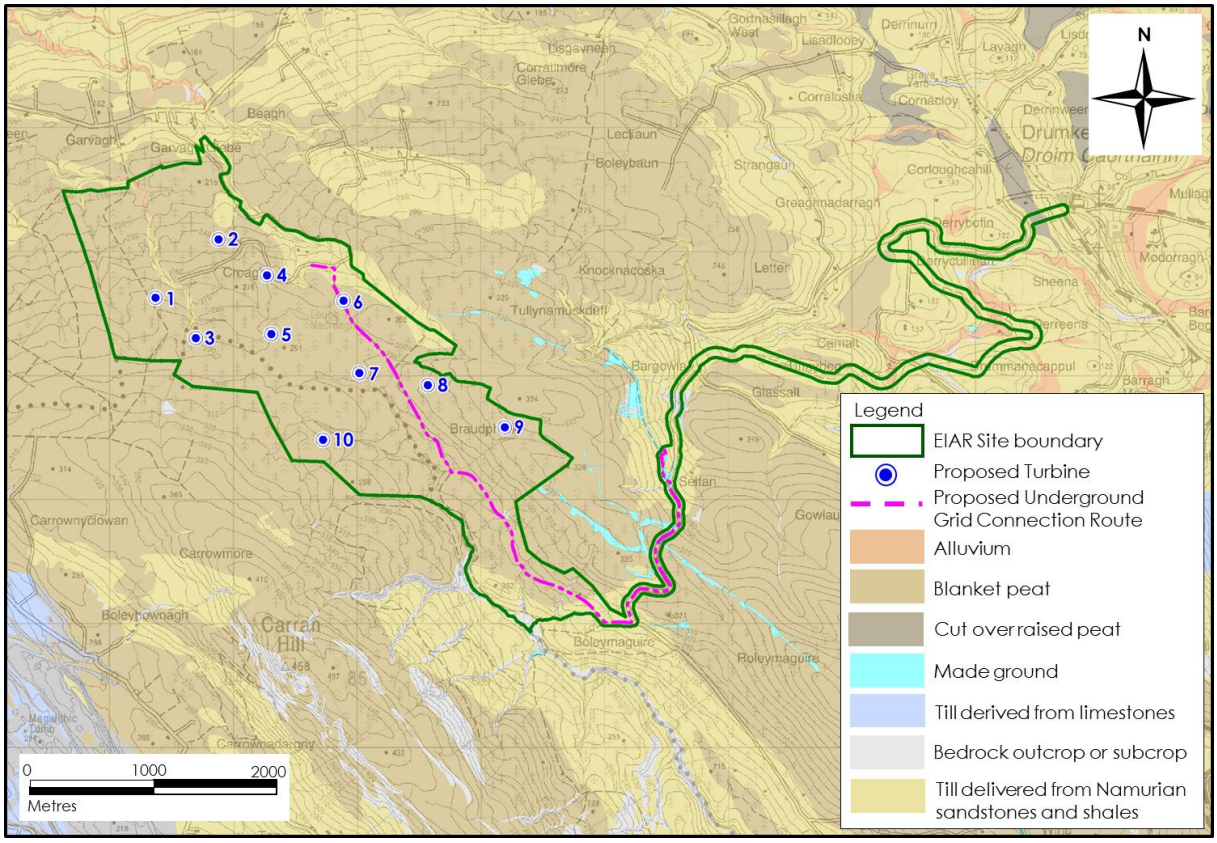


**Figure C: Local subsoils map**

## 3.4 DESIGNATED SITES & HABITATS

Within the Republic of Ireland designated sites include National Heritage Areas (NHAs), proposed National Heritage Areas (pNHAs), candidate Special Areas of Conservation (cSAC), Special Areas of Conservation (SAC) and Special Protection Areas (SPAs).

The eastern boundary of the site is bounded by the Corry Mountain Bog NHA. As the NHA is entirely above (in elevation) the proposed development area, no part of the proposed development areas drain towards this designated site.

The closest SAC to the site is Boleybrack Mountain SAC located approximately 8 km northeast of the proposed development site. No areas of the site drain in this direction. Similarly, Lough Arrow, a SAC, SPA and NHA is located approximately 9km southwest of the site. The majority of the northern section of the Proposed Development site ultimately drains into the Bonet River which then flows through the Lough Gill SAC, located approximately 10km north of the site.

# 4. SITE SPECIFIC FLOOD RISK ASSESSMENT

## 4.1 INTRODUCTION

The following assessment is carried out in accordance with '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (DoEHLG, 2009). The basic objectives of these guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and,
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

A stage 1 assessment of flood risk requires an understanding of where the water comes from (*i.e.* the source), how and where it flows (*i.e.* the pathways) and the people and assets affected by it (*i.e.* the receptors). It is necessary to identify whether there may be any flooding or surface water management issues related to the proposed site that may warrant further detailed investigation.

As per the guidance (DOEHLG, 2009), the stages of a flood risk assessment are:

- *Flood risk identification* – identify whether there are surface water flooding issues at a site; and,
- *Initial flood risk assessment* - confirm sources of flooding that may affect a proposed development.

Further to this, a stage 2 assessment involves the confirmation of sources of flooding, appraising the adequacy of existing information and determining what surveys and modelling approach may be required for further assessment.

## 4.2 FLOOD ZONE MAPPING

Flood zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types or levels of flood zones defined for these purposes according to OPW guidelines:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and,
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

## 4.3 FLOOD RISK IDENTIFICATION

### 4.3.1 Soils Maps – Fluvial Maps

A review of the soil types in the vicinity of the proposed site was undertaken as soils can be a good indicator of past flooding in an area. Due to past flooding of rivers deposits of transported silts/clays referred to as alluvium build up within the floodplain and hence the presence of these soils is a good indicator of potentially flood-prone areas.

Based on the EPA/GSI soil map for the area it appears that there are small areas of mineral alluvium soils (fluvial deposits) mapped along various rivers/streams discussed above. The most abundant deposition of Alluvium is mapped along the Arigna river to the south of the site, however most of the Alluvium deposition occurs further south of the site boundary. There are very localised areas of Alluvium mapped towards the northern boundary of the site, along the Cashel stream and minor deposits along the Killanummery.

In general, however there is no significant alluvium deposition that would be associated with a flood plain or a large geographical area prone to flooding.

### 4.3.2 Historical Mapping

There is no text on local available historical 6" or 25" mapping for the proposed site that identify areas that are "*prone to flooding*" along the proposed route.

### 4.3.3 OPW National Flood Hazard Mapping

The OPW Indicative Flood Maps have no records of recurring flood incidences within the site. The closest mapped flood event is along the R280, some 200m to the south of the construction access road entrance (refer to **Figure D** below).

There is evidence of past flood events (from www.floodinfo.ie) within the Arigna River channel, approximately 2.5 km north of Arigna, which includes photographs of flood debris/washout on roads at Gubbaradda, on the higher ground to the southwest of the river (refer to Error! Reference source not found. below).

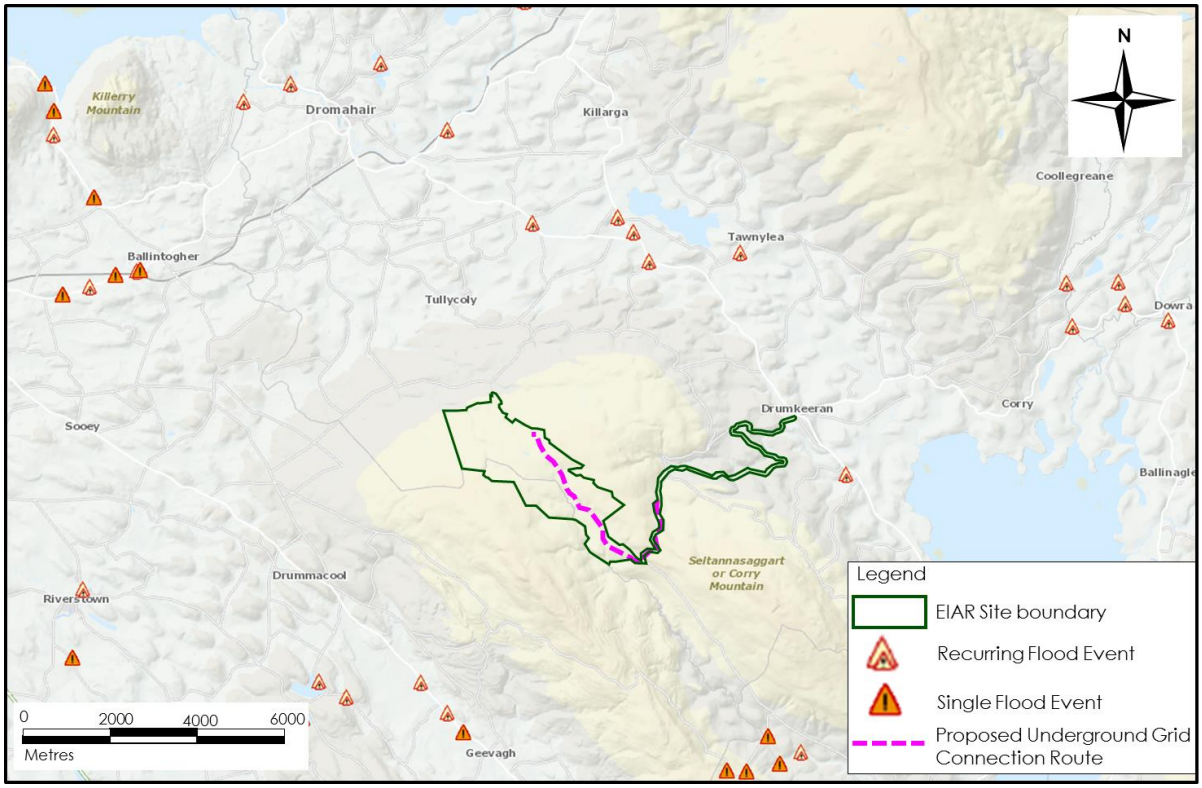


**Figure D: OPW Indicative Floods Map** (www.floods.ie)

**Figure E: Flood debris at Gubbaddarra, northwest of Arigna, July 1992 (www.floodinfo.ie)**

### 4.3.4 Preliminary Flood Risk Assessment Maps – Fluvial and Pluvial Flooding

The PFRA draft flooding maps were queried (via www.myplan.ie/webapp) for areas prone to flooding. The Arigna river channel, which runs through much of the west/south of the site is mapped as a Flood Zone A (1% AEP). The extent of the mapped flood zone is localised to within several metres either side of the river channel.

The Cashel stream/Killanummery river have small areas mapped as Flood Zone A towards the northern boundary of the site, close to the local road.

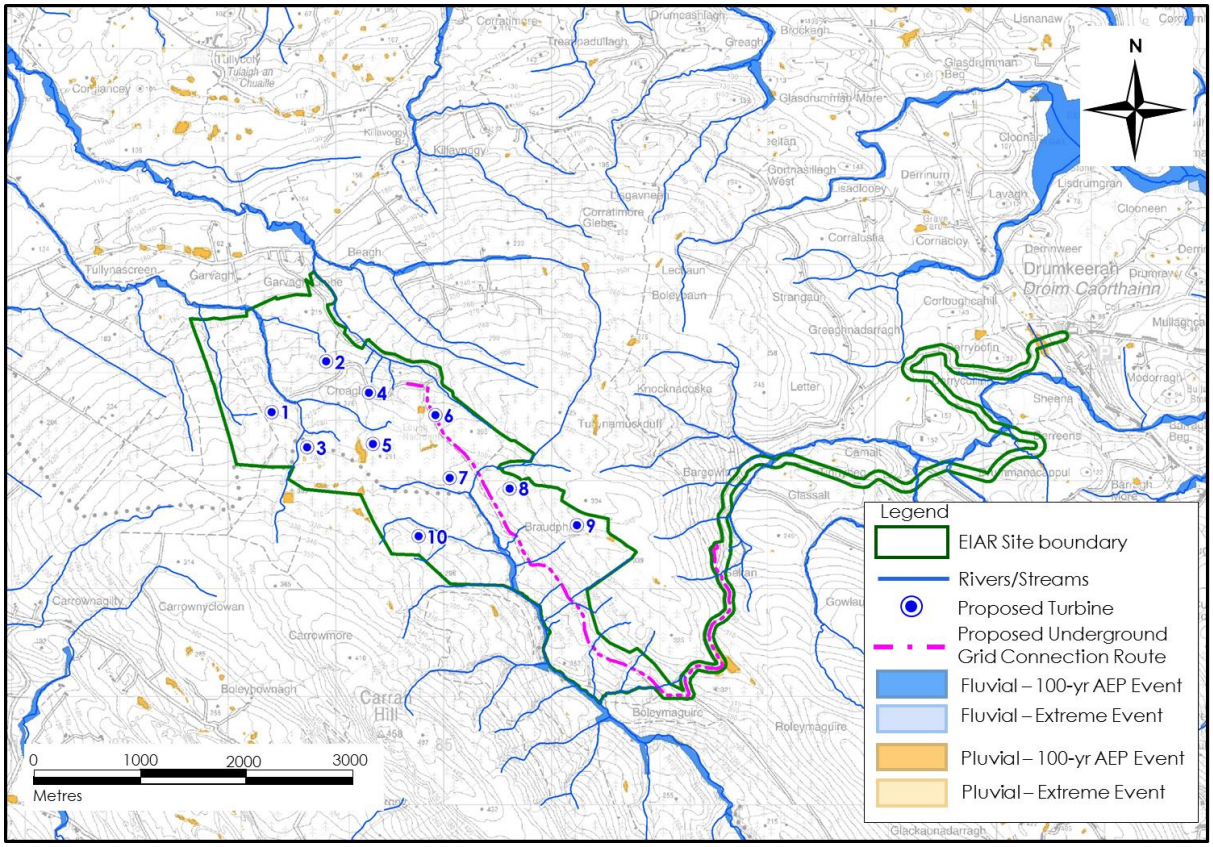


**Figure F: PFRA Fluvial Flood Zone Mapping CFRAM Maps – Fluvial and Coastal Flooding**

Where complete the Catchment Flood Risk Assessment and Management (CFRAM)[2] OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the Preliminary Flood Risk Assessment Maps (PFRA) maps. However, CFRAM mapping is not currently available for the area of the proposed site, and this indicates that the flooding at the site is not a major concern.

### 4.3.5 Summary – Flood Risk Identification

Based on the information gained through the flood identification process, it is evident that small parts of the site immediately surrounding the various river channels are within 1 in 100 year fluvial flood zones. These mapped zones occur towards the south of the site, along the Arigna river and in localised areas to the north, and also near the Cashel stream and Killanummery river. They are limited in extent and do not coincide with the key areas of development (e.g. substation/turbines). All key infrastructure is located in Flood Zone C (Low Risk). Some of the existing watercourse crossings intercept the 100-year flood zone.

[2] *CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011, and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.*

## 4.4 INITIAL FLOOD RISK ASSESSMENT

### 4.4.1 Site Survey

A detailed walkover survey of the proposed site, grid connection route and construction access road was undertaken by HES during November 2018, September 2019 and March 2020.

The first round of sampling on 14th November 2018 followed a period of extended heavy rain. No flooding or out of bank flow was observed. The flows on this date were estimated to be ~8-10 times higher than those observed the following week on the 20th November 2018.

As discussed above, several rivers have their upper reaches within the proposed development site, and flow within either the Arigna or Bonet subcatchment. Sections of the proposed development site are located within the 100-year fluvial flood zone, however no turbines or the substation or other key infrastructure are located within Flood Zone A or Flood Zone B.

### 4.4.2 Existing Site Drainage

The forestry drains are the primary drainage routes towards the natural streams on the development site, but the flows in these drains are generally very low. The integration of the existing main drains with the proposed wind farm drainage is a key component of the drainage design.

Within the Proposed Development site there are numerous manmade drains that are in place predominately to drain the forestry plantations. Mound drains and ploughed ribbon drains are generally spaced approximately every 15m and 2m respectively. As illustrated in **Figure G**, interceptor drains are generally located up-gradient (cut-off drains) and down-gradient of forestry plantations. Interceptor drains are also located up-gradient of forestry access roads. Culverts are generally located at stream crossings and at low points under access roads which drain runoff onto down-gradient forest plantations.

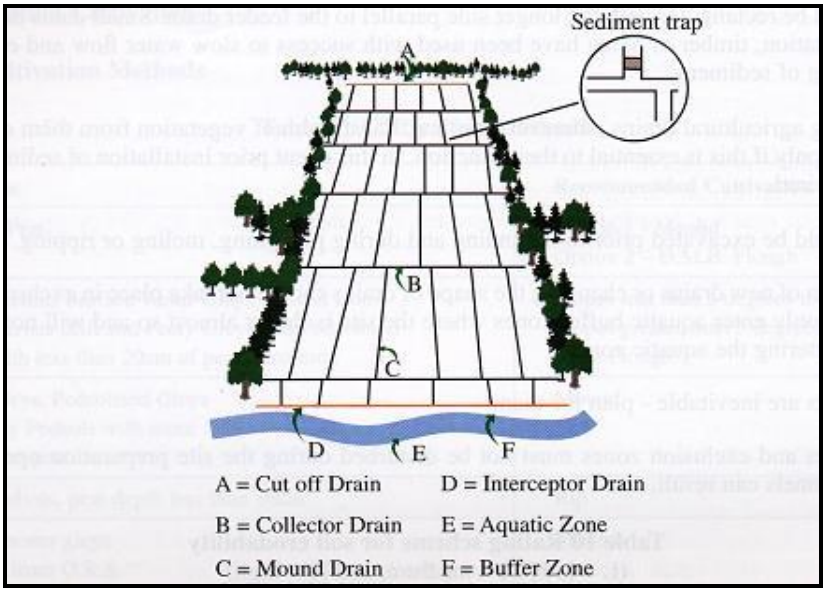


**Figure G: Schematic of typical forestry drainage layout.**

### 4.4.3 Hydrological Flood Conceptual Model

Potential flooding in the vicinity of the proposed site can be described using the Source – Pathway – Receptor Model ("S-P-R"). The primary potential source of flooding in this area, and the one with most consequence for the proposed site, is fluvial. The primary potential pathways, in the most likely order of significance, would be overbank flooding of the Arigna and Killanummery rivers as well as the Cashel Stream during significant rainfall events. The potential receptors in the area are infrastructure and land as outlined below.

### 4.4.4 Summary – Initial Flood Risk Assessment

Based on the information gained through the flood identification process and Initial Flood Risk Assessment process it is apparent that flooding is unlikely to be problematic at the site or downstream of the site. The potential sources of flood risk for the proposed site are outlined and assessed in **Table C**.

**Table C: S-P-R Assessment of Flood Sources for the proposed site**

| Source | Pathway | Receptor | Comment |
|---|---|---|---|
| Tidal | Not applicable | Land and infrastructure. | The proposed site is >10km from the coast and there is no risk of coastal flooding. |
| Fluvial | Overbank flooding of the Arigna, Killanummery, Cashel Stream | Land and infrastructure. | Fluvial flood will be localised to the streams and rivers. All key infrastructure (i.e. turbines, substation, compound etc) is located in Flood Zone C (Low Risk). |
| Pluvial | Ponding of rainwater on site | Land and infrastructure. | There is very little risk of pluvial flooding within the proposed site as drainage moves relatively freely. Small localised areas of pluvial flooding are mapped. |
| Surface water | Surface ponding/ Overflow | Land and infrastructure | Same as above (pluvial). |
| Groundwater | Rising groundwater levels | Land and infrastructure. | Based on local hydrogeological regime and PFRA mapping, there is no apparent risk from groundwater flooding. |

## 4.5 REQUIREMENT FOR A JUSTIFICATION TEST

The matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test[3] is shown in **Table D** below.

It may be considered that the proposed wind farm can be categorised as "Highly Vulnerable Development" However, as stated above, with the exception of watercourse crossings (many already existing), all proposed infrastructure, including the proposed substation, is located in Flood Zone C (Low Risk) and therefore the proposed development is appropriate from a flood risk perspective (refer to **Table D** below).

[3] *A 'Justification Test' is an assessment process designed to rigorously assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk, (DoEHLG, 2009).*

**Table D: Matrix of Vulnerability versus Flood Zone**

| | Flood Zone A | Flood Zone B | Flood Zone C |
|---|---|---|---|
| Highly vulnerable development (including essential infrastructure) | Justification test | Justification test | **Appropriate** |
| Less vulnerable development | Justification test | Appropriate | Appropriate |
| Water Compatible development | Appropriate | Appropriate | Appropriate |

*Note: Taken from Table 3.2 (DoEHLG, 2009)*
***Bold:*** *Applies to this project*

# 5. FLOOD IMPACT PREVENTION AND SURFACE WATER MANAGEMENT

### 5.1.1 Proposed Drainage

The site drainage system was designed integrally with the wind farm layout as a measure to ensure that the proposal will not change the existing flow regime across the site, will not deteriorate water quality and will safeguard existing water quality status of the catchments from wind farm related sediment runoff.

Overland flow rates are therefore likely to be very significant and the drainage system must be designed and managed properly if it is to work effectively. A fundamental principle in the drainage design is that clean water flowing in the upstream catchment, including overland flow and flow in existing streams, is allowed to bypass the works areas without being contaminated by silt from the works. The dirty water from the works areas is collected in a separate drainage system and treated by removing the suspended solids before discharging it to the downstream watercourse. This minimises the volume of dirty water requiring treatment.

All new watercourse crossing will be clear span bridges and these will not effect on site flooding. New drains will be constructed to collect overland flow that is intercepted by the works areas or by new access roads. These will be constructed on the uphill side of the works and piped to the downhill side, bypassing the works areas. However, this will cause the normally dispersed flow to be concentrated at specific discharge points downstream of the works. In order to disperse this flow, each clean water drain will be terminated in a discharge channel running parallel to the ground contours that will function as a weir to disperse the flow over a wider area of vegetation. This will prevent erosion of the ground surface and will attenuate the flow rate to the downstream receiving waters.

The resultant diversion of clean water runoff will ensure that the treatment system will only need to deal with construction related runoff. The treatment system consists of a series of settlement ponds that are located at each works site and at intervals along the access roads. The outflow from the settlement ponds will be allowed to disperse across vegetation and will become diluted through contact with the clean water runoff in the buffer areas before entering the downstream watercourses.

### 5.1.2 Relevant SuDs Guidance

Guidance in relation to surface water management and sustainable urban drainage is also provided in the Leitrim County Development Plan 2015-2021. *Section 3.2* of the development plan states that:

*"Surface water drainage systems are effective at transferring surface water quickly, but they can cause the volume of water in the receiving watercourse to increase more rapidly thereby increasing flood risk. Sustainable Drainage Systems (SuDS) can play a role in reducing and managing run-off to surface water drainage systems as well as improving water quality. For larger developments, the use of Sustainable urban Drainage Systems (SuDS) techniques will be favoured"*

### 5.1.3 On Site Flood Attenuation

The creation of impermeable areas within a development site has the effect of increasing rates of runoff into the downstream drainage system and this may increase flood risk and flood severity downstream. This applies particularly to urban areas that drain to closed pipe systems which do not have the capacity to cater for increased hydraulic loads. The proposed Croagh wind farm development is located within a large rural catchment with an open drainage system. The footprint of the impermeable areas and the associated increase

in runoff rate is very small in the context of the catchment size and therefore represents a negligible increase in downstream flood risk. Notwithstanding the low increase in flood risk due to the development, the drainage system has been designed to prevent any increase in discharge rates above that which already exist in the undeveloped site.

The volume of water requiring attenuation relates to direct precipitation on the roads and hard-standing footprint only. The aim of the storm water attenuation measures is to limit the flow rate from the developed area to that which prevails on the undeveloped site. This is achieved by limiting the flow rate to the downstream receiving waters and temporarily storing the excess water that accumulates as a result. The developed surfaces have some permeability and this reduces the attenuation requirement. Conventional attenuation systems use proprietary flow control units but these can become blocked with debris and vegetation and require regular maintenance. They are therefore not appropriate for use within a forestry environment or where routine maintenance would not be practical.

It is proposed to provide the temporary storage within the drainage channels by creating stone (check) dams within them at regular intervals. The spacing of the dams is typically 100m but depends on the channel slope, with steeper channels requiring shorter spacing intervals. The check dams, which are constructed with small sized aggregate, also reduce the flow rate through the drainage system and are an effective means of providing flow control. Silt fences also provide storage and flow control.

All runoff from the developed areas will be routed through settlement ponds downstream. The outflow from the settlement ponds will be released in a controlled and diffuse manner onto the vegetation or forestry floor where selected forestry rills may be blocked to further promote diffusion of runoff. Therefore, the proposal will not increase the magnitude of the hydrograph peak. The control measures are passive as opposed to mechanical and do not require maintenance to ensure their ongoing effectiveness.

### 5.1.4 Flood Impact Screening for Designated Sites

**Table E** below provides a flood impact screening for local designated sites.

**Table E: Flood Impact Screening for Local Designated Sites**

| Name | Site Code | Flood Risk Screening |
|---|---|---|
| Carrane Hill Bog NHA | 002415 | No increased flood risk, attenuation proposals outlined above. |
| Corry Mountain Bog NHA | 002321 | No increased flood risk, attenuation proposals outlined above. |
| Boleybrack Mountain SAC | 002032 | No increased flood risk, attenuation proposals outlined above. |
| Lough Arrow SAC, SPA, NHA | 001673 | No increased flood risk, no hydrological connection. |
| Corry Mountain Bog NHA | 002321 | No increased flood risk; steep, well drained slopes. |
| Lough Gill SAC | 001976 | No increased flood risk. |

# 6. FRA REPORT CONCLUSIONS

- A flood risk identification study was undertaken to identify existing potential flood risks associated with the proposed Croagh wind farm development at Carrane Hill, Co. Leitrim. From this study:
    - No instances of historical flooding were identified in historic OS maps;
    - No instances of recurring flooding were identified on OPW maps within the proposed development site; and,
    - Areas of the proposed site were identified with the PFRA Flood Zones as described below.
- The Preliminary Flood Risk Assessment (PFRA) mapping indicates that there are areas of the proposed site located in the fluvial Flood Zone A, however these areas do not coincide with proposed turbine locations, substation or other key development related infrastructure;
- The remainder of the proposed site is not mapped as susceptible to flooding, aside from isolated small areas where pluvial flooding may occur; however as before, these areas do not coincide with any areas of proposed infrastructure or development;
- It may be considered that the proposed wind farm can be categorised as "Highly Vulnerable Development", however with the exception of watercourse crossings, all proposed infrastructure is located in Flood Zone C (Low Risk) and therefore the proposed development is appropriate from a flood risk perspective;
- The overall risk of flooding posed by the development of a wind farm at the proposed development site is estimated to be low; and,
- In addition, the risk of the wind farm contributing to downstream flooding is also very low, as the long-term plan for the site is to retain and slow down drainage water prior to release. Robust drainage measures on the site will include swales, silt traps, check dams, settlement ponds and buffered outfalls.

* * * * * * * * * * * * * * * * * * * * * * *

# 7. REFERENCES


| | | |
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| Leitrim County Council | 2015 | Leitrim County Development Plan – Strategic Flood Risk Assessment 2015-2021. |

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# APPENDIX 9-2

***LAB CERTIFICATES***

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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.166T

Report No: HYDR-151151118
Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 15/11/2018
**Date Reported** 27/11/2018
**Order Number** P1459

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 6 sample(s) received in good condition.

**Comments** N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

*Conditions:*
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Report No: HYDR-151151118

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 15/11/2018
**Date Reported** 27/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW1
**Date Tested** 15/11/2018
**ALS ID** 3302604

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 17 | mg / l | P202 |
| Phosphorus | 0.14 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 11.0 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.04 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW3
**Date Tested** 15/11/2018
**ALS ID** 3302605

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 17 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 12.6 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.04 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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# CERTIFICATE OF ANALYSIS

**Date Received** 15/11/2018
**Date Reported** 27/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW6
**Date Tested** 15/11/2018
**ALS ID** 3302606

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 27 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | 0.04 | mg/l P | P281 |
| Chloride | 12.6 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.05 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW8
**Date Tested** 15/11/2018
**ALS ID** 3302607

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 9.0 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

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# CERTIFICATE OF ANALYSIS

**Date Received** 15/11/2018
**Date Reported** 27/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW10
**Date Tested** 15/11/2018
**ALS ID** 3302608

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 9.6 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW12
**Date Tested** 15/11/2018
**ALS ID** 3302609

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 10.4 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-388211118
Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 21/11/2018
**Date Reported** 29/11/2018
**Order Number** P1459

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 6 sample(s) received in good condition.

**Comments** N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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# CERTIFICATE OF ANALYSIS

**Date Received** 21/11/2018
**Date Reported** 29/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW1
**Date Tested** 22/11/2018
**ALS ID** 3309858

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.1 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Orthophosphate | 0.03 | mg/l P | P281 |
| Chloride | 9.8 | mg/l CL | P281 |
| Nitrogen (Total) | 5.7 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW3
**Date Tested** 22/11/2018
**ALS ID** 3309859

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.1 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 12.1 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 7.6 | mg/L N | P285 |

Report Authorised by:

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# CERTIFICATE OF ANALYSIS

**Date Received** 21/11/2018
**Date Reported** 29/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW6
**Date Tested** 22/11/2018
**ALS ID** 3309860

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | 0.11 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.04 | mg/l P | P281 |
| Chloride | 12.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.08 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 5.5 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW8
**Date Tested** 22/11/2018
**ALS ID** 3309861

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.1 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 9.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 7.2 | mg/L N | P285 |

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# CERTIFICATE OF ANALYSIS

**Date Received** 21/11/2018
**Date Reported** 29/11/2018
**Order Number** P1459

**Sample Type** Water
**Client ID** P1459-SW10
**Date Tested** 22/11/2018
**ALS ID** 3309862

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.1 | mg/l P | P207 |
| BOD 5 day Total with ATU | 3 | mg/l O2 | P280 |
| Orthophosphate | 0.03 | mg/l P | P281 |
| Chloride | 9.7 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 2.2 | mg/L N | P285 |

**Sample Type** Water
**Client ID** P1459-SW12
**Date Tested** 22/11/2018
**ALS ID** 3309863

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | 0.11 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.03 | mg/l P | P281 |
| Chloride | 9.8 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 4.1 | mg/L N | P285 |

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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.166T

Report No: HYDR-530060919
Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 10 sample(s) received in good condition.

**Comments** Carrane hill

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-530060919

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**Sample Type** Surface Water
**Client ID** SW1
**Date Tested** 07/09/2019
**ALS ID** 3664639

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 8 | mg / l | P202 |
| Phosphorus | 0.11 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 8.8 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.3 | mg/L N | P285 |

**Sample Type** Surface Water
**Client ID** SW7
**Date Tested** 07/09/2019
**ALS ID** 3664640

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 8.8 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.4 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

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# CERTIFICATE OF ANALYSIS

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**Sample Type** Surface Water
**Client ID** SW5
**Date Tested** 07/09/2019
**ALS ID** 3664641

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 5.1 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.1 | mg/L N | P285 |

**Sample Type** Surface Water
**Client ID** SW6
**Date Tested** 07/09/2019
**ALS ID** 3664642

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.04 | mg/l P | P281 |
| Chloride | 10.0 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.7 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
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# CERTIFICATE OF ANALYSIS

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**Sample Type** Surface Water
**Client ID** SW8
**Date Tested** 07/09/2019
**ALS ID** 3664643

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 8.5 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 2.7 | mg/L N | P285 |

**Sample Type** Surface Water
**Client ID** SW9
**Date Tested** 07/09/2019
**ALS ID** 3664644

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 8.2 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.04 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

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# CERTIFICATE OF ANALYSIS

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**Sample Type** Surface Water
**Client ID** SW11
**Date Tested** 07/09/2019
**ALS ID** 3664645

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 5.8 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.0 | mg/L N | P285 |

**Sample Type** Surface Water
**Client ID** SW12
**Date Tested** 07/09/2019
**ALS ID** 3664646

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 6 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.03 | mg/l P | P281 |
| Chloride | 7.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.5 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

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Report No: HYDR-530060919

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 06/09/2019
**Date Reported** 12/09/2019
**Order Number** P1459

**Sample Type** Surface Water
**Client ID** SW16
**Date Tested** 07/09/2019
**ALS ID** 3664647

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.02 | mg/l P | P281 |
| Chloride | 9.3 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 1.5 | mg/L N | P285 |

**Sample Type** Surface Water
**Client ID** SW17
**Date Tested** 07/09/2019
**ALS ID** 3664648

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 6 | mg / l | P202 |
| Phosphorus | 0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | 0.03 | mg/l P | P281 |
| Chloride | 12.3 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | 2.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-568050419
Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 6 sample(s) received in good condition.

**Comments** N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-568050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 3/4 Croagh SW14
**Date Tested** 06/04/2019
**ALS ID** 3465051

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Chloride | 13.4 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 3/4 Croagh SW15
**Date Tested** 06/04/2019
**ALS ID** 3465052

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 12.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-568050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 3/4 Croagh SW16
**Date Tested** 06/04/2019
**ALS ID** 3465053

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 9 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 17.1 | mg/l CL | P281 |
| Nitrate | 8.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 3/4 Croagh SW17
**Date Tested** 06/04/2019
**ALS ID** 3465054

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 17.9 | mg/l CL | P281 |
| Nitrate | 8.8 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-568050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 3/4 Croagh SW18
**Date Tested** 06/04/2019
**ALS ID** 3465055

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 17.5 | mg/l CL | P281 |
| Nitrate | 5.1 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 3/4 Croagh SW19
**Date Tested** 06/04/2019
**ALS ID** 3465056

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 16.6 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.166T

Report No: HYDR-569050419
Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 6 sample(s) received in good condition.

**Comments** N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-569050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 4/4 Croagh SW14
**Date Tested** 06/04/2019
**ALS ID** 3465057

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 13.4 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 4/4 Croagh SW15
**Date Tested** 06/04/2019
**ALS ID** 3465058

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 12.7 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

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Report No: HYDR-569050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 4/4 Croagh SW16
**Date Tested** 06/04/2019
**ALS ID** 3465059

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | 7 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 8 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 16.7 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 4/4 Croagh SW17
**Date Tested** 06/04/2019
**ALS ID** 3465060

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 18.0 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

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Environmental Chemistry Manager

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Report No: HYDR-569050419

Document No: EF0011

# CERTIFICATE OF ANALYSIS

**Date Received** 05/04/2019
**Date Reported** 15/04/2019
**Order Number** P1459

**Sample Type** Water
**Client ID** 4/4 Croagh SW18
**Date Tested** 06/04/2019
**ALS ID** 3465061

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 17.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.05 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** 4/4 Croagh SW19
**Date Tested** 06/04/2019
**ALS ID** 3465062

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | <5 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 16.8 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.03 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.166T

Report No: HYDR-412200320

Document No: EF0011

# SUPPLEMENTARY CERTIFICATE OF ANALYSIS

**Client** **Hydro Environmental Services**
22 Lower Main Street
Dungarvan
Co. Waterford

**Date Received** 20/03/2020
**Date Reported** 01/04/2020
**Order Number** N/A

**For the Attention of:** Hydro Environmental Services

**Sample Reception** 3 sample(s) received in good condition.

**Comments** N/A

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.166T

Report No: HYDR-412200320

Document No: EF0011

# SUPPLEMENTARY CERTIFICATE OF ANALYSIS

**Date Received** 20/03/2020
**Date Reported** 01/04/2020
**Order Number** N/A

**Sample Type** Water
**Client ID** Access Rd Sw1
**Date Tested** 20/03/2020
**ALS ID** 3931124

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 14.9 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

**Sample Type** Water
**Client ID** Access Rd Sw2
**Date Tested** 20/03/2020
**ALS ID** 3931125

| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 13.2 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | <0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

Report Authorised by: Rosemary Thomas

Rosemary Thomas
Environmental Chemistry Manager

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Report No: HYDR-412200320

Document No: EF0011

# SUPPLEMENTARY CERTIFICATE OF ANALYSIS

**Date Received** 20/03/2020
**Date Reported** 01/04/2020
**Order Number** N/A

**Sample Type** Water
**Client ID** Access Rd Sw3
**Date Tested** 20/03/2020
**ALS ID** 3931126

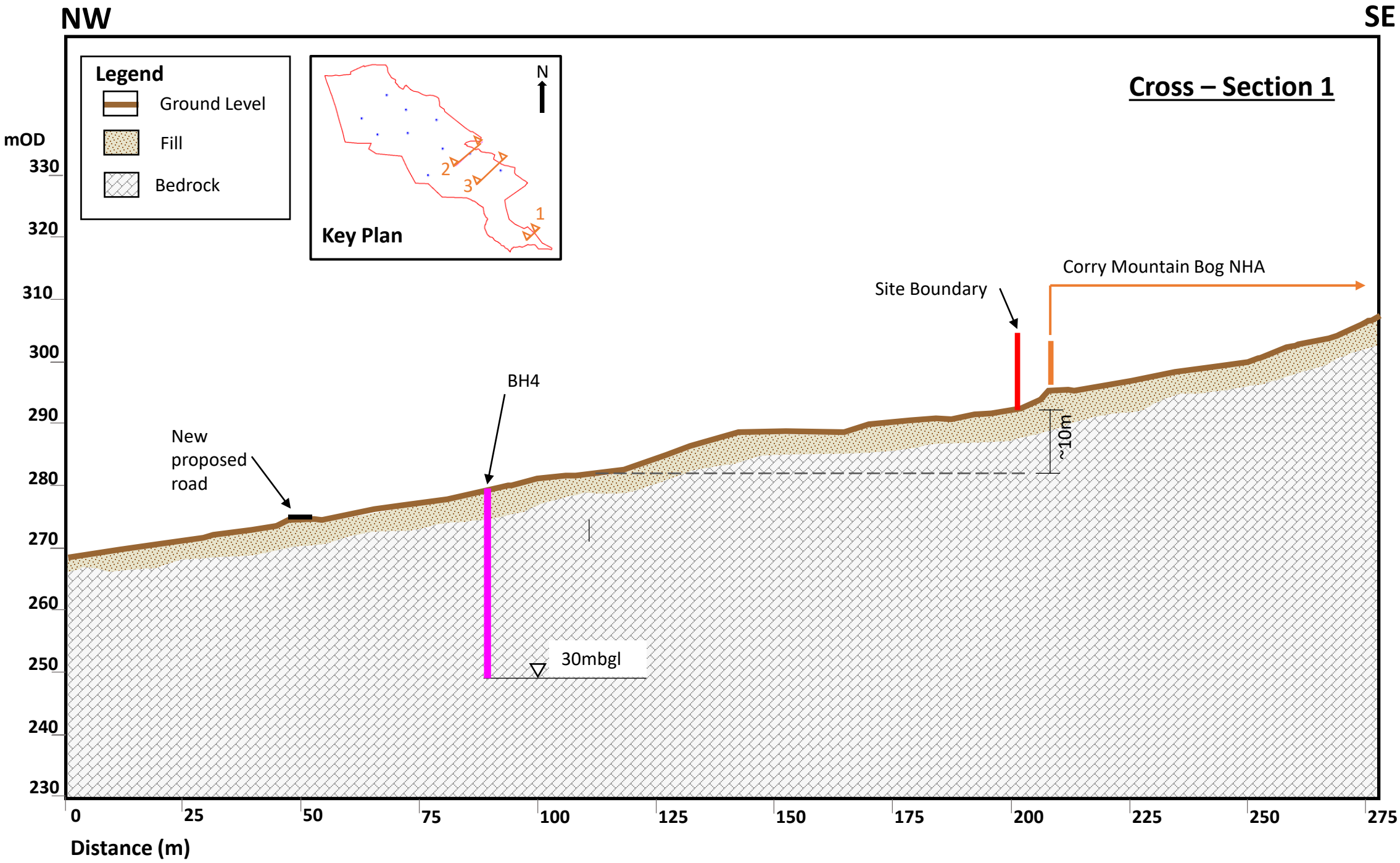
| Test | Result | Unit | Method |
|---|---|---|---|
| Suspended Solids | <5 | mg / l | P202 |
| Phosphorus | <0.10 | mg/l P | P207 |
| BOD 5 day Total with ATU | 2 | mg/l O2 | P280 |
| Orthophosphate | <0.02 | mg/l P | P281 |
| Chloride | 15.4 | mg/l CL | P281 |
| Nitrate | <5.0 | mg/l NO3 | P281 |
| Nitrite | <0.05 | mg/l NO2 | P281 |
| Ammonia | 0.02 | mg/l NH3-N | P281 |
| Nitrogen (Total) | <1.0 | mg/L N | P285 |

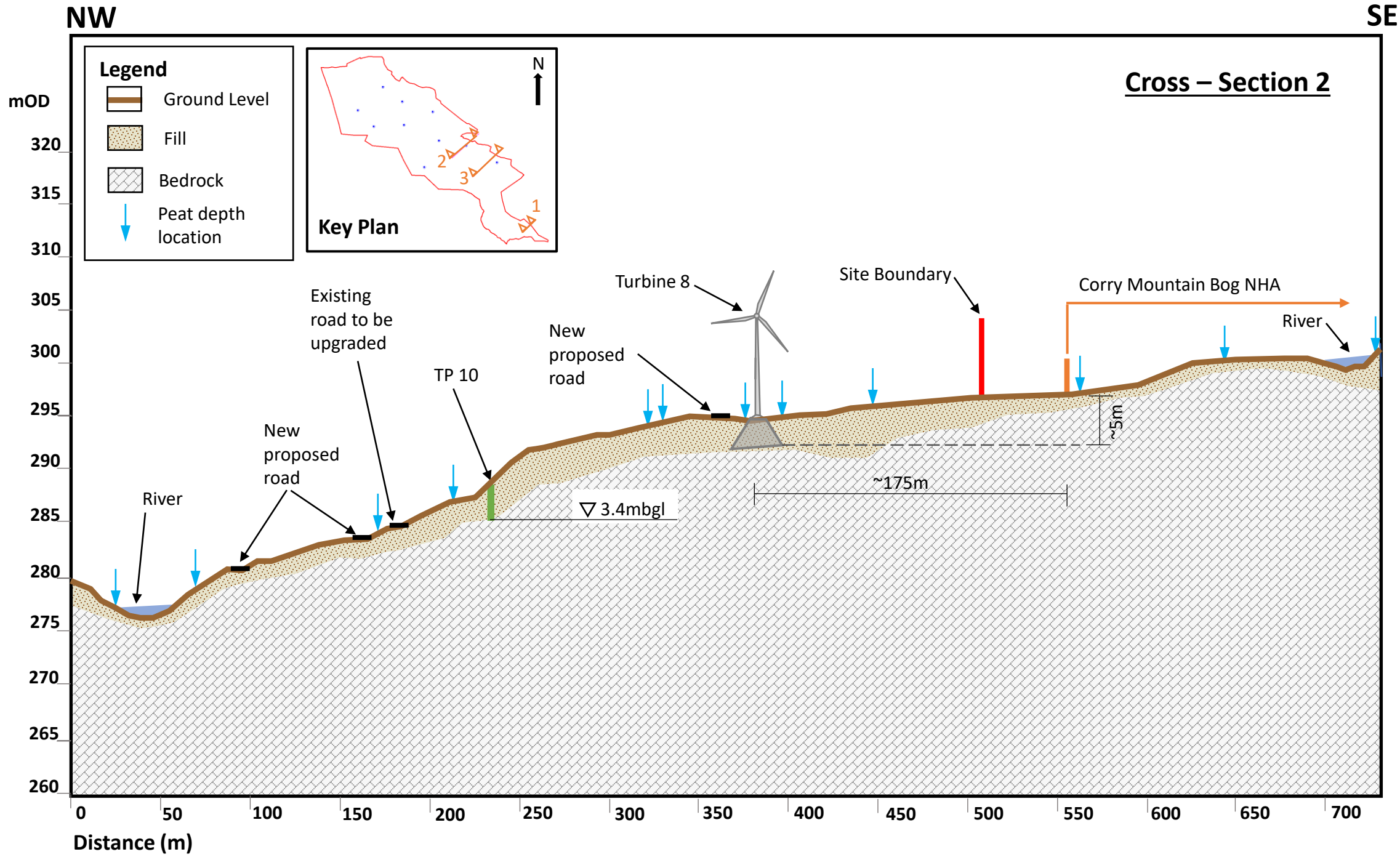
Report Authorised by: Rosemary Thomas

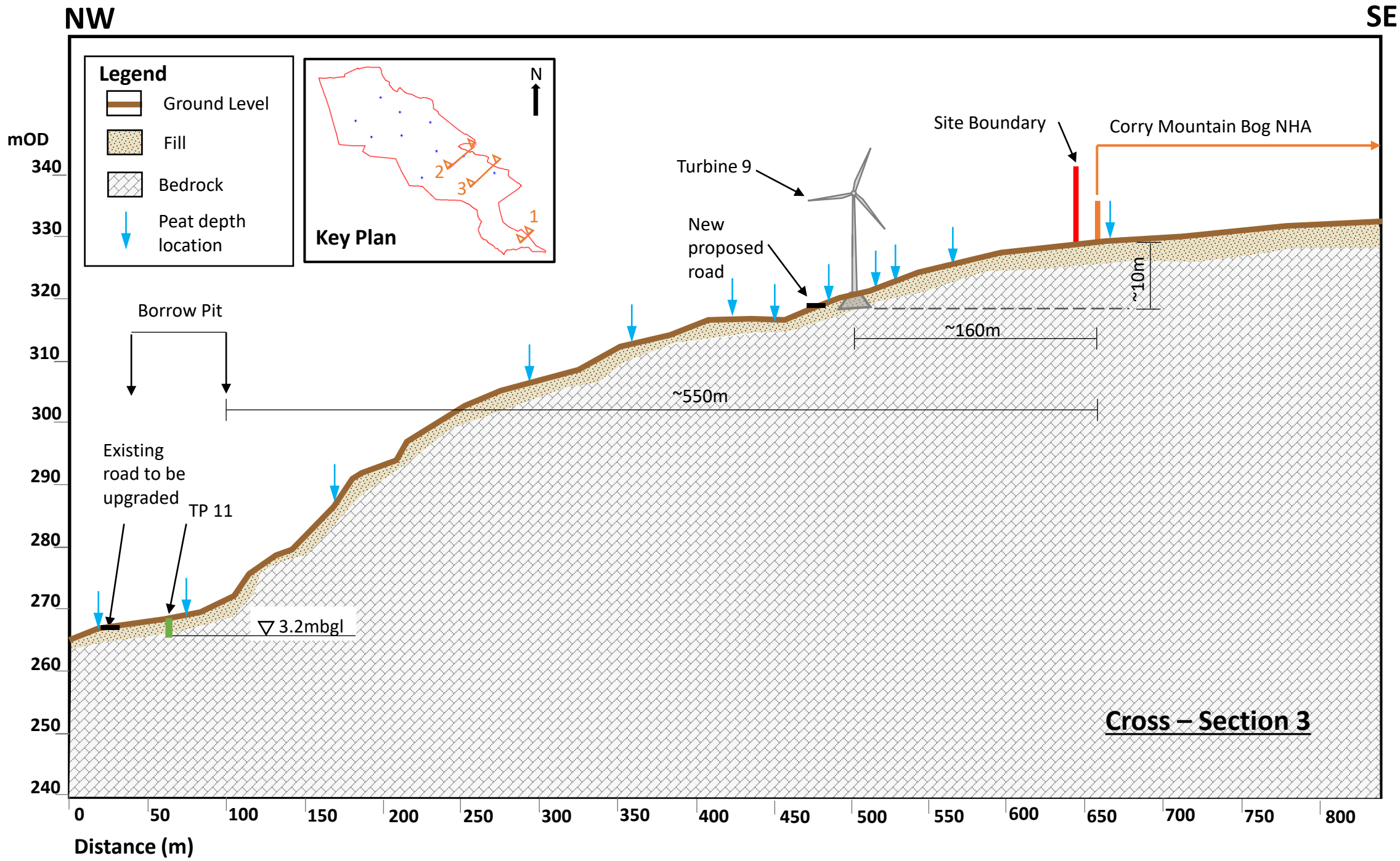
Rosemary Thomas
Environmental Chemistry Manager

# APPENDIX 9-3

***SITE CROSS SECTIONS***


NW
SE
Legend
Ground Level
Fill
Bedrock
N
Key Plan
1
2
3
Cross – Section 1
mOD
330
320
310
300
290
280
270
260
250
240
230
Corry Mountain Bog NHA
Site Boundary
BH4
New
proposed
road
~10m
30mbgl
0
25
50
75
100
125
150
175
200
225
250
275
Distance (m)


NW
SE
Cross – Section 2
Legend
Ground Level
Fill
Bedrock
Peat depth location
Key Plan
N
1
2
3
mOD
320
315
310
305
300
295
290
285
280
275
270
265
260
Turbine 8
Site Boundary
Corry Mountain Bog NHA
River
Existing road to be upgraded
New proposed road
TP 10
New proposed road
River
~5m
~175m
▽ 3.4mbgl
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
Distance (m)


NW
SE
Legend
Ground Level
Fill
Bedrock
Peat depth location
Key Plan
N
1
2
3
mOD
340
330
320
310
300
290
280
270
260
250
240
Site Boundary
Corry Mountain Bog NHA
Turbine 9
New proposed road
~10m
~160m
Borrow Pit
~550m
Existing road to be upgraded
TP 11
3.2mbgl
Cross – Section 3
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
Distance (m)

# APPENDIX 10-1

***CARBON LOSS CALCULATION***

# Cover

CARBON CALCULATOR TOOL v . .

Help About...

Scottish Government and SEPA users only:


The Scottish Government
Application Status Control

Enter password

Sign in

Start Carbon Calculator

This tool calculates payback time for windfarm sited on peatlands using methods given in Nayak et al, 2008 (http://www.gov.scot/Publications/2008/06/25114657/0) and revised equations for GHG emissions (Nayak, D.R., Miller, D., Nolan, A., Smith, P. and Smith, J.U., 2010, Calculating carbon budgets of wind farms on Scottish peatland. Mires and Peat 4: Art. 9. Online: http://mires-and-peat.net/pages/volumes/map04/map0409.php

# Admin

CARBON CALCULATOR TOOL v . . - APPLICATION STATUS CONTROL

Help

Reference Code: Search

| Windfarm Name | Version | Methodology used for calculating emission factors | Status Date | Status |
|---|---|---|---|---|
| No data available in table | | | | |

PreviousNext

---

Selected:

Saved | Signed-off | Received | Consented | Refused | Withdrawn

Revert to original status

# Start

CARBON CALCULATOR TOOL v . .

- Will the site be drained on construction of the windfarm?
- Is the soil at the site highly organic?
- Does windfarm construction require a significant amount of deforestation?
  i.e. is removal in excess of keyholing the turbines within the forest boundary?

If you already have an Application Reference, type it here (or paste it in the first box):

Search

New application

# CoreInput

Core input data
1. Windfarm characteristics 2. Peatland 3. Bog plants 4. Forestry Plantation 5. Emission factors 6. Borrow pits 7. Foundations and hard-standing 8. Access tracks 9. Cable trenches 10. Additional peat 11. Improvement actions 12. Restoration after decomissioning 13. Methodology & application details
Forestry input data
Construction input data
Save ☐ Signed off for submission

Note: Results are only available once ALL data are correct and complete, and a new version will be created.

New app...

Ref: UW4P-GOM1-F0UM v

MENU≡

Help

Core input data | Forestry input data | Construction input data

Windfarm characteristics Page 1 of 12

| Expected values | Minimum | Maximum |
|---|---|---|
| Dimensions | | |
| Number of Turbines: 10 | | |
| Chapter 4 - Description | 10 | 10 |
| Duration of consent (years): 30 | | |
| Chapter 4 - Description | 25 | 30 |
| Performance | | |
| Power rating of 1 turbine (MW): 4.8 | | |
| Chapter 4 - Description | 4.8 | 4.8 |

# Payback Time

Payback Time

Payback Time - ChartsInput Data

| 1. Windfarm CO2 emission saving over... | Exp. | Min. | Max. |
|---|---|---|---|
| ...coal-fired electricity generation (t CO2 / yr) | 1,354 | 1,315 | 1,393 |
| ...grid-mix of electricity generation (t CO2 / yr) | 373 | 363 | 384 |
| ...fossil fuel-mix of electricity generation (t CO2 / yr) | 662 | 643 | 681 |
| Energy output from windfarm over lifetime (MWh) | 44,150 | 35,741 | 45,412 |

| Total CO2 losses due to wind farm (tCO2 eq.) | Exp. | Min. | Max. |
|---|---|---|---|
| 2. Losses due to turbine life (eg. manufacture, construction, decomissioning) | 41,595 | 41,595 | 41,595 |
| 3. Losses due to backup | 28,382 | 23,652 | 28,382 |
| 4. Lossess due to reduced carbon fixing potential | 1,401 | 569 | 2,624 |
| 5. Losses from soil organic matter | 29,232 | 13,481 | 74,910 |
| 6. Losses due to DOC & POC leaching | 0 | 0 | 0 |
| 7. Losses due to felling forestry | 21,463 | 15,785 | 24,095 |
| Total losses of carbon dioxide | 122,074 | 95,082 | 171,606 |

| 8. Total CO2 gains due to improvement of site (t CO2 eq.) | Exp. | Min. | Max. |
|---|---|---|---|
| 8a. Change in emissions due to improvement of degraded bogs | 0 | 0 | 0 |
| 8b. Change in emissions due to improvement of felled forestry | 0 | 0 | 0 |
| 8c. Change in emissions due to restoration of peat from borrow pits | 0 | 0 | 0 |
| 8d. Change in emissions due to removal of drainage from foundations & hardstanding | 0 | 0 | 0 |
| Total change in emissions due to improvements | 0 | 0 | 0 |

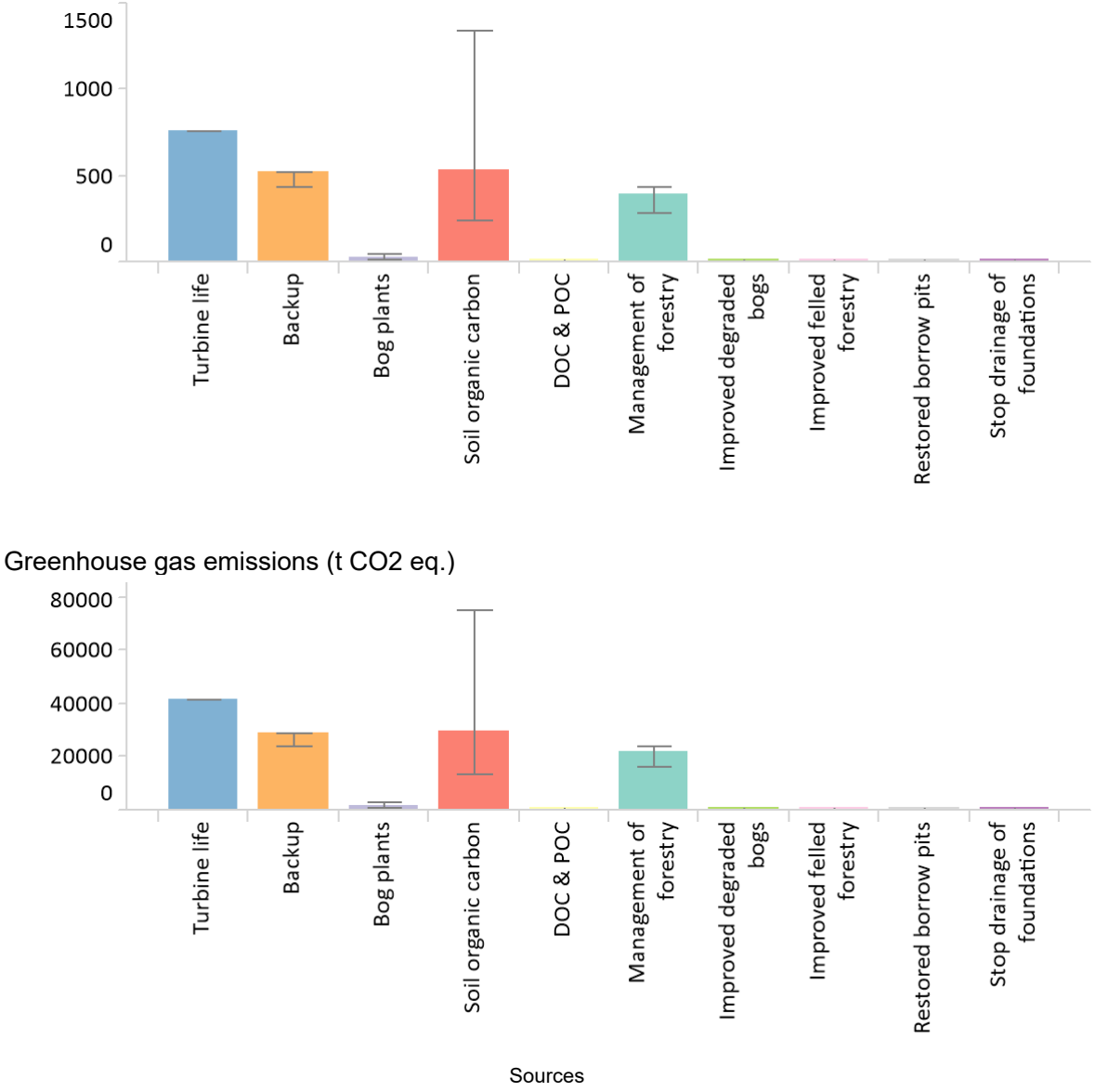
| RESULTS | Exp. | Min. | Max. |
|---|---|---|---|
| Net emissions of carbon dioxide (t CO2 eq.) | 122,074 | 95,082 | 171,606 |
| | | | |
| Carbon Payback Time | | | |
| ...coal-fired electricity generation (years) | 90.2 | 68.3 | 130.5 |
| ...grid-mix of electricity generation (years) | 327.1 | 247.7 | 473.4 |
| ...fossil fuel-mix of electricity generation (years) | 184.3 | 139.6 | 266.7 |
| | | | |
| Ratio of soil carbon loss to gain by restoration (not used in Scottish applications) | No gains! | No gains! | No gains! |

# Payback Time - Charts

Payback Time

Payback Time - ChartsInput Data

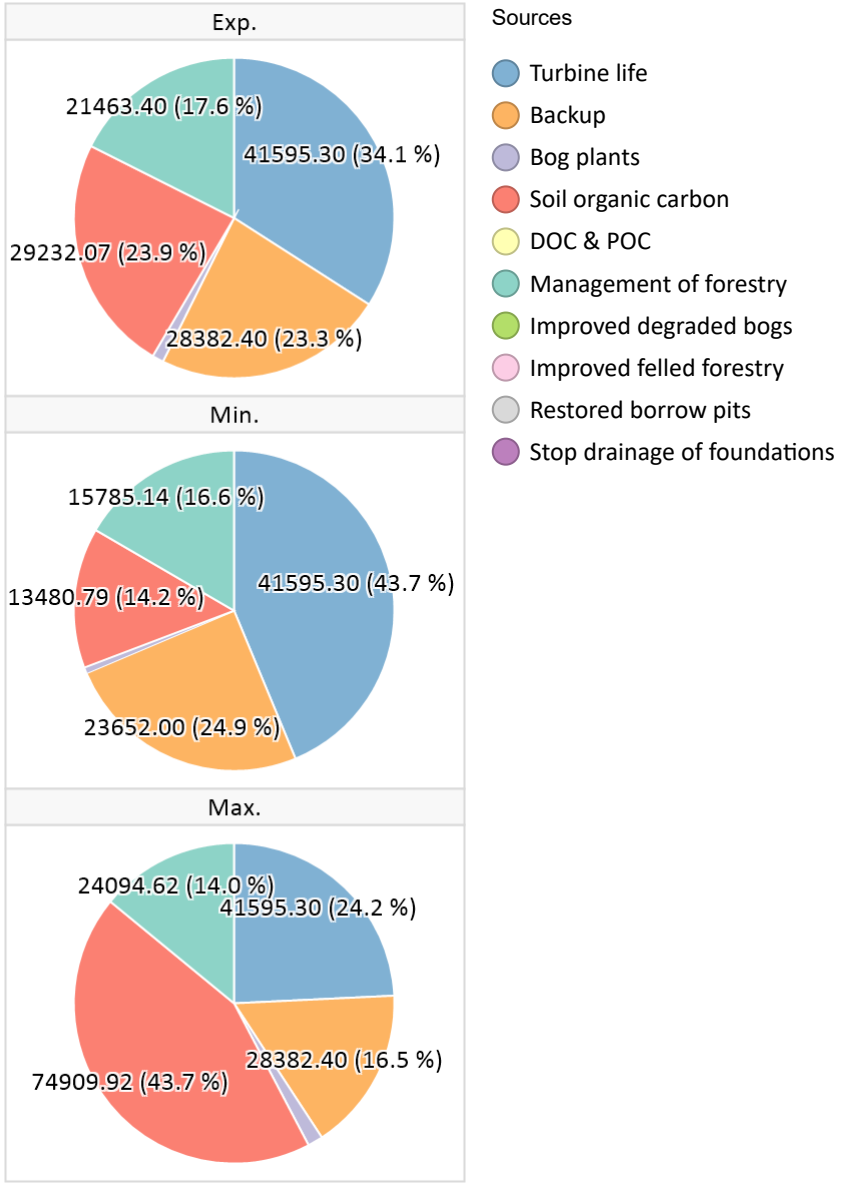
## Carbon payback time (months) using fossil-fuel mix as conterfactual




## Greenhouse gas emissions (t CO2 eq.)




## Proportions of greenhouse gas emissions from different sources



Print this page

Carbon Calculator v1.6.0

Croagh Wind Farm Location: 54.157377 -8.22834

Coillte Renewable Energy

# Core input data

| Input data | Expected value | Minimum value | Maximum value | Source of data |
|---|---|---|---|---|
| Windfarm characteristics | | | | |
| Dimensions | | | | |
| No. of turbines | 10 | 10 | 10 | Chapter 4 - Description |
| Duration of consent (years) | 30 | 25 | 30 | Chapter 4 - Description |
| Performance | | | | |
| Power rating of 1 turbine (MW) | 4.8 | 4.8 | 4.8 | Chapter 4 - Description |
| Capacity factor | 0.35 | 0.34 | 0.36 | Chapter 4 - Description |
| Backup | | | | |
| Fraction of output to backup (%) | 5 | 5 | 5 | SNH Calculator Guidance |
| Additional emissions due to reduced thermal efficiency of the reserve generation (%) | 10 | 10 | 10 | Fixed |
| Total CO2 emission from turbine life (tCO2 $MW^{-1}$) (eg. manufacture, construction, decommissioning) | Calculate wrt installed capacity | Calculate wrt installed capacity | Calculate wrt installed capacity | |
| Characteristics of peatland before windfarm development | | | | |
| Type of peatland | Acid bog | Acid bog | Acid bog | Chapter 6 - Biodiversity |
| Average annual air temperature at site (°C) | 9.3 | 5.7 | 12.9 | Chapter 10 Air & Climate |
| Average depth of peat at site (m) | 2.1 | 1.6 | 2.7 | Chapter 8 - Land, Soils & Geology |
| C Content of dry peat (% by weight) | 55 | 50 | 60 | Default Value Used |
| Average extent of drainage around drainage features at site (m) | 15 | 10 | 20 | Chapter 9 - Water |
| Average water table depth at site (m) | 0.5 | 0.1 | 1 | IDL - Boreholes |
| Dry soil bulk density (g $cm^{-3}$) | 0.1 | 0.09 | 0.11 | Default Value Used |

# 5. Loss of soil CO2 (a, b)



**Emissions due to loss of soil organic carbon**
Loss of C stored in peatland is estimated from % site lost by peat removal (table 5a), CO2 loss from removed peat (table 5b), % site affected by drainage (table 5c), and the CO2 loss from drained peat (table 5d)

**Volume of Peat Removed**
% site lost by peat removal is estimated from peat removed in borrow pits, turbine foundations, hard-standing and access tracks. If peat is removed for any other reason, this must be added in as additional peat excavated in the core input data entry

## 5. Loss of soil C02

| | Exp. | Min. |
|---|---|---|
| **CO2 loss from removed peat (t CO2 equiv.)** | 24150.72 | 13480.79 |
| **CO2 loss from drained peat (t CO2 equiv.)** | 5081.35 | 0 |
| **RESULTS** | | |
| **Total CO2 loss from peat (removed + drained) (t CO2 equiv.)** | 29232.07 | 13480.79 |
| **Additional CO2 payback time of windfarm due to loss of soil C...** | | |
| **...coal-fired electricity generation (months)** | 259.08 | 122.99 |
| **...grid-mix of electricity generation (months)** | 939.97 | 446.23 |
| **...fossil fuel - mix of electricity generation (months)** | 529.68 | 251.45 |

**$CO_2$ loss from removed peats**
If peat is treated in such a way that it is permanently restored, so that less than 100% of the C is lost to the atmosphere, a lower percentage can be entered in cell C10

## 5b. CO2 loss from removed peat

| | Exp. | Min. |
|---|---|---|
| **CO2 loss from removed peat (t CO2)** | 32730.80 | 20192.06 |
| **CO2 loss from undrained peat left in situ (t CO2)** | 8580.08 | 6711.27 |
| **RESULTS** | | |
| **CO2 loss atributable to peat removal only (t CO2)** | 24150.72 | 13480.79 |

## 5a. Volume of peat removed

| | Exp. |
|---|---|
| **Peat removed from borrow pits** | |
| **Area of land lost in borrow pits (m2)** | 25000 |
| **Volume of peat removed from borrow pits (m3)** | 12500 |
| **Peat removed from turbine foundations** | |
| **Area of land lost in foundation (m2)** | 4000 |
| **Volume of peat removed from foundation area (m3)** | 8000 |
| **Peat removed from hard-standing** | |
| **Area of land lost in hard-standing (m2)** | 19250 |
| **Volume of peat removed from hard-standing area (m3)** | 38500 |
| **Peat removed from access tracks** | |
| **Area of land lost in floating roads (m2)** | 6000 |
| **Volume of peat removed from floating roads (m3)** | 6000 |
| **Area of land lost in excavated roads (m2)** | 35400 |
| **Volume of peat removed from excavated roads (m3)** | 70800 |
| **Area of land lost in rock-filled roads (m2)** | 0 |
| **Volume of peat removed from rock-filled roads (m3)** | 0 |
| **Total area of land lost in access tracks (m2)** | 41400 |
| **Total volume of peat removed due to access tracks (m3)** | 76800 |
| **RESULTS** | |
| **Total area of land lost due to windfarm construction (m2)** | 102900 |
| **Total volume of peat removed due to windfarm construction (m3)** | 162300 |

# 5. Loss of soil CO2 (c,d,e)

Payback Time
Payback Time - ChartsInput Data

**Volume of peat drained**
Extent of site affected by drainage is calculated assuming an average extent of drainage around each drainage feature as given in the input data.

**$CO_2$ loss due to drainage**
Note, CO2 losses are calculated using two approaches: IPCC default methodology and more site specific equations derived for this project. The IPCC methodology is included because it is the established approach, although it contains no site detail. The new

## 5c. Volume of peat drained

| | Exp. |
|---|---|
| **Total area affected by drainage around borrow pits (m2)** | 11400 |
| **Total volume affected by drainage around borrow pits (m3)** | 2850 |
| **Peat affected by drainage around turbine foundation and hardstanding** | |
| **Total area affected by drainage of foundation and hardstanding area (m2)** | 48000 |
| **Total volume affected by drainage of foundation and hardstanding area (m3)** | 48000 |
| **Peat affected by drainage of access tracks** | |
| **Total area affected by drainage of access track(m2)** | 213000 |
| **Total volume affected by drainage of access track(m3)** | 186000 |
| **Peat affected by drainage of cable trenches** | |
| **Total area affected by drainage of cable trenches(m2)** | 0 |
| **Total volume affected by drainage of cable trneches(m3)** | 0 |
| **Drainage around additional peat excavated** | |
| **Total area affected by drainage (m2)** | 6827.6 |
| **Total volume affected by drainage (m3)** | 13655.2 |
| **RESULTS** | |

## 5d. CO2 loss from drained peat

| | Exp |
|---|---|
| **Calculations of C Loss from Drained Land if Site is NOT Restored after Decomissioning** | |
| **Total GHG emissions from Drained Land (t CO2 equiv.)** | 5051 |
| **Total GHG emissions from Undrained Land (t CO2 equiv.)** | 4543 |
| **Calculations of C Loss from Drained Land if Site IS Restored after Decomissioning** | |
| **Losses if Land is Drained** | |
| **CH4 emissions from drained land (t CO2 equiv.)** | -13 |
| **CO2 emissions from drained land (t CO2)** | 260 |
| **Total GHG emissions from Drained Land (t CO2 equiv.)** | 5051 |
| **Losses if Land is Undrained** | |
| **CH4 emissions from undrained land (t CO2 equiv.)** | -11 |
| **CO2 emissions from undrained land (t CO2)** | 2339 |
| **Total GHG emissions from Undrained Land (t CO2 equiv.)** | 4543 |
| **RESULTS** | |
| **Total GHG emissions due to drainage (t CO2 equiv.)** | 508 |

**Emission rates from soils**
Note, CO2 losses are calculated using two approaches: IPCC default methodology and more site specific equations derived for this project. The IPCC methodology is included

## 5e. Emission rates from soils

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Calculations following IPCC default methodology** | | | |
| **Flooded period (days/year)** | 178 | 178 | 178 |
| **Annual rate of methane emission (t CH4-C/ha year)** | 0.04 | 0.04 | 0.04 |
| **Annual rate of carbon dioxide emission (t CO2/ha year)** | 35.2 | 35.2 | 35.2 |

# 7. Forestry CO2 loss

Payback Time
Payback Time - ChartsInput Data

## $CO_2$ loss from forests - calculation using detailed management information

Forest carbon calculator (Perks et al, 2009)

| | |
|---|---|
| **Total potential carbon squestration loss due to felling of forestry for the wind farm (t CO2)** | |
| **Total emissions due to cleared land (t CO2)** | |
| **Emissions due to harvesting operations (t CO2)** | |
| **Fossil fuel equivalent saving from use of felled forestry as biofuel (t CO2)** | |
| **Fossil fuel equivalent saving from use of replanted forestry as biofuel (t CO2)** | |
| **RESULTS** | |
| **Total carbon loss associated with forest management(t CO2)** | |

## Emissions due to forest felling - calculation using simple management data

Emissions due to forestry felling are calculated from the reduced carbon sequestered per crop rotation. If the forestry was due to be removed before the planned development, this C loss is not attributable to the wind farm and so the area of forestry to be felled should be entered as zero

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Area of forestry plantation to be felled (ha)** | 54.2 | 49.2 | 59.2 |
| **Carbon sequestered (t C ha-1 yr-1)** | 3.6 | 3.5 | 3.7 |
| **Lifetime of windfarm (years)** | 30 | 25 | 30 |
| **Carbon sequestered over the lifetime of the windfarm (t C ha-1)** | 108 | 87.5 | 111 |
| **RESULTS** | | | |
| **Total carbon loss due to felling of forestry (t CO2)** | 21463.4 | 15785.14 | 24094.62 |
| **Additional CO2 payback time of windfarm due to management of forestry** | | | |
| **...coal-fired electricity generation (months)** | 190.23 | 144.02 | 207.62 |
| **...grid-mix of electricity generation (months)** | 690.16 | 522.51 | 753.25 |
| **...fossil fuel - mix of electricity generation (months)** | 388.91 | 294.44 | 424.46 |

# 8. CO2 gain - site improvement

Payback Time
Payback Time - ChartsInput Data

**Gains due to site improvement**
Note, CO2 losses are calculated using two approaches: IPCC default methodology and more site specific equations derived for this project. The IPCC methodology is included because it is the established approach, although it contains no site detail. The new equations have been thoroughly tested against experimental data (see Nayak et al, 2008 -

## Degraded Bog

| | Exp. |
|---|---|
| **1. Description of site** | |
| **Area to be improved (ha)** | 0 |
| **Depth of peat above water table before improvement (m)** | 0 |
| **Depth of peat above water table after improvement (m)** | 0 |
| **2. Losses with improvement** | |
| **Improved period (years)** | 0 |
| **Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)** | 0.496 |
| **CH4 emissions from improved land (t CO2 equiv.)** | 0 |
| **Selected annual rate of carbone dioxide emissions (t CO2 ha-1 yr-1)** | 0.349 |
| **CO2 emissions from improved land (t CO2 equiv.)** | 0 |
| **Total GHG emissions from improved land (t CO2 eqiv.)** | 0 |

## Felled Forestry

| | Exp. | Min. |
|---|---|---|
| **1. Description of site** | | |
| **Area to be improved (ha)** | 0 | |
| **Depth of peat above water table before improvement (m)** | 0 | |
| **Depth of peat above water table after improvement (m)** | 0 | |
| **2. Losses with improvement** | | |
| **Improved period (years)** | 0 | |
| **Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)** | 0.496 | 0.4 |
| **CH4 emissions from improved land (t CO2 equiv.)** | 0 | |
| **Selected annual rate of carbone dioxide emissions (t CO2 ha-1 yr-1)** | 0.349 | -0.6 |
| **CO2 emissions from improved land (t CO2 equiv.)** | 0 | |
| **Total GHG emissions from improved land (t CO2 eqiv.)** | 0 | |

## Borrow Pits

| | Exp. |
|---|---|
| **1. Description of site** | |
| **Area to be improved (ha)** | 0 |
| **Depth of peat above water table before improvement (m)** | 0 |
| **Depth of peat above water table after improvement (m)** | 0 |
| **2. Losses with improvement** | |
| **Improved period (years)** | 0 |
| **Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)** | 0.496 |
| **CH4 emissions from improved land (t CO2 equiv.)** | 0 |
| **Selected annual rate of carbone dioxide emissions (t CO2 ha-1 yr-1)** | 0.349 |
| **CO2 emissions from improved land (t CO2 equiv.)** | 0 |
| **Total GHG emissions from improved land (t CO2 eqiv.)** | 0 |

## Foundations & Hardstanding

| | Exp. | Min. |
|---|---|---|
| **1. Description of site** | | |
| **Area to be improved (ha)** | 0 | |
| **Depth of peat above water table before improvement (m)** | 0 | |
| **Depth of peat above water table after improvement (m)** | 0 | |
| **2. Losses with improvement** | | |
| **Improved period (years)** | 30 | |
| **Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)** | 0.496 | 0.4 |
| **CH4 emissions from improved land (t CO2 equiv.)** | 0 | |
| **Selected annual rate of carbone dioxide emissions (t CO2 ha-1 yr-1)** | 0.349 | -0.6 |
| **CO2 emissions from improved land (t CO2 equiv.)** | 0 | |
| **Total GHG emissions from improved land (t CO2 eqiv.)** | 0 | |

# 3. CO2 loss backup



**Emissions due to backup power generation**
CO2 loss due to back up is calculated from the extra capacity required for backup of the windfarm given in the input data.

Wind generated electricity is inherently variable, providing unique challenges to the electricity generating industry for provision of a supply to meet consumer demand (Netz, 2004). Backup power is required to accompany wind generation to stabilise the supply to the consumer. This backup power will usually be obtained from a fossil fuel source. At a high level of wind power penetration in the overall generating mix, and with current grid management techniques, the capacity for fossil fuel backup may become strained because it is being used to balance the fluctuating consumer demand with a variable and highly unpredictable output from wind turbines (White, 2007). The Carbon Trust (Carbon Trust/DTI, 2004) concluded that increasing levels of intermittent generation do not present major technical issues at the percentages of renewables expected by 2010 and 2020, but the UK renewables target at the time of that report was only 20%. When national reliance on wind power is low (less than ~20%), the additional fossil fuel generated power requirement can be considered to be insignificant and may be obtained from within the spare generating capacity of other power sectors (Dale et al, 2004). However, as the national supply from wind power increases above 20%, without improvements in grid management techniques, emissions due to backup power generation may become more significant. The extra capacity needed for backup power generation is currently estimated to be 5% of the rated capacity of the wind plant if wind power contributes more than 20% to the national grid (Dale et al 2004). Moving towards the SG target of 50% electricity generation from renewable sources, more short-term capacity may be required in terms of pumped-storage hydro-generated power, or a better mix of offshore and onshore wind generating capacity. Grid management techniques are anticipated to reduce this extra capacity, with improved demand side management, smart meters, grid reinforcement and other developments. However, given current grid management techniques, it is suggested that 5% extra capacity should be assumed for backup power generation if wind power contributes more than 20% to the national grid. At lower contributions, the extra capacity required for backup should be assumed to be zero. These assumptions should be revisited as technology improves.

**Assumption:** Backup assumed to be by fossil-fuel-mix of electricity generation. Note that hydroelectricity may also be used for backup, so this assumption may make the value

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Reserve energy (MWh/yr)** | 21,024 | 21,024 | 21,024 |
| **Annual emissions due to backup from fossil fuel-mix of electricity generation (tCO2/yr)** | 946 | 946 | 946 |
| **RESULTS** | | | |
| **Total emissions due to backup from fossil fuel-mix of electricity generation (tCO2)** | 28,382 | 23,652 | 28,382 |

# 1. CO2 emission saving

Payback Time
Payback Time - ChartsInput Data

**Emissions due to turbine life**
The carbon payback time of the windfarm due to turbine life (eg. manufacture, construction, decomissioning) is calculated by comparing the emissions due to turbine life with carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

Capacity factor calculated from forestry data

| Area name | Value type | Capacity factor (%) | Wind speed ratio | Average site windspeed (m/ |
|---|---|---|---|---|

Capacity factor - Direct input

| | Exp. | Min. | Max. |
|---|---|---|---|
| Capacity factor (%) | 0.4 | 0.3 | 0.4 |

| | Exp. | Min. | Max. |
|---|---|---|---|
| Annual energy output from windfarm (MW/yr) | | | |
| RESULTS | | | |
| Emissions saving over coal-fired electricity generatio… | 1,354 | 1,315 | 1,393 |
| Emissions saving over grid-mix of electricity generati… | 373 | 363 | 384 |
| Emissions saving over fossil fuel - mix of electricity g… | 662 | 643 | 681 |

# 2. CO2 loss turbine life



**Emissions due to turbine life**
The carbon payback time of the windfarm due to turbine life (eg. manufacture, construction, decomissioning) is calculated by comparing the emissions due to turbine life with carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

Calculation of emissions with relation to installed capacity

| | Exp. | Mi |
|---|---|---|
| **Emissions due to turbine frome energy output (t CO2)** | 4017 | |
| **Emissions due to cement used in construction (t CO2)** | 1422 | |

Direct input of emissions due to turbine life

| | Exp. | Min. |
|---|---|---|
| **Emissions due to turbine life (tCO2/windfarm)** | | |

RESULTS

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Losses due to turbine life (manufacture, construction, etc.) (t CO2)** | 41595 | 41595 | 41595 |
| **Additional CO2 payback time of windfarm due to turbine life** | | | |
| **...coal-fired electricity generation (months)** | 369 | 380 | 358 |
| **...grid-mix of electricity generation (months)** | 1338 | 1377 | 1300 |
| **...fossil fuel - mix of electricity generation (months)** | 754 | 776 | 733 |

# 4. Loss CO2 fixing pot.



**Emissions due to loss of bog plants**
Annual C fixation by the site is calculated by multiplying area of the windfarm by the annual C accumulation due to bog plant fixation.

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Area where carbon accumulation by bog plants is lost (ha)** | 38.21 | 25.86 | 53.01 |
| **Total loss of carbon accumulation up to time of restoration (tCO2 eq./ha)** | 37 | 22 | 50 |
| **RESULTS** | | | |
| **Total loss of carbon fixation by plants at the site (t CO2)** | 1401 | 569 | 2624 |
| **Additional CO2 payback time of windfarm due to loss of CO2 fixing potential** | | | |
| **...coal-fired electricity generation (months)** | 12 | 5 | 23 |
| **...grid-mix of electricity generation (months)** | 45 | 19 | 82 |
| **...fossil fuel - mix of electricity generation (months)** | 25 | 11 | 46 |

# 6. CO2 loss DOC & POC



**Emissions due to loss of DOC and POC**

Note, CO2 losses from DOC and POC are calculated using a simple approach derived from generic estimates of the percentage of the total CO2 loss that is due to DOC or POC leaching.

| | Exp. | Min. | Max. |
|---|---|---|---|
| **Gross CO2 loss from restored drained land (t CO2)** | 0.00 | 0.00 | 0.00 |
| **Gross CH4 loss from restored drained land (t CO2 equiv.)** | 0.00 | 0.00 | 0.00 |
| **Gross CO2 loss from improved land (t CO2)** | 0.00 | 0.00 | 0.00 |
| **Gross CH4 loss from improved land (t CO2 equiv.)** | 0.00 | 0.00 | 0.00 |
| **Total gaseous loss of C (t C)** | 0.00 | 0.00 | 0.00 |
| **Total C loss as DOC (t C)** | 0.00 | 0.00 | 0.00 |
| **Total C loss as POC (t C)** | 0.00 | 0.00 | 0.00 |
| **RESULTS** | | | |
| **Total CO2 loss due to DOC leaching (t CO2)** | 0.00 | 0.00 | 0.00 |
| **Total CO2 loss due to POC leaching (t CO2)** | 0.00 | 0.00 | 0.00 |
| **Total CO2 loss due to DOC & POC leaching (t CO2)** | 0.00 | 0.00 | 0.00 |
| **Additional CO2 payback time of windfarm due to DOC & POC** | | | |
| **...coal-fired electricity generation (months)** | 0 | 0 | 0 |
| **...grid-mix of electricity generation (months)** | 0 | 0 | 0 |
| **...fossil fuel - mix of electricity generation (months)** | 0 | 0 | 0 |

# APPENDIX 11-1

## *GLOSSARY OF ACOUSTIC TERMINOLOGY*

## GLOSSARY OF ACOUSTIC TERMINOLOGY

A variety of acoustic parameters and terminology are used throughout this chapter. Significant definitions are identified at this stage to inform the reader.

| | |
|---|---|
| A – Weighting | The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. |
| Background Noise | The noise level rarely fallen below in any given location over any given time period, often classed according to day time, evening or night time periods. The LA90,10min is the parameter that is used to define the background noise level in this instance. LA90 is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise. |
| dB (decibel) | The unit normally employed to measure the magnitude of sound. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa). |
| dB(A) | An 'A-weighted decibel' – a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. A – Weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies. |
| Hub Height Wind Speed | The wind speed at the centre of the turbine rotor. |
| Hertz (Hz) | The unit of sound frequency in cycles per second. |
| $L_{Aeq,T}$ | This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the LAeq value is to either the LAF10 or LAF90 value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background. |
| $L_{AF90}$ | Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting. |
| $L_{den}$ | Refers to the LAeq noise levels over a whole day, but with a penalty of 10 dB(A) for night-time noise (23:00-07:00) and 5 dB(A) for evening noise (19:00-23:00), also known as the day evening night noise indicator. |

## GLOSSARY OF ACOUSTIC TERMINOLOGY (Continued)

| | |
|---|---|
| Low Frequency Noise | LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum. |
| Noise | Sound that evokes a feeling of displeasure in the environment in which it is heard, and is therefore unwelcomed by the receiver |
| Noise Sensitive Location (NSL) | Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other |

| | |
|---|---|
| | area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels. |
| octave band | A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards. |
| Pascal (Pa) | Pascal is a unit of pressure and so sound pressures are measured in Pascals. |
| Sound Power Level ($L_W$) | The sound power level radiated by a source is defined as:<br>$L_W = 10 \times \log_{10}(W/W_o)$ dB.<br>Where W is the acoustic power of the source in Watts (W) and $W_o$ is a reference sound power chosen in air to be $10^{-12}$W. |
| Sound Pressure Level ($L_p$) | The sound pressure level at a point is defined:<br>$L_p = 20 \times \log_{10}(P/P_o)$ dB.<br>Where P is the sound pressure and $P_o$ is a reference pressure for propagation of sound in air and has a value of $2 \times 10^{-5}$Pa. |
| Tonal | Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'. |
| 10 Minute Average Wind Speed (m/s) | The wind speed measured by an anemometer at a specified height above ground level, averaged over a 10-minute period. |
| Wind Shear | The increase of wind speed with height above ground. |

# APPENDIX 11-2

***CALIBRATION CERTIFICATES***

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 02 May 2018** **Certificate Number: UCRT18/1474**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | | | | |
|---|---|---|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL | | | |
| Order No. | ANV MS DEMO | | | |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator | | | |
| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
| | Rion | Sound Level Meter | NL-52 | 00620867 |
| | Rion | Firmware | | 1.8 |
| | Rion | Pre Amplifier | NH-25 | 20927 |
| | Rion | Microphone | UC-59 | 03706 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49<br>*Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 30 April 2018 | ANV Job No. | UKAS18/04279 | |
| Date Calibrated | 02 May 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | Initial Calibration | | |

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# CERTIFICATE OF CALIBRATION

| Certificate Number | |
|---|---|
| UCRT18/1474 | |
| UKAS Accredited Calibration Laboratory No. 0653 | Page 2 of 2 Pages |

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 05 April 2018 | | |
| Calibrator cert. number | UCRT18/1348 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 93.98 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.90 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 21.32 | 22.64 | ± 0.30 | °C |
| Humidity | 42.3 | 42.7 | ± 3.00 | %RH |
| Ambient Pressure | 99.04 | 99.05 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.1 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 11.0 | dB | UR | 15.2 | dB | UR | 20.9 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$ =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel R 1

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 20 November 2018** **Certificate Number: UCRT18/2167**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |
| Order No. | ANV MS HIRE |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|---|
| | Rion | Sound Level Meter | NL-52 | 00620878 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 10188 |
| | Rion | Microphone | UC-59 | 02536 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |

| | |
|---|---|
| Performance Class | 1 |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* |
| Type Approved to IEC 61672-1:2002 | YES Approval Number 21.21 / 13.02 |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* |
| Date Received | 19 November 2018 ANV Job No. UKAS18/11722 |
| Date Calibrated | 20 November 2018 |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | 14 November 2017 | UCRT17/2031 | 0653 |

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# CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT18/2167



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 07 November 2018 | | |
| Calibrator cert. number | UCRT18/2124 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 93.99 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.96 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 23.37 | 22.69 | ± 0.30 | °C |
| Humidity | 39.4 | 39.3 | ± 3.00 | %RH |
| Ambient Pressure | 99.88 | 99.80 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.0 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 14.0 | dB | UR | 18.0 | dB | UR | 23.6 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$ =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: Ben Giles

R 2

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 03 July 2018**

**Certificate Number: UCRT18/1672**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |
| Order No. | ANV MS HIRE |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|---|
| | Rion | Sound Level Meter | NL-52 | 00710288 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 10282 |
| | Rion | Microphone | UC-59 | 02726 |
| | Brüel & Kjær | Calibrator | 4231 | 3002998 |
| | | Calibrator adaptor type if applicable | | UC 0210 |

| | | | |
|---|---|---|---|
| Performance Class | 1 | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | |
| Date Received | 02 July 2018 | ANV Job No. | UKAS18/07414 |
| Date Calibrated | 03 July 2018 | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | 14 July 2017 | UCRT17/1593 | 0653 |

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# CERTIFICATE OF CALIBRATION

| Certificate Number | |
|---|---|
| UCRT18/1672 | |
| UKAS Accredited Calibration Laboratory No. 0653 | Page 2 of 2 Pages |

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | UC 0210 | | |
| Calibrator cal. date | 11 June 2018 | | |
| Calibrator cert. number | UCRT18/1595 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 94.13 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 999.96 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 24.07 | 24.58 | ± 0.30 | °C |
| Humidity | 36.6 | 38.6 | ± 3.00 | %RH |
| Ambient Pressure | 100.87 | 100.83 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.0 | dB | Adjusted indicated level | 94.1 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12.9 | dB | UR | 16.8 | dB | UR | 22.5 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$ =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel R 2

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 18 June 2018**

**Certificate Number: UCRT18/1626**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |
| Order No. | ANV MS HIRE |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

Identification

| *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|
| Rion | Sound Level Meter | NL-52 | 00732075 |
| Rion | Firmware | | 1.8 |
| Rion | Pre Amplifier | NH-25 | 32103 |
| Rion | Microphone | UC-59 | 05632 |
| Rion | Calibrator | NC-74 | 34536109 |
| | Calibrator adaptor type if applicable | | NC-74-002 |

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

*Procedures from IEC 61672-3:2006 were used to perform the periodic tests.*

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

*If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003*

Date Received 13 June 2018 ANV Job No. UKAS18/06374

Date Calibrated 18 June 2018

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate

| *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|
| 03 July 2017 | UCRT17/1554 | 0653 |

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# CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT18/1626



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 11 June 2018 | | |
| Calibrator cert. number | UCRT18/1592 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 94.02 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.95 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 23.20 | 22.87 | ± 0.30 | °C |
| Humidity | 39.7 | 37.9 | ± 3.00 | %RH |
| Ambient Pressure | 100.78 | 100.80 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.1 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

| | | | |
|---|---|---|---|
| Self Generated Noise | This test is currently not performed by this Lab. | | |
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 13.7 | dB | UR | 17.6 | dB | UR | 23.6 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$ =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R 1

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 18 December 2018** **Certificate Number: UCRT18/2250**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |
| Order No. | ANV MS HIRE |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|---|
| | Rion | Sound Level Meter | NL-52 | 00732145 |
| | Rion | Firmware | | 2.0 |
| | Rion | Pre Amplifier | NH-25 | 32173 |
| | Rion | Microphone | UC-59 | 10449 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |

| | | | | |
|---|---|---|---|---|
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 17 December 2018 | ANV Job No. | UKAS18/12768 | |
| Date Calibrated | 18 December 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | 18 January 2018 | UCRT18/1051 | 0653 |

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# CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number UCRT18/2250



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 04 December 2018 | | |
| Calibrator cert. number | UCRT18/2206 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 93.99 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.87 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 23.36 | 23.18 | ± 0.40 | °C |
| Humidity | 41.7 | 47.1 | ± 3.00 | %RH |
| Ambient Pressure | 99.42 | 99.34 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.1 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 11.1 | dB | UR | 15.1 | dB | UR | 21.1 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R 1

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 05 October 2018** **Certificate Number: UCRT18/2021**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |

| | | | | |
|---|---|---|---|---|
| Order No. | ANV MS HIRE | | | |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator | | | |
| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
| | Rion | Sound Level Meter | NL-52 | 00976222 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 76339 |
| | Rion | Microphone | UC-59 | 12155 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 28 September 2018 | ANV Job No. | UKAS18/09611 | |
| Date Calibrated | 05 October 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | 29 November 2017 | UCRT17/2063 | 0653 |

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# CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT18/2021



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 03 October 2018 | | |
| Calibrator cert. number | UCRT18/2010 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 94.01 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.98 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | |
|---|---|---|---|
| Temperature | 23.70 | 23.90 | ± 0.40 °C |
| Humidity | 48.9 | 47.8 | ± 3.00 %RH |
| Ambient Pressure | 100.46 | 100.38 | ± 0.03 kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 93.9 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 11.2 | dB | UR | 15.2 | dB | UR | 21.2 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel R 1

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 10 October 2018** **Certificate Number: UCRT18/2033**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | ANV Measurement Systems<br>Beaufort Court<br>17 Roebuck Way<br>Milton Keynes<br>MK5 8HL |

| | | | | |
|---|---|---|---|---|
| Order No. | ANV MS HIRE | | | |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator | | | |
| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
| | Rion | Sound Level Meter | NL-52 | 01021277 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 21319 |
| | Rion | Microphone | UC-59 | 07020 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 09 October 2018 | ANV Job No. | UKAS18/10637 | |
| Date Calibrated | 10 October 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | 22 May 2018 | UCRT18/1529 | 0653 |

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# CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT18/2033



Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 03 October 2018 | | |
| Calibrator cert. number | UCRT18/2010 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 94.01 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.98 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | | |
|---|---|---|---|---|
| Temperature | 21.74 | 22.18 | ± 0.30 | °C |
| Humidity | 45.6 | 45.2 | ± 3.00 | %RH |
| Ambient Pressure | 100.43 | 100.43 | ± 0.03 | kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.0 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

| | | | |
|---|---|---|---|
| Self Generated Noise | This test is currently not performed by this Lab. | | |
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12.1 | dB | UR | 15.8 | dB | UR | 22.2 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | | 0.12 | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k$=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

R 2

Additional Comments

None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 20 April 2018** **Certificate Number: UCRT18/1437**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | AWN Consulting Limited<br>The Tecpro Building<br>Clonshaugh Business and Technology Park<br>Dublin 17<br>Ireland<br>D17 NX50 |
| Order No. | |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|---|
| | Rion | Sound Level Meter | NL-52 | 00186671 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 76821 |
| | Rion | Microphone | UC-59 | 12817 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |

| | | | | |
|---|---|---|---|---|
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 20 April 2018 | ANV Job No. | UKAS18/04261 | |
| Date Calibrated | 20 April 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | Initial Calibration | | |

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# CERTIFICATE OF CALIBRATION

| Certificate Number | |
|---|---|
| UCRT18/1437 | |
| UKAS Accredited Calibration Laboratory No. 0653 | Page 2 of 2 Pages |

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter | NL-42 / NL-52 | |
| SLM instruction manual ref / issue | | 11-03 | |
| SLM instruction manual source | | Manufacturer | |
| Internet download date if applicable | | N/A | |
| Case corrections available | | Yes | |
| Uncertainties of case corrections | | Yes | |
| Source of case data | | Manufacturer | |
| Wind screen corrections available | | Yes | |
| Uncertainties of wind screen corrections | | Yes | |
| Source of wind screen data | | Manufacturer | |
| Mic pressure to free field corrections | | Yes | |
| Uncertainties of Mic to F.F. corrections | | Yes | |
| Source of Mic to F.F. corrections | | Manufacturer | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | | Yes | |
| Specified or equivalent Calibrator | | Specified | |
| Customer or Lab Calibrator | | Lab Calibrator | |
| Calibrator adaptor type if applicable | | NC-74-002 | |
| Calibrator cal. date | | 05 April 2018 | |
| Calibrator cert. number | | UCRT18/1348 | |
| Calibrator cal cert issued by | | 0653 | |
| Calibrator SPL @ STP | | 93.98 dB | Calibration reference sound pressure level |
| Calibrator frequency | | 1001.90 Hz | Calibration check frequency |
| Reference level range | | 25 - 130 dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | |
|---|---|---|---|
| Temperature | 23.57 | 23.78 | ± 0.30 °C |
| Humidity | 47.7 | 45.5 | ± 3.00 %RH |
| Ambient Pressure | 101.35 | 101.36 | ± 0.03 kPa |

Response to associated Calibrator at the environmental conditions above.

| Initial indicated level | 94.1 dB | | Adjusted indicated level | 94.0 dB |
|---|---|---|---|---|
| The uncertainty of the associated calibrator supplied with the sound level meter = | | | | 0.10 dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | |
|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12.5 | dB | UR | 16.6 | dB | UR | 22.3 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | | 0.12 | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan R 2

Additional Comments
None

# CERTIFICATE OF CALIBRATION

0653

**Date of Issue: 20 April 2018**

**Certificate Number: UCRT18/1432**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems



Approved Signatory

K. Mistry

| | |
|---|---|
| Customer | AWN Consulting Limited<br>The Tecpro Building<br>Clonshaugh Business and Technology Park<br>Dublin 17<br>Ireland<br>D17 NX5D |
| Order No. | |
| Description | Sound Level Meter / Pre-amp / Microphone / Associated Calibrator |

| Identification | *Manufacturer* | *Instrument* | *Type* | *Serial No. / Version* |
|---|---|---|---|---|
| | Rion | Sound Level Meter | NL-52 | 00186667 |
| | Rion | Firmware | | 1.9 |
| | Rion | Pre Amplifier | NH-25 | 76817 |
| | Rion | Microphone | UC-59 | 12812 |
| | Rion | Calibrator | NC-74 | 34536109 |
| | | Calibrator adaptor type if applicable | | NC-74-002 |

| | | | | |
|---|---|---|---|---|
| Performance Class | 1 | | | |
| Test Procedure | TP 2.SLM 61672-3 TPS-49 | | | |
| | *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.* | | | |
| Type Approved to IEC 61672-1:2002 | YES | Approval Number | 21.21 / 13.02 | |
| | *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003* | | | |
| Date Received | 20 April 2018 | ANV Job No. | UKAS18/04261 | |
| Date Calibrated | 20 April 2018 | | | |

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

| Previous Certificate | *Dated* | *Certificate No.* | *Laboratory* |
|---|---|---|---|
| | Initial Calibration | | |

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# CERTIFICATE OF CALIBRATION

| Certificate Number |
|---|
| UCRT18/1432 |
| Page 2 of 2 Pages |

UKAS Accredited Calibration Laboratory No. 0653

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

| | | | |
|---|---|---|---|
| SLM instruction manual title | Sound Level Meter NL-42 / NL-52 | | |
| SLM instruction manual ref / issue | 11-03 | | |
| SLM instruction manual source | Manufacturer | | |
| Internet download date if applicable | N/A | | |
| Case corrections available | Yes | | |
| Uncertainties of case corrections | Yes | | |
| Source of case data | Manufacturer | | |
| Wind screen corrections available | Yes | | |
| Uncertainties of wind screen corrections | Yes | | |
| Source of wind screen data | Manufacturer | | |
| Mic pressure to free field corrections | Yes | | |
| Uncertainties of Mic to F.F. corrections | Yes | | |
| Source of Mic to F.F. corrections | Manufacturer | | |
| Total expanded uncertainties within the requirements of IEC 61672-1:2002 | Yes | | |
| Specified or equivalent Calibrator | Specified | | |
| Customer or Lab Calibrator | Lab Calibrator | | |
| Calibrator adaptor type if applicable | NC-74-002 | | |
| Calibrator cal. date | 05 April 2018 | | |
| Calibrator cert. number | UCRT18/1348 | | |
| Calibrator cal cert issued by | 0653 | | |
| Calibrator SPL @ STP | 93.98 | dB | Calibration reference sound pressure level |
| Calibrator frequency | 1001.90 | Hz | Calibration check frequency |
| Reference level range | 25 - 130 | dB | |

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

| Environmental conditions during tests | Start | End | |
|---|---|---|---|
| Temperature | 22.18 | 22.93 | ± 0.30 °C |
| Humidity | 53.1 | 51.5 | ± 3.00 %RH |
| Ambient Pressure | 101.32 | 101.34 | ± 0.03 kPa |

Response to associated Calibrator at the environmental conditions above.

| | | | | | |
|---|---|---|---|---|---|
| Initial indicated level | 94.0 | dB | Adjusted indicated level | 94.0 | dB |
| The uncertainty of the associated calibrator supplied with the sound level meter ± | | | | 0.10 | dB |

Self Generated Noise — This test is currently not performed by this Lab.

| | | | |
|---|---|---|---|
| Microphone installed (if requested by customer) = Less Than | N/A | dB | A Weighting |
| Uncertainty of the microphone installed self generated noise ± | N/A | dB | |

Microphone replaced with electrical input device - UR = Under Range indicated

| Weighting | A | | | C | | | Z | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12.7 | dB | UR | 16.7 | dB | UR | 22.7 | dB | UR |
| Uncertainty of the electrical self generated noise ± | | | | | | 0.12 | | dB | |

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel R 1

Additional Comments
None

# APPENDIX 11-3

***MODELLING ASSUMPTIONS***

# Noise Modelling Assumptions

Prediction calculations for turbine noise have been conducted in accordance with ISO 9613: Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation, 1996. Guidance in terms of the calculation settings has been obtained from the Institute of Acoustics (IoA) Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (IoA GPG) and its associated supplementary guidance notes. The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions.

The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation)

Noise Calculations have been conducted using a source height corresponding to the hub height of the proposed turbines, a receiver height of 4m and an assumed ground factor of G=0.5.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in an attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(d) + 11$$

where d = distance from the source

A wind turbine may be considered as a point source beyond a distance corresponding to one rotor diameter.

Atmospheric Adsorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies.

In accordance with the guidance set out in the IoA GPG for calculations, a temperature of 10°C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency

spectrum of the noise. The barrier attenuations predicted by the ISO9613 model have been shown to be significantly greater than that measured in practice under down wind conditions.

# APPENDIX 11-4

***DETAILS OF OTHER WIND FARMS***

*Table A4.1 Garvagh Glebe Turbine Co-ordinates*

| Co-ordinates (ITM) | |
|---|---|
| Easting | Northing |
| 585,325 | 823,856 |
| 585,489 | 823,503 |
| 585,898 | 823,511 |
| 586,455 | 823,270 |
| 586,945 | 823,082 |
| 586,093 | 823,851 |
| 586,410 | 823,661 |
| 587,615 | 821,468 |
| 587,605 | 820,977 |
| 588,092 | 821,137 |
| 588,338 | 820,904 |
| 588,657 | 820,619 |
| 587,125 | 822,745 |

*Table A4.1 Black Banks 1 Turbine Co-ordinates*

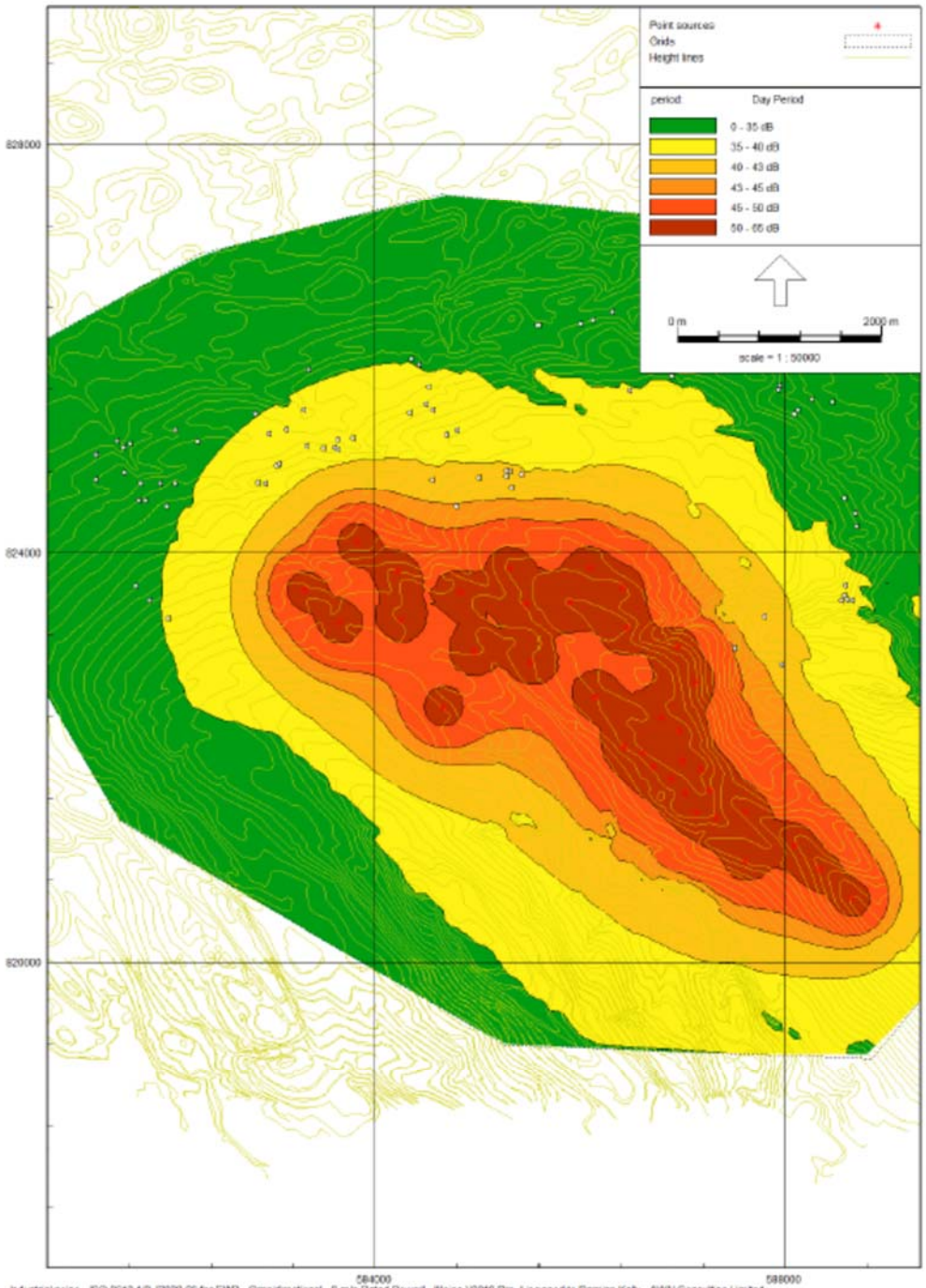
| Co-ordinates (ITM) | |
|---|---|
| Easting | Northing |
| 586,790 | 822,394 |
| 586,971 | 822,267 |
| 586,996 | 821,977 |
| 587,178 | 821,893 |

*Table A4.1 Black Banks 2 Turbine Co-ordinates*

| Co-ordinates (ITM) | |
|---|---|
| **Easting** | **Northing** |
| 586,427 | 822,110 |
| 586,609 | 822,045 |
| 586,716 | 821,918 |
| 586,887 | 821,801 |
| 587,027 | 821,654 |
| 587,128 | 821,456 |
| 587,319 | 821,405 |
| 587,256 | 821,682 |

# APPENDIX 11-5

***NOISE CONTOUR AT RATED POWER AND WINDSPEED***


Point sources
Grids
Height lines
period
Day Period
0 - 35 dB
35 - 40 dB
40 - 43 dB
43 - 45 dB
45 - 50 dB
50 - 65 dB
0 m
2000 m
scale = 1 : 50000
828000
824000
820000
584000
588000

# APPENDIX 11-6

***DIRECTIONAL NOISE PREDICTIONS - CUMULATIVE***

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the North sector (0°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 26.2 | 29.6 | 31.1 | 31.9 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 25.2 | 28.6 | 30.1 | 31 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 21.4 | 24.6 | 26.1 | 27 | 27.6 |
| | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 22.3 | 25.6 | 27.1 | 28 | 28.5 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 23.4 | 26.7 | 28.2 | 29 | 29.5 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 23.1 | 26.3 | 27.9 | 28.8 | 29.2 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 23 | 26.3 | 27.8 | 28.7 | 29.1 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 24.4 | 27.8 | 29.3 | 30.1 | 30.5 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 18.9 | 22.3 | 23.8 | 24.6 | 24.9 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 19 | 22.4 | 23.8 | 24.7 | 25.2 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 19.6 | 23.1 | 24.5 | 25.4 | 25.6 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 21.6 | 24.8 | 26.3 | 27.2 | 27.8 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 22.7 | 26 | 27.5 | 28.4 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 26.6 | 30.1 | 31.6 | 32.4 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 27.1 | 30.5 | 32.1 | 32.9 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 23.2 | 26.4 | 28 | 28.9 | 29.4 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 24.4 | 27.7 | 29.3 | 30.1 | 30.5 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 26 | 29.6 | 31.1 | 31.9 | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 24.5 | 27.8 | 29.4 | 30.2 | 30.6 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 25.6 | 29 | 30.5 | 31.4 | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 25.9 | 29.2 | 30.8 | 31.6 | 31.9 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 25.9 | 29.2 | 30.8 | 31.7 | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 26.3 | 29.7 | 31.3 | 32.1 | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 25.9 | 29.4 | 30.9 | 31.7 | 31.8 |
| | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 22.1 | 24.9 | 26.7 | 27.7 | 28.6 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 22.2 | 24.9 | 26.8 | 27.8 | 28.7 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 23.2 | 25.9 | 27.8 | 28.8 | 29.7 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 23.6 | 26.9 | 28.5 | 29.4 | 29.6 |
| | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 23.6 | 26.7 | 28.4 | 29.3 | 29.9 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 24.5 | 27.5 | 29.4 | 30.3 | 31.1 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 26.2 | 28.9 | 30.8 | 31.8 | 32.5 |
| | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 28.6 | 31 | 33.2 | 34.2 | 35.1 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 27.6 | 29.6 | 32 | 33.1 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 29 | 30.8 | 33.4 | 34.5 | 35.7 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 27.4 | 29.3 | 31.8 | 32.9 | 34.1 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 29.3 | 32.4 | 34.1 | 35 | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 31.2 | 34 | 36 | 36.9 | 37.5 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 28.2 | 30.2 | 32.7 | 33.8 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 19.5 | 22.1 | 24 | 25 | 26.1 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 19 | 21.3 | 23.3 | 24.5 | 25.8 |
| | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 18.9 | 21.2 | 23.3 | 24.4 | 25.8 |
| | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 18 | 19.5 | 22 | 23.4 | 25.3 |
| | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 17.9 | 19.6 | 22 | 23.3 | 25.1 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 18 | 19.6 | 22.1 | 23.4 | 25.3 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 19.5 | 21.1 | 23.5 | 24.8 | 26.7 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 19.6 | 21.2 | 23.7 | 24.9 | 26.8 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 19.4 | 20.9 | 23.5 | 24.9 | 26.6 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 20 | 21.5 | 24.1 | 25.5 | 27.2 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 18.9 | 19.9 | 22.8 | 24.3 | 26.4 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 19.1 | 20.4 | 23.1 | 24.6 | 26.5 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 19.5 | 20.8 | 23.5 | 25.1 | 27.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 19.4 | 20.7 | 23.4 | 25 | 26.9 |
| | 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 | 18.6 | 19.6 | 22.3 | 23.9 | 25.9 |
| | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 18.3 | 19.4 | 22.2 | 23.7 | 25.8 |
| | 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 | 20.5 | 21.3 | 24.3 | 26 | 28.1 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 20.7 | 21.5 | 24.6 | 26.3 | 28.4 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 21.2 | 21.9 | 25.1 | 26.7 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 25.3 | 25.8 | 29.3 | 31.3 | 33.0 |
| | 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 | 26.4 | 27 | 30.4 | 32.3 | 34.1 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 26 | 26.6 | 30 | 32 | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 26.3 | 26.9 | 30.3 | 32.3 | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 26.5 | 27.1 | 30.5 | 32.4 | 34.1 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 30.2 | 30.5 | 34.2 | 36.1 | 37.7 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 27.8 | 29.8 | 32.3 | 33.4 | 34.6 |
| | 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 | 34.1 | 34.3 | 38.2 | 40.1 | 41.5 |
| | 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 | -- | -- | -- | -- | -- |
| R066 | Dwelling | 20 | 23.1 | 24.7 | 25.6 | 26.2 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 20.8 | 24 | 25.6 | 26.5 | 27.1 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 20.6 | 23.6 | 25.1 | 26 | 26.3 |
| | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 32.2 | 32.6 | 36.3 | 38.3 | 39.8 |
| | 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 | 22.2 | 23.8 | 26.3 | 27.6 | 29.2 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 18.6 | 20 | 22.6 | 24.1 | 26.0 |
| | 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 | 18.2 | 20 | 22.3 | 23.6 | 25.3 |
| | 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 | -- | -- | -- | -- | -- |
| R073 | Dwelling | 23.7 | 26.9 | 28.5 | 29.4 | 29.9 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 23.5 | 26.9 | 28.4 | 29.3 | 29.7 |
| | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 26.1 | 29.5 | 31.1 | 31.9 | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 26.7 | 30 | 31.6 | 32.4 | 32.7 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 25.9 | 28.6 | 30.5 | 31.5 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 27.6 | 31 | 32.5 | 33.4 | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the Northeast sector (45°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 28.2 | 31.6 | 33.1 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 27.3 | 30.7 | 32.2 | 33.1 | 33.4 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 25.2 | 28.4 | 29.9 | 30.8 | 31.4 |
| | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 26 | 29.3 | 30.8 | 31.7 | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 26.8 | 30.1 | 31.6 | 32.4 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 26.5 | 29.7 | 31.3 | 32.2 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 26.7 | 30 | 31.5 | 32.4 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 27.7 | 31.1 | 32.6 | 33.4 | 33.8 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 23 | 26.4 | 27.9 | 28.7 | 29.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 22.8 | 26.2 | 27.6 | 28.5 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 23.6 | 27.1 | 28.5 | 29.4 | 29.6 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 25.5 | 28.7 | 30.2 | 31.1 | 31.7 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 26.6 | 29.9 | 31.4 | 32.3 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 30 | 33.5 | 35 | 35.8 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R015 | Dwelling | 30.4 | 33.8 | 35.4 | 36.2 | 36.4 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 26.5 | 29.7 | 31.3 | 32.2 | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 27.7 | 31 | 32.6 | 33.4 | 33.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 29.1 | 32.7 | 34.2 | 35 | 35.1 |
| | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 27.7 | 31 | 32.6 | 33.4 | 33.8 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 28.6 | 32 | 33.5 | 34.4 | 34.7 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 28.4 | 31.7 | 33.3 | 34.1 | 34.4 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 28.4 | 31.7 | 33.3 | 34.2 | 34.5 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 28.8 | 32.2 | 33.8 | 34.6 | 34.9 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 29 | 32.5 | 34 | 34.8 | 34.9 |
| | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 24.2 | 27 | 28.8 | 29.8 | 30.7 |
| | 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 $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 24.2 | 26.9 | 28.8 | 29.8 | 30.7 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 25 | 27.7 | 29.6 | 30.6 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 25.3 | 28.6 | 30.2 | 31.1 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 25.2 | 28.3 | 30 | 30.9 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 26.2 | 29.2 | 31.1 | 32 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 27.7 | 30.4 | 32.3 | 33.3 | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 30 | 32.4 | 34.6 | 35.6 | 36.5 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 29.3 | 31.3 | 33.7 | 34.8 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R034 | Dwelling | 30.7 | 32.5 | 35.1 | 36.2 | 37.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 29 | 30.9 | 33.4 | 34.5 | 35.7 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 30.8 | 33.9 | 35.6 | 36.5 | 37.0 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 33.3 | 36.1 | 38.1 | 39 | 39.6 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 29.8 | 31.8 | 34.3 | 35.4 | 36.6 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 20.3 | 22.9 | 24.8 | 25.8 | 26.9 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 19.4 | 21.7 | 23.7 | 24.9 | 26.2 |
| | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 19.6 | 21.9 | 24 | 25.1 | 26.5 |
| | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 18.8 | 20.3 | 22.8 | 24.2 | 26.1 |
| | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 18.5 | 20.2 | 22.6 | 23.9 | 25.7 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 18.4 | 20 | 22.5 | 23.8 | 25.7 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 19.6 | 21.2 | 23.6 | 24.9 | 26.8 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 19.7 | 21.3 | 23.8 | 25 | 26.9 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 19.8 | 21.3 | 23.9 | 25.3 | 27.0 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 20.3 | 21.8 | 24.4 | 25.8 | 27.5 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 18 | 19 | 21.9 | 23.4 | 25.5 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 18.3 | 19.6 | 22.3 | 23.8 | 25.7 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 18.6 | 19.9 | 22.6 | 24.2 | 26.1 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 18.5 | 19.8 | 22.5 | 24.1 | 26.0 |
| | 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 | 17.9 | 18.9 | 21.6 | 23.2 | 25.2 |
| | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 17.7 | 18.8 | 21.6 | 23.1 | 25.2 |
| | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 19.6 | 20.4 | 23.4 | 25.1 | 27.2 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 19.3 | 20.1 | 23.2 | 24.9 | 27.0 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 19.7 | 20.4 | 23.6 | 25.2 | 27.4 |
| | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 23.6 | 24.1 | 27.6 | 29.6 | 31.3 |
| | 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 | 24.5 | 25.1 | 28.5 | 30.4 | 32.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 24.1 | 24.7 | 28.1 | 30.1 | 31.8 |
| | 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 | 24.4 | 25 | 28.4 | 30.4 | 32.1 |
| | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 24.6 | 25.2 | 28.6 | 30.5 | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 28.4 | 28.7 | 32.4 | 34.3 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 29.4 | 31.4 | 33.9 | 35 | 36.2 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 31.9 | 32.1 | 36 | 37.9 | 39.3 |
| | 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 | -- | -- | -- | -- | -- |
| R066 | Dwelling | 24.1 | 27.2 | 28.8 | 29.7 | 30.3 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 24.6 | 27.8 | 29.4 | 30.3 | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 23 | 26 | 27.5 | 28.4 | 28.7 |
| | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 29.6 | 30 | 33.7 | 35.7 | 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 | -- | -- | -- | -- | -- |
| R070 | Dwelling | 22.6 | 24.2 | 26.7 | 28 | 29.6 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 18.1 | 19.5 | 22.1 | 23.6 | 25.5 |
| | 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 | -- | -- | -- | -- | -- |
| R072 | Dwelling | 19.2 | 21 | 23.3 | 24.6 | 26.3 |
| | 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 | -- | -- | -- | -- | -- |
| R073 | Dwelling | 26.4 | 29.6 | 31.2 | 32.1 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 27.3 | 30.7 | 32.2 | 33.1 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 28.7 | 32.1 | 33.7 | 34.5 | 34.8 |
| | 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 | 29.2 | 32.5 | 34.1 | 34.9 | 35.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 27.5 | 30.2 | 32.1 | 33.1 | 33.9 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 29.4 | 32.8 | 34.3 | 35.2 | 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 | -- | -- | -- | -- | -- |

*Table A11.3 Cumulative Predicted Turbine Noise Levels for the East sector (90°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 28.2 | 31.6 | 33.1 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 27.3 | 30.7 | 32.2 | 33.1 | 33.4 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 25.8 | 29 | 30.5 | 31.4 | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 26.6 | 29.9 | 31.4 | 32.3 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 27.2 | 30.5 | 32 | 32.8 | 33.3 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 26.8 | 30 | 31.6 | 32.5 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 27.4 | 30.7 | 32.2 | 33.1 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 28.2 | 31.6 | 33.1 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 23.8 | 27.2 | 28.7 | 29.5 | 29.8 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 23.9 | 27.3 | 28.7 | 29.6 | 30.1 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 24.5 | 28 | 29.4 | 30.3 | 30.5 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 26.7 | 29.9 | 31.4 | 32.3 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 27.9 | 31.2 | 32.7 | 33.6 | 34.1 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 31.9 | 35.4 | 36.9 | 37.7 | 37.9 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 32.5 | 35.9 | 37.5 | 38.3 | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 28.6 | 31.8 | 33.4 | 34.3 | 34.8 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 29.8 | 33.1 | 34.7 | 35.5 | 35.9 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 31.3 | 34.9 | 36.4 | 37.2 | 37.3 |
| | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 29.9 | 33.2 | 34.8 | 35.6 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R020 | Dwelling | 31.2 | 34.6 | 36.1 | 37 | 37.3 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 31.3 | 34.6 | 36.2 | 37 | 37.3 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 31.2 | 34.5 | 36.1 | 37 | 37.3 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 31.8 | 35.2 | 36.8 | 37.6 | 37.9 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 31.2 | 34.7 | 36.2 | 37 | 37.1 |
| | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 27.3 | 30.1 | 31.9 | 32.9 | 33.8 |
| | 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 $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 27.2 | 29.9 | 31.8 | 32.8 | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 28.1 | 30.8 | 32.7 | 33.7 | 34.6 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 28 | 31.3 | 32.9 | 33.8 | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 28.1 | 31.2 | 32.9 | 33.8 | 34.4 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 29.2 | 32.2 | 34.1 | 35 | 35.8 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 30.6 | 33.3 | 35.2 | 36.2 | 36.9 |
| | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 33.1 | 35.5 | 37.7 | 38.7 | 39.6 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 32 | 34 | 36.4 | 37.5 | 38.7 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 33.3 | 35.1 | 37.7 | 38.8 | 40.0 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 31.6 | 33.5 | 36 | 37.1 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 33 | 36.1 | 37.8 | 38.7 | 39.2 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 35.2 | 38 | 40 | 40.9 | 41.5 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 32.4 | 34.4 | 36.9 | 38 | 39.2 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 23.6 | 26.2 | 28.1 | 29.1 | 30.2 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 22.3 | 24.6 | 26.6 | 27.8 | 29.1 |
| | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 22.6 | 24.9 | 27 | 28.1 | 29.5 |
| | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 21.7 | 23.2 | 25.7 | 27.1 | 29.0 |
| | 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 Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 21.3 | 23 | 25.4 | 26.7 | 28.5 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 21.1 | 22.7 | 25.2 | 26.5 | 28.4 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 22.2 | 23.8 | 26.2 | 27.5 | 29.4 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 22.3 | 23.9 | 26.4 | 27.6 | 29.5 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 22.4 | 23.9 | 26.5 | 27.9 | 29.6 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 22.9 | 24.4 | 27 | 28.4 | 30.1 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 20.2 | 21.2 | 24.1 | 25.6 | 27.7 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 20.5 | 21.8 | 24.5 | 26 | 27.9 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 20.5 | 21.8 | 24.5 | 26.1 | 28.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 20.4 | 21.7 | 24.4 | 26 | 27.9 |
| | 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 | 20 | 21 | 23.7 | 25.3 | 27.3 |
| | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 19.8 | 20.9 | 23.7 | 25.2 | 27.3 |
| | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 21.3 | 22.1 | 25.1 | 26.8 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 21.1 | 21.9 | 25 | 26.7 | 28.8 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 21.2 | 21.9 | 25.1 | 26.7 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 24.8 | 25.3 | 28.8 | 30.8 | 32.5 |
| | 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 | 25.3 | 25.9 | 29.3 | 31.2 | 33.0 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 24.9 | 25.5 | 28.9 | 30.9 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 25.2 | 25.8 | 29.2 | 31.2 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 25.5 | 26.1 | 29.5 | 31.4 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 29.4 | 29.7 | 33.4 | 35.3 | 36.9 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 32 | 34 | 36.5 | 37.6 | 38.8 |
| | 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 | 32.9 | 33.1 | 37 | 38.9 | 40.3 |
| | 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 | -- | -- | -- | -- | -- |
| R066 | Dwelling | 24.6 | 27.7 | 29.3 | 30.2 | 30.8 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 26.4 | 29.4 | 30.9 | 31.8 | 32.1 |
| | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 30 | 30.4 | 34.1 | 36.1 | 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 | -- | -- | -- | -- | -- |
| R070 | Dwelling | 25.3 | 26.9 | 29.4 | 30.7 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 20.4 | 21.8 | 24.4 | 25.9 | 27.8 |
| | 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 | 22.2 | 24 | 26.3 | 27.6 | 29.3 |
| | 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 | -- | -- | -- | -- | -- |
| R073 | Dwelling | 29.4 | 32.6 | 34.2 | 35.1 | 35.6 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 28.1 | 31.5 | 33 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 31.9 | 35.3 | 36.9 | 37.7 | 38.0 |
| | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 32.1 | 35.4 | 37 | 37.8 | 38.1 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 30.5 | 33.2 | 35.1 | 36.1 | 36.9 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 29.4 | 32.8 | 34.3 | 35.2 | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the Southeast sector (135°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 28.2 | 31.6 | 33.1 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 27.3 | 30.7 | 32.2 | 33.1 | 33.4 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 25.8 | 29 | 30.5 | 31.4 | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 26.6 | 29.9 | 31.4 | 32.3 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 27.2 | 30.5 | 32 | 32.8 | 33.3 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 26.8 | 30 | 31.6 | 32.5 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 27.4 | 30.7 | 32.2 | 33.1 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 28.2 | 31.6 | 33.1 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 23.8 | 27.2 | 28.7 | 29.5 | 29.8 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 23.9 | 27.3 | 28.7 | 29.6 | 30.1 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 24.5 | 28 | 29.4 | 30.3 | 30.5 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 26.7 | 29.9 | 31.4 | 32.3 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 27.9 | 31.2 | 32.7 | 33.6 | 34.1 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 31.9 | 35.4 | 36.9 | 37.7 | 37.9 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 32.5 | 35.9 | 37.5 | 38.3 | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 28.8 | 32 | 33.6 | 34.5 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 30 | 33.3 | 34.9 | 35.7 | 36.1 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 31.6 | 35.2 | 36.7 | 37.5 | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 30.2 | 33.5 | 35.1 | 35.9 | 36.3 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 31.6 | 35 | 36.5 | 37.4 | 37.7 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 32.1 | 35.4 | 37 | 37.8 | 38.1 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 32.2 | 35.5 | 37.1 | 38 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 32.5 | 35.9 | 37.5 | 38.3 | 38.6 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 31.5 | 35 | 36.5 | 37.3 | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 28.5 | 31.3 | 33.1 | 34.1 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 28.5 | 31.2 | 33.1 | 34.1 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 29.4 | 32.1 | 34 | 35 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 30 | 33.3 | 34.9 | 35.8 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R029 | Dwelling | 29.7 | 32.8 | 34.5 | 35.4 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R030 | Dwelling | 30.5 | 33.5 | 35.4 | 36.3 | 37.1 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 31.9 | 34.6 | 36.5 | 37.5 | 38.2 |
| | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 34 | 36.4 | 38.6 | 39.6 | 40.5 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 33.4 | 35.4 | 37.8 | 38.9 | 40.1 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 34.7 | 36.5 | 39.1 | 40.2 | 41.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 33.1 | 35 | 37.5 | 38.6 | 39.8 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 34.6 | 37.7 | 39.4 | 40.3 | 40.8 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 36.2 | 39 | 41 | 41.9 | 42.5 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 33.9 | 35.9 | 38.4 | 39.5 | 40.7 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 25.7 | 28.3 | 30.2 | 31.2 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 25 | 27.3 | 29.3 | 30.5 | 31.8 |
| | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 25.1 | 27.4 | 29.5 | 30.6 | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 24.4 | 25.9 | 28.4 | 29.8 | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 24.1 | 25.8 | 28.2 | 29.5 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 24 | 25.6 | 28.1 | 29.4 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 25.3 | 26.9 | 29.3 | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 25.4 | 27 | 29.5 | 30.7 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 25.3 | 26.8 | 29.4 | 30.8 | 32.5 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 25.8 | 27.3 | 29.9 | 31.3 | 33.0 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 23.3 | 24.3 | 27.2 | 28.7 | 30.8 |
| | 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 | 23.7 | 25 | 27.7 | 29.2 | 31.1 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 23.9 | 25.2 | 27.9 | 29.5 | 31.4 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 23.8 | 25.1 | 27.8 | 29.4 | 31.3 |
| | 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 | 23.2 | 24.2 | 26.9 | 28.5 | 30.5 |
| | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 22.9 | 24 | 26.8 | 28.3 | 30.4 |
| | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 24.1 | 24.9 | 27.9 | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 23.8 | 24.6 | 27.7 | 29.4 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 24 | 24.7 | 27.9 | 29.5 | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 27.8 | 28.3 | 31.8 | 33.8 | 35.5 |
| | 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 | 28.1 | 28.7 | 32.1 | 34 | 35.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 27.7 | 28.3 | 31.7 | 33.7 | 35.4 |
| | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 28 | 28.6 | 32 | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 28.3 | 28.9 | 32.3 | 34.2 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 32.1 | 32.4 | 36.1 | 38 | 39.6 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 33.4 | 35.4 | 37.9 | 39 | 40.2 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 35.7 | 35.9 | 39.8 | 41.7 | 43.1 |
| | 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 | -- | -- | -- | -- | 0.1 |
| R066 | Dwelling | 24.6 | 27.7 | 29.3 | 30.2 | 30.8 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 27 | 30 | 31.5 | 32.4 | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 32.4 | 32.8 | 36.5 | 38.5 | 40.0 |
| | 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 | -- | -- | -- | -- | -- |
| R070 | Dwelling | 28.1 | 29.7 | 32.2 | 33.5 | 35.1 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 23.6 | 25 | 27.6 | 29.1 | 31.0 |
| | 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 | 24.7 | 26.5 | 28.8 | 30.1 | 31.8 |
| | 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 | 35.4 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 28.1 | 31.5 | 33 | 33.9 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 32.2 | 35.6 | 37.2 | 38 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 32.9 | 36.2 | 37.8 | 38.6 | 38.9 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 31.7 | 34.4 | 36.3 | 37.3 | 38.1 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 29.4 | 32.8 | 34.3 | 35.2 | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the South sector (180°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 26.1 | 29.5 | 31 | 31.8 | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 25.4 | 28.8 | 30.3 | 31.2 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 25.5 | 28.7 | 30.2 | 31.1 | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 26.2 | 29.5 | 31 | 31.9 | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 26.6 | 29.9 | 31.4 | 32.2 | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 26.2 | 29.4 | 31 | 31.9 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 27.1 | 30.4 | 31.9 | 32.8 | 33.2 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 27.6 | 31 | 32.5 | 33.3 | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 23.8 | 27.2 | 28.7 | 29.5 | 29.8 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 23.8 | 27.2 | 28.6 | 29.5 | 30.0 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 24.5 | 28 | 29.4 | 30.3 | 30.5 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 26.7 | 29.9 | 31.4 | 32.3 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 27.8 | 31.1 | 32.6 | 33.5 | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 31.9 | 35.4 | 36.9 | 37.7 | 37.9 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 32.4 | 35.8 | 37.4 | 38.2 | 38.4 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 28.8 | 32 | 33.6 | 34.5 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 30 | 33.3 | 34.9 | 35.7 | 36.1 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 31.6 | 35.2 | 36.7 | 37.5 | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 30.2 | 33.5 | 35.1 | 35.9 | 36.3 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 31.6 | 35 | 36.5 | 37.4 | 37.7 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 32.1 | 35.4 | 37 | 37.8 | 38.1 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 32.2 | 35.5 | 37.1 | 38 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 32.5 | 35.9 | 37.5 | 38.3 | 38.6 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 31.5 | 35 | 36.5 | 37.3 | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 28.5 | 31.3 | 33.1 | 34.1 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 28.6 | 31.3 | 33.2 | 34.2 | 35.1 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 29.5 | 32.2 | 34.1 | 35.1 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R028 | Dwelling | 30 | 33.3 | 34.9 | 35.8 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R029 | Dwelling | 29.8 | 32.9 | 34.6 | 35.5 | 36.1 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 30.7 | 33.7 | 35.6 | 36.5 | 37.3 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 32.2 | 34.9 | 36.8 | 37.8 | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 34.5 | 36.9 | 39.1 | 40.1 | 41.0 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 33.8 | 35.8 | 38.2 | 39.3 | 40.5 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 35.1 | 36.9 | 39.5 | 40.6 | 41.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 33.6 | 35.5 | 38 | 39.1 | 40.3 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 35.1 | 38.2 | 39.9 | 40.8 | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 36.9 | 39.7 | 41.7 | 42.6 | 43.2 |
| | 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 | -- | -- | -- | -- | 0.2 |
| R038 | Dwelling | 34.3 | 36.3 | 38.8 | 39.9 | 41.1 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 26 | 28.6 | 30.5 | 31.5 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 25.4 | 27.7 | 29.7 | 30.9 | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 25.5 | 27.8 | 29.9 | 31 | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 24.7 | 26.2 | 28.7 | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 24.4 | 26.1 | 28.5 | 29.8 | 31.6 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 24.5 | 26.1 | 28.6 | 29.9 | 31.8 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 25.8 | 27.4 | 29.8 | 31.1 | 33.0 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 25.9 | 27.5 | 30 | 31.2 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 25.8 | 27.3 | 29.9 | 31.3 | 33.0 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 26.3 | 27.8 | 30.4 | 31.8 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 24.6 | 25.6 | 28.5 | 30 | 32.1 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 24.9 | 26.2 | 28.9 | 30.4 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 25.1 | 26.4 | 29.1 | 30.7 | 32.6 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 25.1 | 26.4 | 29.1 | 30.7 | 32.6 |
| | 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 | 24.4 | 25.4 | 28.1 | 29.7 | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 24.1 | 25.2 | 28 | 29.5 | 31.6 |
| | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 25.7 | 26.5 | 29.5 | 31.2 | 33.3 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 25.5 | 26.3 | 29.4 | 31.1 | 33.2 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 25.9 | 26.6 | 29.8 | 31.4 | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 29.7 | 30.2 | 33.7 | 35.7 | 37.4 |
| | 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 | 30.2 | 30.8 | 34.2 | 36.1 | 37.9 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 29.8 | 30.4 | 33.8 | 35.8 | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 30.1 | 30.7 | 34.1 | 36.1 | 37.8 |
| | 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 | 30.3 | 30.9 | 34.3 | 36.2 | 37.9 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 34 | 34.3 | 38 | 39.9 | 41.5 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 33.9 | 35.9 | 38.4 | 39.5 | 40.7 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 37.4 | 37.6 | 41.5 | 43.4 | 44.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | 1.5 | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | 0.4 | 1.8 |
| R066 | Dwelling | 24.4 | 27.5 | 29.1 | 30 | 30.6 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 24.4 | 27.6 | 29.2 | 30.1 | 30.7 |
| | 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 $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 27 | 30 | 31.5 | 32.4 | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 34.3 | 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 | 30.2 | 32.7 | 34 | 35.6 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 24.6 | 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 | 24.9 | 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 | 35.4 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 27.8 | 31.2 | 32.7 | 33.6 | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 32.2 | 35.6 | 37.2 | 38 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 32.9 | 36.2 | 37.8 | 38.6 | 38.9 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 32 | 34.7 | 36.6 | 37.6 | 38.4 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 27.1 | 30.5 | 32 | 32.9 | 33.2 |
| | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the Southwest sector (225°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 22.8 | 26.2 | 27.7 | 28.5 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 22.1 | 25.5 | 27 | 27.9 | 28.2 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 22 | 25.2 | 26.7 | 27.6 | 28.2 |
| | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 22.8 | 26.1 | 27.6 | 28.5 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 22.9 | 26.2 | 27.7 | 28.5 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 22.4 | 25.6 | 27.2 | 28.1 | 28.5 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 23.9 | 27.2 | 28.7 | 29.6 | 30.0 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 24.3 | 27.7 | 29.2 | 30 | 30.4 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 20.5 | 23.9 | 25.4 | 26.2 | 26.5 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 20.9 | 24.3 | 25.7 | 26.6 | 27.1 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 21.2 | 24.7 | 26.1 | 27 | 27.2 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 23.8 | 27 | 28.5 | 29.4 | 30.0 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 25.1 | 28.4 | 29.9 | 30.8 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 29.9 | 33.4 | 34.9 | 35.7 | 35.9 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 30.6 | 34 | 35.6 | 36.4 | 36.6 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 27.1 | 30.3 | 31.9 | 32.8 | 33.3 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 28.3 | 31.6 | 33.2 | 34 | 34.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 30.1 | 33.7 | 35.2 | 36 | 36.1 |
| | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 28.8 | 32.1 | 33.7 | 34.5 | 34.9 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 30.5 | 33.9 | 35.4 | 36.3 | 36.6 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 31.5 | 34.8 | 36.4 | 37.2 | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 31.6 | 34.9 | 36.5 | 37.4 | 37.7 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 31.9 | 35.3 | 36.9 | 37.7 | 38.0 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 30.1 | 33.6 | 35.1 | 35.9 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R025 | Dwelling | 28 | 30.8 | 32.6 | 33.6 | 34.5 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 28.2 | 30.9 | 32.8 | 33.8 | 34.7 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 29.1 | 31.8 | 33.7 | 34.7 | 35.6 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 29.7 | 33 | 34.6 | 35.5 | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 29.4 | 32.5 | 34.2 | 35.1 | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 30.3 | 33.3 | 35.2 | 36.1 | 36.9 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 31.8 | 34.5 | 36.4 | 37.4 | 38.1 |
| | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 34.1 | 36.5 | 38.7 | 39.7 | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 33.4 | 35.4 | 37.8 | 38.9 | 40.1 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 34.7 | 36.5 | 39.1 | 40.2 | 41.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 33.2 | 35.1 | 37.6 | 38.7 | 39.9 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 34.5 | 37.6 | 39.3 | 40.2 | 40.7 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 36.1 | 38.9 | 40.9 | 41.8 | 42.4 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 33.9 | 35.9 | 38.4 | 39.5 | 40.7 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 26 | 28.6 | 30.5 | 31.5 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 25.4 | 27.7 | 29.7 | 30.9 | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 25.5 | 27.8 | 29.9 | 31 | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 24.7 | 26.2 | 28.7 | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 24.4 | 26.1 | 28.5 | 29.8 | 31.6 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 24.5 | 26.1 | 28.6 | 29.9 | 31.8 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 25.8 | 27.4 | 29.8 | 31.1 | 33.0 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 25.9 | 27.5 | 30 | 31.2 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 25.8 | 27.3 | 29.9 | 31.3 | 33.0 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 26.3 | 27.8 | 30.4 | 31.8 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 24.6 | 25.6 | 28.5 | 30 | 32.1 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 24.9 | 26.2 | 28.9 | 30.4 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 25.2 | 26.5 | 29.2 | 30.8 | 32.7 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 25.1 | 26.4 | 29.1 | 30.7 | 32.6 |
| | 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 | 24.4 | 25.4 | 28.1 | 29.7 | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 24.1 | 25.2 | 28 | 29.5 | 31.6 |
| | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 25.9 | 26.7 | 29.7 | 31.4 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 25.8 | 26.6 | 29.7 | 31.4 | 33.5 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 26.2 | 26.9 | 30.1 | 31.7 | 33.9 |
| | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 30 | 30.5 | 34 | 36 | 37.7 |
| | 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 | 30.7 | 31.3 | 34.7 | 36.6 | 38.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 30.3 | 30.9 | 34.3 | 36.3 | 38.0 |
| | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 30.6 | 31.2 | 34.6 | 36.6 | 38.3 |
| | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 30.8 | 31.4 | 34.8 | 36.7 | 38.4 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 34.5 | 34.8 | 38.5 | 40.4 | 42.0 |
| | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 33.5 | 35.5 | 38 | 39.1 | 40.3 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 38 | 38.2 | 42.1 | 44 | 45.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | 2.1 | -- | 0.4 |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | 1 | 2.4 |
| R066 | Dwelling | 20.8 | 23.9 | 25.5 | 26.4 | 27.0 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 20.4 | 23.6 | 25.2 | 26.1 | 26.7 |
| | 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 $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 26.5 | 29.5 | 31 | 31.9 | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 35.4 | 35.8 | 39.5 | 41.5 | 43.0 |
| | 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 | -- | -- | -- | -- | -- |
| R070 | Dwelling | 28.6 | 30.2 | 32.7 | 34 | 35.6 |
| | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 24.6 | 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 | 24.9 | 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 | 28.8 | 32 | 33.6 | 34.5 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 24.6 | 28 | 29.5 | 30.4 | 30.8 |
| | 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 | 31.5 | 34.9 | 36.5 | 37.3 | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 32.3 | 35.6 | 37.2 | 38 | 38.3 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 31.6 | 34.3 | 36.2 | 37.2 | 38.0 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 23.8 | 27.2 | 28.7 | 29.6 | 29.9 |
| | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the West sector (270°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 21 | 24.4 | 25.9 | 26.7 | 27.1 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 20.1 | 23.5 | 25 | 25.9 | 26.2 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 19.5 | 22.7 | 24.2 | 25.1 | 25.7 |
| | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 20.3 | 23.6 | 25.1 | 26 | 26.5 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 20.8 | 24.1 | 25.6 | 26.4 | 26.9 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 20.4 | 23.6 | 25.2 | 26.1 | 26.5 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 21.3 | 24.6 | 26.1 | 27 | 27.4 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 21.9 | 25.3 | 26.8 | 27.6 | 28.0 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 17.9 | 21.3 | 22.8 | 23.6 | 23.9 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 18 | 21.4 | 22.8 | 23.7 | 24.2 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 18.6 | 22.1 | 23.5 | 24.4 | 24.6 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 21 | 24.2 | 25.7 | 26.6 | 27.2 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 22.2 | 25.5 | 27 | 27.9 | 28.4 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 26.3 | 29.8 | 31.3 | 32.1 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 26.9 | 30.3 | 31.9 | 32.7 | 32.9 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 23.7 | 26.9 | 28.5 | 29.4 | 29.9 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 25.1 | 28.4 | 30 | 30.8 | 31.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 26.8 | 30.4 | 31.9 | 32.7 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 25.8 | 29.1 | 30.7 | 31.5 | 31.9 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 27.3 | 30.7 | 32.2 | 33.1 | 33.4 |
| | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 28.7 | 32 | 33.6 | 34.4 | 34.7 |
| | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 29.1 | 32.4 | 34 | 34.9 | 35.2 |
| | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 28.8 | 32.2 | 33.8 | 34.6 | 34.9 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 26.9 | 30.4 | 31.9 | 32.7 | 32.8 |
| | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 25.7 | 28.5 | 30.3 | 31.3 | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 26.1 | 28.8 | 30.7 | 31.7 | 32.6 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 27.1 | 29.8 | 31.7 | 32.7 | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 28.3 | 31.6 | 33.2 | 34.1 | 34.3 |
| | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 27.8 | 30.9 | 32.6 | 33.5 | 34.1 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 28.4 | 31.4 | 33.3 | 34.2 | 35.0 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 30.1 | 32.8 | 34.7 | 35.7 | 36.4 |
| | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 32 | 34.4 | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 31.9 | 33.9 | 36.3 | 37.4 | 38.6 |
| | 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 | -- | -- | -- | -- | -- |
| R034 | Dwelling | 33.1 | 34.9 | 37.5 | 38.6 | 39.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 31.7 | 33.6 | 36.1 | 37.2 | 38.4 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 33.3 | 36.4 | 38.1 | 39 | 39.5 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 34.8 | 37.6 | 39.6 | 40.5 | 41.1 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 32.3 | 34.3 | 36.8 | 37.9 | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 24.6 | 27.2 | 29.1 | 30.1 | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 24.4 | 26.7 | 28.7 | 29.9 | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 24.3 | 26.6 | 28.7 | 29.8 | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 23.4 | 24.9 | 27.4 | 28.8 | 30.7 |
| | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 23.4 | 25.1 | 27.5 | 28.8 | 30.6 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 23.6 | 25.2 | 27.7 | 29 | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 25.1 | 26.7 | 29.1 | 30.4 | 32.3 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 25.2 | 26.8 | 29.3 | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 25 | 26.5 | 29.1 | 30.5 | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 25.5 | 27 | 29.6 | 31 | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 24.3 | 25.3 | 28.2 | 29.7 | 31.8 |
| | 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 | 24.6 | 25.9 | 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 | -- | -- | -- | -- | -- |
| R051 | Derelict | 24.9 | 26.2 | 28.9 | 30.5 | 32.4 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 24.8 | 26.1 | 28.8 | 30.4 | 32.3 |
| | 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 | 25 | 27.7 | 29.3 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R054 | Dwelling | 23.7 | 24.8 | 27.6 | 29.1 | 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 | -- | -- | -- | -- | -- |
| R055 | Dwelling | 25.5 | 26.3 | 29.3 | 31 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 25.4 | 26.2 | 29.3 | 31 | 33.1 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 25.9 | 26.6 | 29.8 | 31.4 | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 29.8 | 30.3 | 33.8 | 35.8 | 37.5 |
| | 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 | 30.5 | 31.1 | 34.5 | 36.4 | 38.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 30.1 | 30.7 | 34.1 | 36.1 | 37.8 |
| | 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 | 30.4 | 31 | 34.4 | 36.4 | 38.1 |
| | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 30.6 | 31.2 | 34.6 | 36.5 | 38.2 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 34.3 | 34.6 | 38.3 | 40.2 | 41.8 |
| | 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 | 31.9 | 33.9 | 36.4 | 37.5 | 38.7 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 37.8 | 38 | 41.9 | 43.8 | 45.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | 1.9 | -- | 0.2 |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | 0.8 | 2.2 |
| R066 | Dwelling | 18.4 | 21.5 | 23.1 | 24 | 24.6 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 18.5 | 21.7 | 23.3 | 24.2 | 24.8 |
| | 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 $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 23.1 | 26.1 | 27.6 | 28.5 | 28.8 |
| | 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 | 35.2 | 35.6 | 39.3 | 41.3 | 42.8 |
| | 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 | 27.7 | 29.3 | 31.8 | 33.1 | 34.7 |
| | 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 | 24.1 | 25.5 | 28.1 | 29.6 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R072 | Dwelling | 23.6 | 25.4 | 27.7 | 29 | 30.7 |
| | 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 | -- | -- | -- | -- | -- |
| R073 | Dwelling | 25.3 | 28.5 | 30.1 | 31 | 31.5 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 22 | 25.4 | 26.9 | 27.8 | 28.2 |
| | 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 | 27.9 | 31.3 | 32.9 | 33.7 | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 29.4 | 32.7 | 34.3 | 35.1 | 35.4 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 29.8 | 32.5 | 34.4 | 35.4 | 36.2 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 22.3 | 25.7 | 27.2 | 28.1 | 28.4 |
| | 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 | -- | -- | -- | -- | -- |

*Table A11.1 Cumulative Predicted Turbine Noise Levels for the Northwest (315°)*

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R001 | Dwelling | 22.9 | 26.3 | 27.8 | 28.6 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R002 | Dwelling | 21.9 | 25.3 | 26.8 | 27.7 | 28.0 |
| | 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 | -- | -- | -- | -- | -- |
| R003 | Dwelling | 19.4 | 22.6 | 24.1 | 25 | 25.6 |
| | 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 | -- | -- | -- | -- | -- |
| R004 | Dwelling | 20.2 | 23.5 | 25 | 25.9 | 26.4 |
| | 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 | -- | -- | -- | -- | -- |
| R005 | Dwelling | 20.9 | 24.2 | 25.7 | 26.5 | 27.0 |
| | 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 | -- | -- | -- | -- | -- |
| R006 | Dwelling | 20.6 | 23.8 | 25.4 | 26.3 | 26.7 |
| | 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 | -- | -- | -- | -- | -- |
| R007 | Dwelling | 20.9 | 24.2 | 25.7 | 26.6 | 27.0 |
| | 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 | -- | -- | -- | -- | -- |
| R008 | Dwelling | 21.9 | 25.3 | 26.8 | 27.6 | 28.0 |
| | 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 | -- | -- | -- | -- | -- |
| R009 | Dwelling | 17.1 | 20.5 | 22 | 22.8 | 23.1 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | -- | -- | -- | -- | -- |
| R010 | Dwelling | 17.1 | 20.5 | 21.9 | 22.8 | 23.3 |
| | 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 | -- | -- | -- | -- | -- |
| R011 | Dwelling | 17.8 | 21.3 | 22.7 | 23.6 | 23.8 |
| | 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 | -- | -- | -- | -- | -- |
| R012 | Dwelling | 19.8 | 23 | 24.5 | 25.4 | 26.0 |
| | 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 | -- | -- | -- | -- | -- |
| R013 | Dwelling | 21 | 24.3 | 25.8 | 26.7 | 27.2 |
| | 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 | -- | -- | -- | -- | -- |
| R014 | Dwelling | 25.3 | 28.8 | 30.3 | 31.1 | 31.3 |
| | 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 | -- | -- | -- | -- | -- |
| R015 | Dwelling | 25.8 | 29.2 | 30.8 | 31.6 | 31.8 |
| | 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 | -- | -- | -- | -- | -- |
| R016 | Dwelling | 21.9 | 25.1 | 26.7 | 27.6 | 28.1 |
| | 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 | -- | -- | -- | -- | -- |
| R017 | Dwelling | 23.2 | 26.5 | 28.1 | 28.9 | 29.3 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R018 | Dwelling | 24.8 | 28.4 | 29.9 | 30.7 | 30.8 |
| | 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 | -- | -- | -- | -- | -- |
| R019 | Dwelling | 23.6 | 26.9 | 28.5 | 29.3 | 29.7 |
| | 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 | -- | -- | -- | -- | -- |
| R020 | Dwelling | 25.1 | 28.5 | 30 | 30.9 | 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 | -- | -- | -- | -- | -- |
| R021 | Dwelling | 26 | 29.3 | 30.9 | 31.7 | 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 | -- | -- | -- | -- | -- |
| R022 | Dwelling | 26.3 | 29.6 | 31.2 | 32.1 | 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 | -- | -- | -- | -- | -- |
| R023 | Dwelling | 26.4 | 29.8 | 31.4 | 32.2 | 32.5 |
| | 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 | -- | -- | -- | -- | -- |
| R024 | Dwelling | 24.7 | 28.2 | 29.7 | 30.5 | 30.6 |
| | 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 | -- | -- | -- | -- | -- |
| R025 | Dwelling | 22.6 | 25.4 | 27.2 | 28.2 | 29.1 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R026 | Dwelling | 22.7 | 25.4 | 27.3 | 28.3 | 29.2 |
| | 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 | -- | -- | -- | -- | -- |
| R027 | Dwelling | 23.8 | 26.5 | 28.4 | 29.4 | 30.3 |
| | 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 | -- | -- | -- | -- | -- |
| R028 | Dwelling | 24.7 | 28 | 29.6 | 30.5 | 30.7 |
| | 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 | -- | -- | -- | -- | -- |
| R029 | Dwelling | 24.4 | 27.5 | 29.2 | 30.1 | 30.7 |
| | 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 | -- | -- | -- | -- | -- |
| R030 | Dwelling | 25.4 | 28.4 | 30.3 | 31.2 | 32.0 |
| | 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 | -- | -- | -- | -- | -- |
| R031 | Dwelling | 27.3 | 30 | 31.9 | 32.9 | 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 | -- | -- | -- | -- | -- |
| R032 | Dwelling | 30.1 | 32.5 | 34.7 | 35.7 | 36.6 |
| | 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 | -- | -- | -- | -- | -- |
| R033 | Derelict | 29.3 | 31.3 | 33.7 | 34.8 | 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 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R034 | Dwelling | 30.5 | 32.3 | 34.9 | 36 | 37.2 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R035 | Dwelling | 29.3 | 31.2 | 33.7 | 34.8 | 36.0 |
| | 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 | -- | -- | -- | -- | -- |
| R036 | Dwelling | 30.5 | 33.6 | 35.3 | 36.2 | 36.7 |
| | 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 | -- | -- | -- | -- | -- |
| R037 | Dwelling | 32.8 | 35.6 | 37.6 | 38.5 | 39.1 |
| | 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 | -- | -- | -- | -- | -- |
| R038 | Dwelling | 29.7 | 31.7 | 34.2 | 35.3 | 36.5 |
| | 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 | -- | -- | -- | -- | -- |
| R039 | Dwelling | 21.6 | 24.2 | 26.1 | 27.1 | 28.2 |
| | 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 | -- | -- | -- | -- | -- |
| R040 | Dwelling | 21.2 | 23.5 | 25.5 | 26.7 | 28.0 |
| | 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 | -- | -- | -- | -- | -- |
| R041 | Dwelling | 21.1 | 23.4 | 25.5 | 26.6 | 28.0 |
| | 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 | -- | -- | -- | -- | -- |
| R042 | Dwelling | 20.1 | 21.6 | 24.1 | 25.5 | 27.4 |
| | 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 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R043 | Dwelling | 20.1 | 21.8 | 24.2 | 25.5 | 27.3 |
| | 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 | -- | -- | -- | -- | -- |
| R044 | Dwelling | 20.3 | 21.9 | 24.4 | 25.7 | 27.6 |
| | 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 | -- | -- | -- | -- | -- |
| R045 | Dwelling | 21.8 | 23.4 | 25.8 | 27.1 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R046 | Derelict | 22 | 23.6 | 26.1 | 27.3 | 29.2 |
| | 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 | -- | -- | -- | -- | -- |
| R047 | Dwelling | 21.8 | 23.3 | 25.9 | 27.3 | 29.0 |
| | 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 | -- | -- | -- | -- | -- |
| R048 | Derelict | 22.4 | 23.9 | 26.5 | 27.9 | 29.6 |
| | 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 | -- | -- | -- | -- | -- |
| R049 | Dwelling | 21.9 | 22.9 | 25.8 | 27.3 | 29.4 |
| | 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 | -- | -- | -- | -- | -- |
| R050 | Dwelling | 22 | 23.3 | 26 | 27.5 | 29.4 |
| | 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 | 22.5 | 23.8 | 26.5 | 28.1 | 30.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | 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 | 22.4 | 23.7 | 26.4 | 28 | 29.9 |
| | 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 | 21.5 | 22.5 | 25.2 | 26.8 | 28.8 |
| | 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 | 21.3 | 22.4 | 25.2 | 26.7 | 28.8 |
| | 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 | 23.8 | 24.6 | 27.6 | 29.3 | 31.4 |
| | 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 | -- | -- | -- | -- | -- |
| R056 | Derelict | 23.9 | 24.7 | 27.8 | 29.5 | 31.6 |
| | 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 | -- | -- | -- | -- | -- |
| R057 | Dwelling | 24.5 | 25.2 | 28.4 | 30 | 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 | -- | -- | -- | -- | -- |
| R058 | Dwelling | 28.4 | 28.9 | 32.4 | 34.4 | 36.1 |
| | 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 | 29.3 | 29.9 | 33.3 | 35.2 | 37.0 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised 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 | -- | -- | -- | -- | -- |
| R060 | Derelict | 29 | 29.6 | 33 | 35 | 36.7 |
| | 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 | -- | -- | -- | -- | -- |
| R061 | Dwelling | 29.2 | 29.8 | 33.2 | 35.2 | 36.9 |
| | 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 | -- | -- | -- | -- | -- |
| R062 | Derelict | 29.4 | 30 | 33.4 | 35.3 | 37.0 |
| | 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 | -- | -- | -- | -- | -- |
| R063 | Derelict | 33.1 | 33.4 | 37.1 | 39 | 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 | -- | -- | -- | -- | -- |
| R064 | Dwelling | 29.3 | 31.3 | 33.8 | 34.9 | 36.1 |
| | 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 | -- | -- | -- | -- | -- |
| R065 | Dwelling | 36.4 | 36.6 | 40.5 | 42.4 | 43.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |
| | Daytime Excess | -- | -- | 0.5 | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | 0.8 |
| R066 | Dwelling | 18.2 | 21.3 | 22.9 | 23.8 | 24.4 |
| | 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 | -- | -- | -- | -- | -- |
| R067 | Dwelling | 18.6 | 21.8 | 23.4 | 24.3 | 24.9 |
| | 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 | -- | -- | -- | -- | -- |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| R068 | Derelict | 20.7 | 23.7 | 25.2 | 26.1 | 26.4 |
| | 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 | -- | -- | -- | -- | -- |
| R069 | Dwelling | 34.3 | 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 | 24.7 | 26.3 | 28.8 | 30.1 | 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 | -- | -- | -- | -- | -- |
| R071 | Derelict | 21.5 | 22.9 | 25.5 | 27 | 28.9 |
| | 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 | -- | -- | -- | -- | -- |
| R072 | Dwelling | 20.3 | 22.1 | 24.4 | 25.7 | 27.4 |
| | 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 | -- | -- | -- | -- | -- |
| R073 | Dwelling | 23.2 | 26.4 | 28 | 28.9 | 29.4 |
| | 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 | -- | -- | -- | -- | -- |
| R074 | Dwelling | 21.5 | 24.9 | 26.4 | 27.3 | 27.7 |
| | 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 | -- | -- | -- | -- | -- |
| R075 | Dwelling | 25.9 | 29.3 | 30.9 | 31.7 | 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 | -- | -- | -- | -- | -- |
| R076 | Dwelling | 26.8 | 30.1 | 31.7 | 32.5 | 32.8 |
| | Daytime Criterion | 40.0 | 40.0 | 40.0 | 45.0 | 45.0 |

| House ID | Description | dB $L_{A90,10min}$ at Various Standarised Wind Speeds (m/s) | | | | |
|---|---|---|---|---|---|---|
| | | 4 | 5 | 6 | 7 | ≥8 |
| | Daytime Excess | -- | -- | -- | -- | -- |
| | Night time Criterion | 43.0 | 43.0 | 43.0 | 43.0 | 43.0 |
| | Night time Excess | -- | -- | -- | -- | -- |
| R077 | Derelict | 27 | 29.7 | 31.6 | 32.6 | 33.4 |
| | 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 | -- | -- | -- | -- | -- |
| R078 | Derelict | 24.2 | 27.6 | 29.1 | 30 | 30.3 |
| | 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 | -- | -- | -- | -- | -- |

# APPENDIX 12-1

## *LANDSCAPE AND VISUAL IMPACT ASSESSMENT METHODOLOGY*

# 1. LVIA METHODOLOGY

## 1.1 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 primary study area for the proposed development, as delineated in green on the EIAR figures (maps).

However, the landscape and visual baseline mapping and viewpoint selection are based on wider study areas. The landscape study area has been chosen as 20 kilometres for visual and landscape effects and 15 kilometres from the proposed wind turbines for effects on landscape character. 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;
- Visual effects during the construction phase and cumulative landscape and visual effects during the construction phase;
- All potential effects occurring during decommissioning of the Proposed Development.
- Areas in County Cavan due to distance from the proposed development and the lack of significant visual or landscape receptors falling into the small area of the county falling within the study area

## 1.2 Zone of Theoretical Visibility Mapping

The Zone of Theoretical Visibility (ZTV) represents the area over which a development can theoretically be seen and is based on a Digital Terrain Model (DTM), overlaid on a map base. A DTM refers to the way in which a computer represents a piece of topography in three dimensions as a digital model. ZTV maps provide the following information:

- Indicates broad areas where visibility of a wind energy development is most likely to occur;
- How much of the wind energy development is likely to be visible (using different coloured bands for different numbers of turbines);
- The extent and pattern of visibility.

Production of ZTV maps is usually one of the first steps of Visual Impact Assessment, helping to inform the selection of the Study Area in which impacts will be considered in more detail and the identification of sensitive vantage points. (Visual Representation of Wind Farms, Scottish Natural Heritage, 2017).

### 1.2.1 Limitations of ZTV Mapping

The Scottish Natural Heritage guidelines referred to above acknowledge the following limitations inherent to the use of theoretical visibility mapping:

- The ZTV presents a 'bare ground' scenario, i.e. visibility of the proposed development in a landscape without screening structures or vegetation. This includes trees, hedgerows, buildings and small-scale landform or ground surface features. The ZTV also does not take into account the effects of weather and atmospheric conditions, and therefore can be said to represent a 'worst-case' scenario, that is where the wind farm could potentially be seen given no intervening obstructions and favourable weather conditions.
- The ZTV indicates areas from where a wind farm may be visible, but cannot show how it will look, nor indicate the nature or magnitude of visual impacts. The visibility of the turbines will decrease with the distance from which they are viewed, but this is not accounted for in the ZTV. Figure 11.1 below provides an illustration of the differences in view relative to the distance from a turbine.


*Figure 1-1 The effect of distance on visibility of wind turbines (Illustrative Purposes Only)*

- A ZTV is only as accurate as the data on which it is based. It is not easy to test the accuracy of a ZTV in the field, although some verification will occur during the assessment of viewpoints.
- In order to handle large areas of terrain, the DTM data is based on information that does not allow detail to be distinguished below a certain level. There are also differences in the way that the software package 'interpolates' between heights in the calculations made.

### 1.2.2 ZTV Methodology

The ZTV maps presented in the EIAR show visibility of the proposed wind farm using the half blade height of the wind turbines as points of reference. Separate colour bands are used on each ZTV map to indicate the number of turbines which will potentially be visible to half blade i.e. only half a blade might be visible over the topography as opposed to seeing a full turbine. The legend on each map shows the number of visible turbines for each corresponding colour. Hub Height ZTS, are also conventionally used, including only areas where the turbines will be seen above hub height. However, as the half-blade ZTV represents a worst-case scenario this model is used in the assessment rather than the hub height ZTV.

The maps also show the visibility of the proposed wind farm in addition to visibility of other existing and permitted wind farms in the area. The area covered by the ZTV maps has a radius of 20 kilometres from the outer-most proposed turbines. As this ZTV area includes a considerable proportion of sea, the ZTV maps show only the visibility on land.

ZTV maps assume a worst-case or 'bare ground' scenario, i.e. no land-cover. They represent visibility of the proposed wind farm in the absence of all natural and manmade features from the landscape, including vegetation, houses and other buildings. In reality, such features will restrict or limit visibility of the wind turbines, due to the screening effects of vegetation, for example forestry and road-side hedgerows and trees, and buildings, particularly within towns and villages.

### 1.2.3 Route Screening Methodology - Roads

In order to comprehensively demonstrate the varying roadside screening and to record the actual visibility in comparison to the theoretical visibility, a methodology was developed. This is termed Route Screening Analysis and it was undertaken from all roads within a five-kilometre radius of the proposed turbines that have theoretical visibility indicated by the ZTV map. Roads beyond five kilometres from the turbines were not surveyed, as with increasing distance any screening by individual landscape elements such as trees or buildings decreases in significance.

Route Screening Analysis as its name suggests considers the actual visibility of the proposed wind farm from surrounding roads. Within 5km of the proposed development, the area generally comprises upland forested areas, agricultural land, a network of trees and hedgerows, and settlements. In order to get a clearer understanding of visibility and screening, and to bridge the gap for the assessor between the computer-generated ZTV maps and the actual nature of visibility in the study area, Route Screening Analysis was undertaken.

Within a five-kilometre radius of the proposed development site boundary, each route with theoretical visibility was driven, with notes taken on screening, views, and the direction of the views to the proposed development.

In preparation for the route screening assessment, the ZTV maps were overlaid with aerial imagery and printed at a large scale. Each route was driven once in each direction as a minimum. The route was driven slowly along the route and mapping and notes of each section of roadway on a high-resolution aerial image was carried out. Screening between the wind farm site and the relevant side of the road was marked. In cases where the road travels directly in the direction of the proposed wind farm, screening on both sides of the road was included and the most representative of the two roadsides were mapped.

In addition, photographs were taken at regular intervals of approximately 500 metres along the routes to allow later confirmation of mapping, and to methodically record the views along the route. A photograph of the view along the road was taken in each direction, as well as the view to either side of the road. Following the site visit, a map was created of each route. The screening along the route was mapped as one of three categories:

The categories were as follows:

- Little/no screening – mainly open and with some very light vegetation
- Intermittent/Partial Screening – light deciduous roadside vegetation and vegetation with short gaps which would allow intermittent or partial views
- Dense Screening – vegetation which is dense enough to block views (e.g. coniferous forestry)

## 1.3 Viewpoint Photomontages

### 1.3.1 Viewpoint Identification

The viewpoints or photo locations were selected following guidance contained in the DoEHLG *'Wind Energy Development Guidelines for Planning Authorities'* (2006), the *'Guidelines for Landscape and*

*Visual Impact Assessment'* (2013) and in the *'Visual Representation of Wind Farms'* (Scottish Natural Heritage, 2017). The selection of photo locations is designed to give a representative range of views of the proposed development.

Viewpoints, the photo locations from which the photomontages are produced, were chosen after compiling the Visual Baseline. 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 in order of priority:

- Designated Scenic Routes and Scenic Views
- Settlements
- 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 under the sections identified above along with theoretical visibility at those locations indicated by the ZTV maps.

After all key visual receptors are identified, a Visual Receptor Preliminary Assessment is carried out to eliminate the visual receptors for the following reasons:

- No or very limited theoretical visibility indicated on the ZTV map for the visual receptor
- Designated views and scenic routes as well as OSi Viewing Points that are nor directed towards the proposed development
- Visual receptors visited on site, where views towards the turbines were either entirely screened or substantially screened and distance from the proposed development site would mitigate any visual effects

Establishing visibility on the ground was assisted by the TrueViewVisuals software, which is an iPad-based tool to help visualisation of a project live on the ground before it is built.

All other key visual receptors were selected as viewpoint locations. In addition, viewpoints were selected in close proximity to the proposed turbines, where turbines are likely to be most visible and hence visual effects may be greatest.

Viewpoints were chosen having regard to the SNH Guidance (2017) which advises that a range of views should be shown at a range of distances and aspects, as well as at varying elevations and showing both where the development will be completely visible as well as partially visible. Consideration was also given to ensure that photomontages captured other wind farms in order to assess cumulative visual effects.

### 1.3.2 Photomontages

Photomontages are visualisations that superimpose an image of a proposed development upon a photograph or series of photographs. They are intended as graphical representations of how a proposed development will appear in the existing landscape and are used as a tool in the LVIA process. A series of photomontages has been prepared as part of this assessment and are presented in a separate Volume 2 Photomontage Booklet to be submitted to along with this EIAR.

### 1.3.2.1 Photomontage Limitations

Photographs, and therefore photomontages, are subject to a range of limitations, as stated in *'Visual Assessment of Wind Farms'* (Scottish Natural Heritage, 2014):

- Visualisations provide a tool for assessment that can be compared with an actual view in the field; they should never be considered as a substitute to visiting a viewpoint in the field.
- Neither photographs nor visualisations can replicate a view as seen in reality by the human eye.
- Visualisations are only as accurate as the data used to construct them.
- Visualisations can only represent the view from a single location at a particular time and in particular weather conditions.
- Static visualisations cannot convey the effect of turbine blade movement.

Although the scale, siting and geometry of photomontages are based on technical data, the other qualities of the image are open to judgments. The guidance also notes that interpretation of visualisations also needs to take into account additional information including variable lighting, movement of turbine blades, seasonal differences and the movement of the viewer through the landscape. However, accepting these limitations, the SNH guidelines state that photomontages are useful tools in the Visual Impact Assessment of wind turbines.

Furthermore, with regard to the representation of cumulative visual effects, existing and permitted turbines are also shown in the photomontages. The representation of existing turbines relies on photographs taken on site, while permitted and proposed turbines are images of turbines superimposed into the image. As such there can be a discrepancy in the lighting and sharpness between these two different representations.

Photomontages are 2D representations of 3D views and thus cannot convey the perspective and depth pf view of seeing the actual objects with the naked eye. One of the areas that this limitation affects cumulative visual effects is where proposed turbines are proposed to be located in front or behind existing or permitted turbines. In the field this physical separation may be obvious, while on the photomontage the turbines may appear as one wind farm.

### 1.3.2.2 Photomontage Presentations

The viewpoints presented in the accompanying Photomontage Booklet show several views from each viewpoint location. These include:

1. **Overview Sheet** – Viewpoint details include location description, grid reference distance from nearest turbine and technical data in relation to photography. Three maps at varies scales show the viewpoint location. A 120 -degree existing view image without any proposed and permitted turbine. Existing turbines visible in the landscape may appear within the image and the horizontal extent of the 90-degree and 53.5-degree image to be presented in subsequent images is also framed.
2. **Visual Baseline** - 90-degree existing view image without any proposed or permitted turbines and a matching wireframe image of the same view which includes any existing turbines visible in the landscape. If turbines are already existing in the landscape, these are visible on the photograph and are rendered in the wireframe.
3. **Proposed View (90 degrees)** – Showing a 90-degree photomontage image with the proposed wind farm and all other existing and permitted wind farms within the viewpoint. A matching wireframe image shows the turbines of all proposed, permitted and existing wind farms individually coloured and labelled for ease of identification.

4. **Proposed View (53.5 degrees)** – Showing a photomontage image of the proposed turbines and any existing and permitted turbines in a 53.5-degree horizontal field of view.
5. **Proposed Wireframe (53.5 degrees)** - Showing a wireframe image of the proposed turbines and any existing and permitted turbines in a 53.5-degree horizontal field of view. The proposed turbines and any other existing wind farms are individually coloured and labelled for ease of identification.

The viewpoint images contained in the booklet are devised to be viewed at arms length.

# 1.4 Landscape and Visual Impact Assessment Methodology

## 1.4.1 Identification of Landscape Receptors

The landscape receptors were selected following guidance contained the *'Guidelines for Landscape and Visual Impact Assessment'* (2013) and in the *'Visual Representation of Wind Farms'* (Scottish Natural Heritage, 2017).

The following landscape receptors are identified in the landscape baseline:

- **Landscape Designations** based on:
  - County Leitrim
  - County Sligo
  - County Roscommon
- **Landscape Character of the Proposed Development Site** and its immediate environment based on:
  - Landscape Type identified using DoEHLG Guidelines 2006
  - 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)

After all landscape receptors are identified, a Landscape Receptor Preliminary Assessment is carried out to eliminate the landscape receptors, where no or very limited theoretical visibility has been indicated on the ZTV map.

All other landscape receptors were selected for further assessment of landscape effects.

## 1.4.2 Assessing Landscape Effects

The methodology uses qualitative methods in order to arrive at an assessment, which is based on the Landscape and Landscape Assessment (2000) Guidelines as well as the GLVIA (2013), and the DoEHLG (2006) Guidelines were also taken into account.

Landscape effects can be described as changes which affect the landscape as a resource. This includes how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects and its landscape character. Landscape effects also relate to changes in the structure of the landscape. Under the GLVIA (2013), the assessment of likely significant effects on landscape receptors includes a judgement on both the sensitivity of the receptor as well as magnitude of the change.

### 1.4.2.1 Assessing Landscape Sensitivity

Landscape Sensitivity, which is described in the GLVIA (2013) as a combination of the landscape's susceptibility to change as well as the value attached to the landscape

Susceptibility to change can be described as the ability of the landscape receptor (either the overall character, quality of the landscape or a particular landscape feature) to accommodate the proposed development without undue consequences for the maintenance of the baseline (existing) landscape and/or the aims of landscape planning policies and strategies. Landscape value is a combination of values which are assessed in the landscape baseline, combining any formal landscape designations.

For the purposes of this LVIA and the assessment of landscape sensitivity, the following landscape sensitivity ratings assigned to the landscape character areas were assessed/chosen/identified based on the *Landscape Character Assessment of County Roscommon*, *Landscape Assessment of County Leitrim* and the provisional landscape character assessment carried out by MKO for the Sligo landscape falling within the study area:

- Very High
- High
- Moderate
- Low

### 1.4.2.2 Assessing Magnitude of Change in the Landscape

The magnitude of change in each landscape character area is a combination of the visual presence - size and scale - of the change, the extent of the area to be affected, and the duration and reversibility of the effect. The magnitude of change for each landscape character area was assessed using the definitions outlined in Table 1-1 below.

*Table 1-1 Magnitude of Landscape Change Assessment Criteria*

| Magnitude of Change | Description |
|---|---|
| Substantial | Where a landscape will experience the loss of key landscape features or the introduction of uncharacteristic additions over a large area. The changes to the landscape are prominent and large in scale. The level of change has an effect on the overall landscape character. |
| Moderate | A more limited loss of or change to landscape features over a medium extent which will result in some change to landscape features and aesthetics. Could include the addition of some new uncharacteristic features or elements that would lead to the potential for change in landscape character in a localised area or part of a landscape character area. Would include moderate effects on the overall landscape character that do not affect key characteristics. |
| Slight | The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. |

| Magnitude of Change | Description |
|---|---|
| Negligible | A change affecting smaller areas of landscape character including the loss of some landscape elements or the addition of features or elements which are either of low value or hardly noticeable. |

### 1.4.2.3 Landscape Effects Assessment Matrix

The significance of landscape effect was arrived at by combining the magnitude and sensitivity classifications, using the assessment matrix in Table 1-2 below, where landscape sensitivity is shown in the left-hand first column and magnitude of change is shown in the first row at the top of the table.

*Table 1-2 Landscape effects significance assessment matrix*

| | Substantial | Moderate | Slight | Negligible |
|---|---|---|---|---|
| Very High | Major | Major/Moderate | Moderate | Moderate/Minor |
| High | Major/Moderate | Moderate | Moderate/Minor | Minor |
| Moderate | Moderate | Moderate/Minor | Minor | Minor/Negligible |
| Low | Moderate/Minor | Minor | Minor/Negligible | Negligible |

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 1-3 below.

*Table 1-3 EPA Impact Assessment Significance Classification for Landscape Effects*

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| Major | Profound | An effect which obliterates sensitive characteristics |
| Major/Moderate | Very significant | An effect, which by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment |
| Moderate | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Moderate/Minor | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| Minor | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| **Minor/Negligible** | Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| **Negligible** | Imperceptible | An effect capable of measurement but without significant consequences |

### 1.4.3 Assessing Visual Effects

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. These may result from changes in content and character of views as a result in changes to the landscape. The assessment of visual effects is based on views shown in photomontages and the potential visibility indicated by the ZTV maps as well as actual visibility on the ground.

It should be noted that in assessing visual effects, there are different types of visual effects:

- **Visual obstruction:** This occurs when there is an impact on a view which blocks the view
- **Visual intrusion:** This occurs when there is an impact on a view but which does not block the view.

Due to the nature of the development and the appearance of wind turbines, visual intrusion occurs more frequently than obstruction.

The likely significance effects of the proposed development in terms of visual and landscape effects are informed by the ZTV and photomontages. The significance of the effect on visual receptors is a combination of the sensitivity of the receptor as well as the magnitude of the change.

#### 1.4.3.1 Visual Receptor Sensitivity

Visual Receptor Sensitivity depends on the occupation or activity of the people, as well the extent to which the attention is focused on views and visual amenity, according to the GLVIA Guidelines (2013). Visual receptor sensitivity is assessed as either being Very High, High, Medium or Low, based on the definition of descriptions set out in Table 1-4 below.

*Table 1-4 Visual Receptor Sensitivity Assessment Criteria*

| Sensitivity of Visual Receptor(s) | Description |
|---|---|
| Very High | Included in this category are viewers that are primarily focused on views from this particular location, such as visitors to popular destinations identified for their outstanding views or residents in close proximity or medium proximity whose primary views will be in the direction of the development. |
| High | Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes |

| Sensitivity of Visual Receptor(s) | Description |
|---|---|
| Medium | Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. |
| Low | Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. |

### 1.4.3.2 Magnitude of Visual Change

The magnitude of the visual change resulting at each viewpoint is a combination of scale of the change, the extent of the area to be affected and the duration and reversibility of the effect, determined by reviewing the photomontage and wireframe images for each viewpoint. The magnitude of change is determined in accordance with the definitions and descriptions included in Table 1-5 below.

*Table 1-5 Magnitude of Visual Change Assessment Criteria*

| Magnitude of Change | Description |
|---|---|
| Substantial | Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the proposed development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration. |
| Moderate | The change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting. |
| Slight | The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. |
| Negligible | Any change would only be barely distinguishable from the status quo "do-nothing scenario" in the surroundings. The composition and character of the view would be substantially unaltered, approximating to little or no change. |

### 1.4.3.3 Visual Effects Assessment Matrix

Table 1-6 below shows the significance of visual effects, arrived at by combining the visual receptor sensitivity and the magnitude of change classifications. Visual receptor sensitivity is shown in the left-

hand first column and magnitude of visual change is shown in the first row at the top of the table.

*Table 1-6 Visual effects significance assessment matrix*

| | Substantial | Moderate | Slight | Negligible |
|---|---|---|---|---|
| Very High | Major | Major/Moderate | Moderate | Moderate/Minor |
| High | Major/Moderate | Moderate | Moderate/Minor | Minor |
| Medium | Moderate | Moderate/Minor | Minor | Minor/Negligible |
| Low | Moderate/Minor | Minor | Minor/Negligible | Negligible |

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 1-3 below.

*Table 1-7 EPA Impact Assessment Significance Classification for Visual Effects*

| Matrix Classification Significance | EPA Significance Classification | EPA (2017) Definition of Significance |
|---|---|---|
| Major | Profound | An effect which obliterates sensitive characteristics |
| Major/Moderate | Very significant | An effect, which by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment |
| Moderate | Significant | An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| Moderate/Minor | Moderate | An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| Minor | Slight | An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| Minor/Negligible | Not Significant | An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| Negligible | Imperceptible | An effect capable of measurement but without significant consequences |

### 1.4.3.4 Residual Visual Effect

After determining the significance of the visual effect using the assessment matrix in Table 1-6 above, mitigating factors are taken into consideration to arrive at the final residual effect. In some cases, mitigating factors merit the residual effect being less than the one arrived at using the assessment matrix.

## 1.4.4 Assessing Cumulative Landscape and Visual Effects

### 1.4.4.1 Cumulative Landscape Effects

The SNH 2017 publication *Assessing the Cumulative Impact of Onshore Wind Energy Developments* identifies two principal areas of cumulative landscape effects, on the physical fabric of the landscape and on the landscape character. To this effect the guidelines state:

- *Cumulative effects on the **physical fabric** of the landscape arise when two or more developments affect landscape components such as woodland, dykes, rural roads or hedgerows. Although this may not significantly affect the landscape character, the cumulative effect on these components may be significant – for example, where the last remnants of former shelterbelts are completely removed by two or more developments.*
- *Cumulative effects on **landscape character** arise when two or more developments introduce new features into the landscape. In this way, they can change the landscape character to such an extent that they create a different landscape character type, in a similar way to large scale afforestation. That change need not be adverse; some derelict or degraded landscapes may be enhanced as a result of such a change in landscape character.*

Potential changes to the physical fabric outlined above are predominantly restricted to the proposed development site and the LCAs in which the site is located. Therefore, these landscape receptors will be assessed for cumulative landscape effects on the physical fabric of the landscape arising from the proposed development.

Cumulative effects on the landscape character will be assessed in the Landscape Character Areas (LCAs) that have theoretical visibility of the proposed development with particular emphasis on the two LCAs in which the proposed turbines will be located.

Table 1-8 below taken from *Cumulative Impact of Wind Turbines on Landscape and Visual Amenity* (Carmarthenshire County Council, 2013) will be used to assign a current status of the LCAs and whether the addition of the proposed turbines will change the status of any of the LCAs.

*Table 1-8 Landscape types with regard to wind turbine development descriptions (Source Guidance on cumulative impact of wind turbines on landscape and visual amenity*

| | Landscape Status | Description |
|---|---|---|
| 1 | Landscape character area with no wind turbines | No turbines within an area and not visible except at a distance where they are very small or inconspicuous. |
| 2 | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s | Turbines are visible but are not at a scale, number, spacing or extent that makes them a defining/key characteristic. Turbines might be seen occasionally at close quarters but more often within background views. |
| 3 | Landscape character area with wind turbines | Turbines are located and visible and are at a scale and/or a spacing that makes them one of the defining/key characteristics. Turbines might be seen in the foreground, mid-ground or background. However, there would be other key characteristics which would be strong and there would be sufficient separation between turbines for views without turbines and other characteristics remaining dominant in these parts of the area. |

| | Landscape Status | Description |
|---|---|---|
| 4 | Wind turbine landscape | Turbines are frequent and may include extensive wind farms and are the dominant, defining characteristic but there is separation between groups of turbines. However, within these areas wind turbines are likely to be visible. |
| 5 | Windfarm | Landscape fully developed as a wind farm with no clear separation between groups of turbines. |

Cumulative landscape effects are included in LCA Assessment Tables in Appendix 12.2 and summarised in the LVIA Chapter of the EIAR.

### 1.4.4.2 Cumulative Visual Effects

For this assessment, the SNH (2012) definition of cumulative effects as additional changes caused by a proposed development in conjunction with other similar developments, is used, however, this assessment also considers other types of developments. The definition in the DoEHLG Guidelines (2006) defines cumulative impacts in terms of wind farms, as the perceived effect on the landscape of two or more wind energy developments visible from any one place.

The GLVIA (2013) and SNH (2012) guidance also note cumulative visual effects can be experienced in combination, where two or more developments are visible from one viewpoint, as well as sequentially, where a viewer moves to another viewpoint and sees the same or different developments. The photomontage viewpoints illustrate combined visibility and analysis of the photomontages and route screening allows sequential visibility to be assessed.

The SNH 2017 publication *Siting and Designing Wind Farms in the Landscape* gives additional guidance on assessing combined visual effects in that it is states:

> *"A key factor determining the cumulative impact of wind farms is the distinct identity of each group. This relates to their degree of separation and similarity of design. This applies whether they are part of a single development, a wind farm extension, or a separate wind farm in a wider group. A wind farm, if located close to another of similar design, may appear as an extension; however, if it appears at least slightly separate and of different design, it may conflict with the other development. In these cases, if a landscape is unable to accommodate the scale of a combined development, wind farm groups should appear clearly separate. It is important to achieve a balance between wind farms and the undeveloped open landscape retained between them. Adequate separation will help to maintain wind farms as distinct entities. The separation distance required will vary according to the landscape characteristics."*

It also outlines that introducing turbines that are not similar in form, design, colour and scale may increase visual complexity and clutter.

Therefore, the cumulative assessment will concentrate on the above two issues:

- Whether the proposed turbines increase the spatial extent of turbines in the view
- Whether there is visual separation between the proposed turbines and other wind developments in the landscape
- Whether the contrast of different size and design between different wind developments creates visual clutter.

As cumulative visual effects depend on the aspect from which the turbines will be seen various viewpoints were selected to give a thorough overview of the how the proposed turbines will appear in conjunction to turbines already present.

The assessment of cumulative effects was included in the viewpoint assessment tables in Appendix 12.3 and summarised in the LVIA Chapter of the EIAR.

*Table 1-9 Increase in Spatial Extent of Turbines in the View*

| Magnitude of Increase | Description |
|---|---|
| Significant | The spatial extent of turbines in the view is significantly increased by the proposed turbines. |
| Moderate | The spatial extent of turbines in the view is increased by a moderate amount by the proposed turbines. |
| Slight | The spatial extent of turbines in the view is slightly increased by the proposed turbines. |
| Negligible | There is no noticeable increase of the spatial extent of turbines in the view created by introduction of the proposed turbines to existing turbines already present in the view. |

*Table 1-10 Visual Separation*

| Magnitude of Change | Description |
|---|---|
| Complete | The proposed and existing turbines clearly separate and the proposed windfarm has a visual identity distinct from any other proposed or existing turbines. |
| Medium | The proposed and existing turbines have sufficient visual separation to allow the observer to identity proposed or existing turbines as separate developments. |
| Slight | The proposed and existing turbines appear behnd or in front of each other, but it the distance between them is visually apparent and therefore they do not appear as one wind farm |
| Negligible | The proposed and existing turbines appear alongside each other and appear as one large wind farm |

*Table 1-11 Difference in Scale*

| Magnitude of Change | Description |
|---|---|
| Substantial | Substantial differences in scale and design of the proposed and existing turbines are evident. |
| Moderate | The proposed and existing turbines have differences in scale and design that are evident, but not strongly contrasting |
| Slight | A difference in scale and design can be seen, but is not significant. |
| Negligible | Any difference in scale and design between proposed and existing turbines is barely discernible |

# APPENDIX 12-2

***LANDSCAPE CHARACTER ASSESSMENT TABLES***

# 1. LANDSCAPE CHARCTER ASSESSMENT TABLES

## 1.1 County Leitrim

| LCA 11 - Corry Mountain | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The proposed turbines are located within this LCA. |
| **LCA Key Characteristics** | › Extensive, mountainous uplands bordering Lough Allen.<br>› Rough grazing on moorland hills and plateau.<br>› Extensive areas of coniferous forestry.<br>› Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.<br>› Impressive views from higher ground.<br>› Moorland plateau retains sense of isolation despite access roads and infrastructure.<br>› Field boundaries create strong patterns on lower hill slopes but show signs of dereliction in places.<br>› Distinctive upland valleys sheltering small farming communities.<br>› Semi-natural woodlands on steeper slopes and around farms. |
| **Visibility within LCA** | There is full visibility of the proposed turbines in the majority of this LCT, except for patchy or no visibility on the north-eastern slopes as indicated by the ZTV. Viewpoint 16 and 17 are located within this LCA. |
| **Cumulative Baseline** | There are existing and proposed wind farms within this LCA. These are: Garvagh Glebe, Black Banks, Monaneenatieve, Corrie Mountain and Spion Kop. Other wind farms in adjacent LCAs are also visible in parts of this LCA. |
| **Cumulative Landscape Status** | Landscape character area with wind turbines |
| **Cumulative Landscape Effects** | The proposed development will add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | Wind farm development is considered a key issue for the Corry Mountain LCA according to the *Landscape Assessment of County Leitrim* and therefore the sensitivity is considered **High**. It is a priority to site new wind farms/ communication masts close to existing development on the plateau to minimise impact on more remote areas of upland. |
| **Magnitude of Change** | **Moderate** A more limited loss of or change to landscape features over a medium extent which will result in some change to landscape features and aesthetics. Could include the addition of some new uncharacteristic features or elements that would lead to the potential for change in landscape character in a localised area or part of a landscape character area. Would include moderate effects on the overall landscape character that do not |

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|---|---|
| | affect key characteristics. The effects could be long to medium term and/or partially reversible. |
| **Significance of Effect** | **High x Moderate = Moderate = Significant (EPA, 2017)**<br>An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited theoretical visibility on north-eastern slopes<br>› Due to forestation and roadside vegetation actual visibility will be significantly reduced |

| LCA 6 - Doons and Crockauns | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | This LCA is approximately 9.73 kilometres away from the nearest turbine at its closest point, and 20.25 kilometres at its furthest. |
| **LCA Key Characteristics** | › Varied limestone geology has created distinctive landform features, mountain profiles and scree slopes.<br>› Contrasting land uses including extensive grazing, coniferous plantations and areas of both upland and lowland peat bog.<br>› Semi-natural woodlands fringing Lough Gill.<br>› Sparse settlement pattern of isolated farmhouses amongst areas of rush infested pasture.<br>› Scrub encroachment and coniferous plantations obscure distinctive landform features.<br>› Parkes Castle in an attractive lough side setting.<br>› Lough Gill and its shores, noted for their nature conservation value. |
| **Visibility within LCA** | There is intermittent full theoretical visibility indicated within this LCA as evident by the ZTV. Viewpoint 6 is located within this LCA. |
| **Cumulative Baseline** | There are no existing wind farms within this LCA. However, other wind farms in adjacent LCAs are visible in parts of this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | Wind energy has not been highlighted as a key issue in the *Landscape Assessment of County Leitrim* hence the landscape sensitivity to wind farm development would be considered **Moderate.** |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level |

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|---|---|
| | and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Theoretical visibility restricted to elevated areas of this LCA<br>› Due to forestation and roadside vegetation actual visibility will be further reduced<br>› Intervening distance (in excess of approx. 10km) |

| LCA 7 - Benboo | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 10.02 kilometres away from the closest point of the LCA, and approximately 14.33 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Rugged heath-clad hills form a distinctive mountain profile.<br>› Smooth upland slopes are covered with heath and natural grassland.<br>› Underlying bedrock is exposed where peaty soils are thinnest.<br>› Streams in shallow valleys drain the hillsides and flow off the lower slopes into rivers which encircle the hard rock outcrop.<br>› Gorges and streams shelter linear clusters of scrub and woodland.<br>› Lower slopes are fringed by marginal, rushy pastures largely enclosed by fencing and coniferous plantations. Distinctive low stone walls are evident stretching up some hillsides forming long rectangular fields.<br>› Roads encircle the mountain along which are located small, isolated farm cottages, often occupying sheltered locations and are surrounded by small copses. No settlement on the mountain itself.<br>› Distinct lack of archaeological monuments.<br>› Panoramic views over the adjacent lowlands. |
| **Visibility within LCA** | There is potential full visibility from the majority of this LCA as evident by the ZTV. No viewpoints are located within this LCA. |
| **Cumulative Baseline** | There are no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | The sensitivity of this landscape is **High** as the Benboo Mountains are distinctive within the landscape along with the field boundaries and heath-clad which stretch up the mountain. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the |

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| | landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Intervening distance (in excess of 10km) |

| LCA 8 - The Boleybrack Uplands | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 6.78 kilometres away from the closest point of the LCA, and approximately 20.24 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Extensive, mountainous uplands retain a sense of isolation.<br>› Rough grazing on moorland hills and plateau.<br>› Extensive areas of coniferous forestry.<br>› Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.<br>› Impressive panoramic views from higher ground of surrounding mountains and lowlands.<br>› Field boundaries creating strong patterns on lower hill slopes showing signs of dereliction in places.<br>› Distinctive upland valley sheltering small farming communities.<br>› Semi-natural woodlands on steeper slopes above O'Donnell's Rock. |
| **Visibility within LCA** | There is potential theoretical visibility of the proposed wind turbines from the south and east sides of this LCA as indicated by the ZTV. No viewpoints are located within this LCA. |
| **Cumulative Baseline** | The Tullynamoyle turbines and the Tullunamoyle wind farm extension are within this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | **High**, as wind farm development is considered a key issue for the Boleybrack Uplands as identified within the Leitrim Landscape Character Assessment. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level |

| | |
|---|---|
| | and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Theoretical visibility restricted to the south-western part of this LCA<br>› Due to forestation and roadside vegetation actual visibility will be further reduced in the lowland areas of this LCA |

| LCA 9 – The Northern Glens, Central Lowlands and Lough Allen | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 2.31 kilometres away from the closest point of the LCA, and approximately 28.33 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Undulating, drumlin covered lowlands and glens confined by sharp break in slope and mountainous areas.<br>› 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.<br>› Small blocks of deciduous woodland and some coniferous plantations.<br>› Linear settlements strung out along roads winding through the lowlands.<br>› Local geological and topographical conditions give each glen its own particular character.<br>› Major communication routes through the mountains. Major towns often sited where several routes meet.<br>› Sense of enclosure within the drumlin swarms with occasional long views to the surrounding uplands providing orientation.<br>› Castles are important local landmarks and an indication of the strategic importance of these landscapes in history. |
| **Visibility within LCA** | Patchy full theoretical visibility indicated by the ZTV in most of this LCA. Viewpoints 7, 8, 9, 10, 11 and 12 are located within this LCA. |
| **Cumulative Baseline** | There are no existing or permitted turbines within the landscape study area of this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | **Moderate** as the *'undulating landform and a robust hedgerow* network *allow the landscape to accommodate a degree of change'* (Landscape Assessment of County Leitrim). |

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|---|---|
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Undulating topography coupled with forestation and roadside vegetation reduce visibility within this LCA. |

| LCA 10 – Sliabh An Iarainn | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 12.75 kilometres away from the closest point of the LCA, and approximately 26.61 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Extensive, mountainous uplands bordering Lough Allen.<br>› Rough grazing on moorland hills and plateau.<br>› Extensive areas of coniferous forestry.<br>› Sparsely populated. Small houses associated with outbuildings are evident across many of the lower, gentler farmed slopes.<br>› Impressive views from higher ground.<br>› Moorland plateau retains sense of isolation despite access roads and infrastructure.<br>› Field boundaries creating strong patterns on lower hill slopes showing signs of dereliction in places.<br>› Distinctive upland valleys sheltering small farming communities.<br>› Semi-natural woodlands on steeper slopes and around farms.<br>› Concentration of sweathouses on some of the lower farmed slopes. |
| **Visibility within LCA** | There is intermittent full theoretical visibility evident within the LCA, with a large area of no visibility along the south-eastern shore of Lough Allen. Viewpoint 13 is located within this LCA. |
| **Cumulative Baseline** | There are currently no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | Due to the large coniferous plantations and deterioration of field boundaries the landscape sensitivity is considered **Moderate**. |

| | |
|---|---|
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Extensive forestation and roadside vegetation reduce visibility within the parts of this LCA adjacent to Lough Allen.<br>› Clear views mainly restricted to the upper north-western slopes of Sliabh an Iarainn, at a distance in excess of approximately 14 km, which will be a mitigation factor |

## 1.2 County Sligo

| LCA 1 – Carrane Hill (Provisional) | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | There are two turbines within the LCA and the furthest point within this LCA situated 8.60 kilometres away from the nearest turbine. |
| **LCA Key Characteristics** | › Upland area surrounding Carrane Hill and its south-western slopes.<br>› Extensive mountain moorland areas covering the summit.<br>› Carrane Hill Bog has been subject to turf-cutting, but large areas of undisturbed moorland.<br>› Fields occupy most of the lower slopes.<br>› Commercial conifer plantation throughout this LCA<br>› No settlements and sparsely populated.<br>› A number of scenic routes in this LCA. |
| **Visibility within LCA** | Approximately a quarter of this LCA will have theoretical visibility and is restricted to the northern and eastern parts. Viewpoint 15 is located within this LCA. |
| **Cumulative Baseline** | There are numerous existing wind farms within this LCA. These are the Geevagh , Derrysallagh and Caranne Hill turbines. |
| **Cumulative Landscape Status** | Landscape character area with wind turbines |
| **Cumulative Landscape Effects** | The proposed development will add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |

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|---|---|
| **Landscape Sensitivity to Wind Farm Development** | As a significant proportion of this provisional LCA has been designated as *Sensitive Rural Landscapes* and *Visually Vulnerable Areas* in the *Landscape Characterisation Map,* the sensitivity is considered **High**. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited theoretical visibility<br>› Most of the areas of *Sensitive Rural Landscapes* will have no visibility of the proposed turbines<br>› The focus of the scenic routes in this LCA is generally not in the direction of the proposed turbines. |

| LCA 2 Lough Arrow and Environs (Provisional) | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 5.51 kilometres away from the closest point of the LCA, and approximately 14.78 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Shores of Lough Arrow mainly forested with a mixture of conifer and deciduous trees<br>› Generally well-maintained pattern of fields beyond the lake.<br>› Away from the lough pockets of commercial forestry.<br>› Elevated areas either side of Lough Arrow<br>› To the south-west are the Bricklieve Mountains with panoramic views over Lough Arrow from Carrowkeel Megalithic Cemetery.<br>› Area is not highly populated, but some ribbon development |
| **Visibility within LCA** | The eastern part of this LCA will have partial theoretical visibility on higher ground only, whereas west of Lough Arrow there is mainly full theoretical visibility until the ridgeline of the Bricklieve Mountains. Viewpoints 1 and 2 are located within this LCA. |
| **Cumulative Baseline** | There are currently no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |

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|---|---|
| **Landscape Sensitivity to Wind Farm Development** | Some parts of this provisional LCA have been designated as *Sensitive Rural Landscapes* and *Visually Vulnerable Areas* in the *Landscape Characterisation Map,* therefore, the sensitivity is considered **Moderate**. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Theoretical visibility is limited in the parts of the LCA closest to the proposed development and distance will mitigate in the areas with highest theoretical visibility<br>› Extensive forestation and roadside vegetation further reduce visibility within this LCA<br>› *Sensitive Rural Landscapes* and *Visually Vulnerable Areas* will have partial theoretical visibility of the proposed turbines<br>› The focus of the scenic routes in this LCA is generally towards Lough Arrow |

| LCA 3 – Eastern Lowlands (Provisional) | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 5.40 kilometres away from the closest point of the LCA, and approximately 12.73 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Characterised by extensive farmland, the pattern of the landscape is shaped by the tree lines and hedgerows of the field boundaries<br>› Some forestry plantation<br>› Gently undulating drumlin landscape<br>› Many watercourses, including the Unshin, Douglas and Owenmore Rivers |
| **Visibility within LCA** | The drumlin landscape results in patchy, but mainly full theoretical visibility as indicated by the ZTV within this LCA. Viewpoints 3 and 4 are located within this LCA. |
| **Cumulative Baseline** | There are currently no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | Landscape character area with occasional wind turbines in it and/or intervisible in another landscape character area/s |
| **Cumulative Landscape Effects** | The proposed development will slightly add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |

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|---|---|
| **Landscape Sensitivity to Wind Farm Development** | Only a few small areas in this provisional LCA have been designated as *Sensitive Rural Landscapes* in the *Landscape Characterisation Map,* therefore, the sensitivity is considered **Low**. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Low x Moderate – Minor/Negligible = Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Forestation and roadside vegetation reduce visibility within this LCA<br>› No Visually Vulnerable Areas within this LCA<br>› There are three scenic routes (Nos. 12,55 and 65), where no visibility could be established on the ground |

| LCA 4 – Lough Gill, Sligo and Environs (Provisional) | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 8.81 kilometres away from the closest point of the LCA, and approximately 20.15 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › The banks of Lough Gill are densely forested with mainly broadleaf trees.<br>› On the northern shore the land undulates until Crockauns, Keelogyboy and Cope's Mountain.<br>› 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.<br>› Apart from the lake shore and Lough Gill itself there are also recreation trails in Hazelwood Forest and Union Wood |
| **Visibility within LCA** | The southern slopes of Killery Mountain, Slieve Dangan and Slieve Daene have full theoretical visibility of the proposed turbines as well as the northern shoreline and hinterlands of Lough Gill. Other areas will have no visibility. Viewpoint 5 is located within this LCA. |
| **Cumulative Baseline** | There are currently no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | No turbines within an area and not visible except at a distance where they are very small or inconspicuous. |
| **Cumulative Landscape Effects** | The proposed development will add to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |

| | |
|---|---|
| **Landscape Sensitivity to Wind Farm Development** | As a significant proportion of this provisional LCA has been designated as *Sensitive Rural Landscapes* and *Visually Vulnerable Areas* in the *Landscape Characterisation Map,* the sensitivity is considered **High**. |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Forestation and roadside vegetation greatly reduce visibility within this LCA<br>› Most *Visually Vulnerable Areas* will not have theoretical visibility<br>› Just above half of *Sensitive Rural Landscape* areas will have theoretical visibility<br>› Scenic routes in these areas are predominantly focussed on Lough Gill and the uplands in the southern part of this LCA |

## 1.3 County Roscommon

| LCA 1 – Lough Allen and Arigna Foothills | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 12.58 kilometres away from the closest point of the LCA, and approximately 14.88 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Quiet, sparsely populated broad valley defined by high mountains overlooking a very large lake.<br>› The area forms a distinctively flat region between the Arigna Mountains and Lough Allen.<br>› The land cover is predominantly peat bog and moorland, however there are areas of marginal farmland as well as small pockets of good quality arable land.<br>› The R280 is the main regional road, with few other roads in the area. |
| **Visibility within LCA** | There is a narrow band of full theoretical visibility in the lower part of this LCA, decreasing to partial theoretical visibility. No viewpoints are located within this LCA. |
| **Cumulative Baseline** | There are currently no existing wind farms within this LCA. |
| **Cumulative Landscape Status** | No turbines within an area and not visible except at a distance where they are very small or inconspicuous. |
| **Cumulative Landscape Effects** | The proposed development will add slightly to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | Wind energy was not identified as a force for change in this LCA in the Roscommon Landscape Character Assessment, therefore the sensitivity is considered **Moderate** |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited theoretical visibility<br>› The focus of scenic route in this LCA is towards Lough Allen and to a lesser extent the nearby Kilrononan Mountain. |

| LCA 14 - Arigna Mountains | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 8.54 kilometres away from the closest point of the LCA, and approximately 12.95 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › Arigna Mountains LCA is set on a rugged mountain steeped in mining history and providing some of the best views in the county.<br>› The character area comprises rolling ridges, marginal farmland and coniferous forests.<br>› There are numerous Scenic Routes and Scenic Views in the area, providing an elevated panorama of rolling farmland down to Lough Allen. |
| **Visibility within LCA** | There is a patch of full theoretical visibility in the centre of this LCA. No viewpoints are located within this LCA. |
| **Cumulative Baseline** | There are several existing wind farms within this LCA. These are the Altagowlan, Garvagh Tullyhaw, Seltannaveeny and Kilronan turbines. |
| **Cumulative Landscape Status** | Landscape character area with wind turbines |
| **Cumulative Landscape Effects** | The proposed development will add slightly to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | Wind energy was not identified as a force for change in this LCA in the Roscommon Landscape Character Assessment, therefore the sensitivity is considered **Moderate** |
| **Magnitude of Change** | **Slight** - The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible. |
| **Significance of Effect** | **Moderate x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited theoretical visibility<br>› The focus of scenic of scenic routes and views in this LCA is towards Lough Allen |

| LCA 16 - Lough Key and Boyle River Network | |
|---|---|
| **Distance from Site to Nearest/Furthest Area of LCA** | The closest proposed turbine is approximately 11.92 kilometres away from the closest point of the LCA, and approximately 23.04 kilometres away from the furthest point of the LCA. |
| **LCA Key Characteristics** | › The overall image of this landscape is one of an extensive organically shaped lakeland fringed by broadleaf forest.<br>› Undulating in an easterly direction this drumlin lakeland landscape is dominated by Lough Key and a series of other loughs, including Oakport Lough and Lough Eidin, all of which are linked by the Boyle River flowing in an easterly direction to connect to the River Shannon.<br>› The ridgeline of the hills located just north of Lough Key mark the northern boundary, while the southern boundary is delineated by the N4.<br>› The land cover in the northwest of the LCA is predominantly wet grassland with large areas of understorey forest, scrub and patches of heath.<br>› In contrast the south eastern half of the LCA is made up of dry grassland with large areas of mature forest and patches of cut over raised bog and reclaimed raised bog. |
| **Theoretical Visibility within LCA** | There are patches of partial theoretical visibility within this LCA, yet this is minimal. No viewpoints are located within this LCA. |
| **Cumulative Baseline** | There are no existing wind turbines within this LCA. |
| **Cumulative Landscape Status** | No turbines within an area and not visible except at a distance where they are very small or inconspicuous. |
| **Cumulative Landscape Effects** | The proposed development will add very slightly to the cumulative landscape effects but not change the status identified above. Therefore, cumulative landscape effects are considered **Low**. |
| **Landscape Sensitivity to Wind Farm Development** | As the Roscommon Landscape Character Assessment has classed the landscape value of this LCA as Exceptional, the landscape sensitivity to wind energy is considered **Very High**. |
| **Magnitude of Change** | **Negligible** - a change affecting smaller areas of landscape character including the loss of some landscape elements or the addition of features or elements which are either of low value or hardly noticeable. The effects could be short term and/or reversible. |
| **Significance of Effect** | **Very High x Negligible = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Very limited theoretical visibility coupled with mainly dense roadside vegetation<br>› Intervening distance (in excess of 12km)<br>› All scenic routes and views are focussed on Lough Key, except one which will have no visibility of the proposed turbines. |

# APPENDIX 12-3

***VIEWPOINTS ASSESSMENT***

*Table 1 Viewpoints*

| VP No | Description | Grid Ref. (Irish Grid) |
|---|---|---|
| 1 | View from the summit of Bricklieve Mountain in Carrowkeel Megalithic Cemetery, situated in the townland of Carrowkeel, approximately 14.58 km south-west from the nearest turbine. | E 175,337 N 311,744 |
| 2 | View taken from a section of the N4 national road designated as Scenic Route No. 3 in Sligo CDP directly east of Lough Arrow in the townland of Castlebaldwin, approximately 12.28 kilometres south-east of the nearest turbine. | E 176,687 N 312,850 |
| 3 | View from the N4 national road in the townland of Doorly, approximately 14.19 kilometres east of the nearest turbine. | E 169,257 N 323,083 |
| 4 | View from Radharc Na gCaisléan housing estate in the south of Collooney Town in the townland of Rathrippon, approximately 16.26 kilometres east of the nearest turbine. | E 167,949 N 325,527 |
| 5 | View from car park off R286 on Lough Gill Drive marked as a Viewing Point over Lough Gill on OS map in the townland of Corwillick, approx. 12.8 kilometres north-west of the nearest turbine | E 177,241 N 335,006 |
| 6 | View from Parke's Castle between the R286 regional road and Lough Gill, in the townland of Kilmore, approximately 12.89 kilometres north-west of the nearest turbine. | E 178,285 N 335,075 |
| 7 | View from the townland of Dromahair taken on the R288, approximately 8.25 km north-west of the nearest turbine. | E 180,495 N 331,092 |
| 8 | View from Co. Leitrim designated Scenic View No. 15 on unnamed local road in the townland of Carrigeencor, to the north of Carrigeencor Lough, approximately 10.66 km north of the nearest turbine. | E 183,367 N 334,416 |
| 9 | View from McDermott Terrace housing estate in Manorhamilton Town in the townland of Manorhamilton, approximately 16.03 km north–west of the of the nearest turbine. | E 188,867 N 339,320 |
| 10 | View from the R280 opposite the villages Catholic Church in the townland of Killarga, County Leitrim, approximately 7.56 kilometres north-east of the nearest turbine. | E 186,354 N 331,126 |
| 11 | View from the townland of Drumkeeran, taken on the R280 road, approximately 4.52 km north-east of the nearest turbine. | E 190,530 N 324,520 |
| 12 | View from Corry Strand on the shore of Lough Allen, in the townland of Cavan, approximately 8.77 kilometres east of the nearest turbine. | E 194,675 N 323,911 |
| 13 | View from a local road off the R207 road in the village of Ballinagleragh in the townland of Drumreilly, approximately 14.94 km east of the nearest turbine. | E 199,891 N 323,043 |

| VP No | Description | Grid Ref. (Irish Grid) |
|---|---|---|
| 14 | View from the R208 regional road in north of the town of Drumshanbo in the townland of Carriknabrack, approximately 16.05 km south-east of the nearest turbine. | E 197,347<br>N 311,167 |
| 15 | View from local road designated as Scenic Route No. 66 in Sligo CDP in the townland of Ballynashee, approx. 5.0 kilometres south-south-east of the nearest turbine | E 187,753<br>N 317,957 |
| 16 | View from an unnamed road in the townland of Beagh, approximately 1.37 kilometres north-west of the nearest turbine. | E 184,766<br>N 325,113 |
| 17 | View from a local road in the townland of Tullynascreen, approximately 1.9 kilometres north-west of the nearest turbine. | E 182,162<br>N 325,179 |

| Viewpoint 1 – Carrowkeel Megalithic Cemetery | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken from the summit of in Carrowkeel Megalithic Cemetery, situated in the townland of Carrowkeel<br>› 14.58 km south-west of the of the nearest turbine<br>› Grid Reference: E175,337 N311,744<br>› No. of turbines visible: 9/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 2 Lough Arrow and Environs (Prov.) - **Moderate** | **Visual Receptor(s) & Sensitivity** | Visitors-High |
| **Description of 'Do Nothing Scenario'** | This view taken at the peak of Bricklieve Mountain is within Carrowkeel Megalithic Cemetery with two passage tombs visible to the left in the foreground amongst the mountain moorland vegetation. At the bottom of the mountain there are middle distances views to Lough Arrow and its surrounding s consisting mainly of fields separated by hedges and tree lines interspersed with occasional buildings. There are clear long-distance views to the ridgeline of Carrne Hill and beyond that to Benbulbin and the rest of the Dartry Mountains. The existing Geevagh turbines can be seen just below the ridgeline and the existing and permitted Carrane Hill turbines appear from mid tower upwards near the summit. Further to the right the permitted Derrysallagh turbines will be visible, while other turbines though theoretically visible appear not visible with the naked eye. | | |
| **Proposed Photomontage Description** | The proposed view shows all the proposed turbines visible behind the existing Geevagh turbines from Carrowkeel Megalithic Cemetery. Six will be visible from around hub height, while only the blade tips of the remaining four turbines will be seen crossing the horizon. While the proposed turbines will be taller than the nearby Carrane Hill turbines they do not appear so from this perspective. The spatial extent of the proposed turbines within the view is minor. The overall view is expansive and has the capacity to absorb the proposed development. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**.<br><br>**Mitigation Factors include:**<br><br>› The existing, permitted and proposed wind turbines appear as three separate groups on the ridgeline rather than one continuous line<br>› The Croagh turbines are at a significantly lower elevation to the other wind farms in the foreground and to the side, which mitigates any differences in tip heights.<br>› Extensive screening provided by the ridgeline<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view | | |

| Viewpoint 1 – Carrowkeel Megalithic Cemetery | |
|---|---|
| | and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› No residential visual receptors<br>› Visitors to the Megalithic Cemetery will not be primarily be focused on the view, but on the adjacent passage tombs<br>› Recreational visual receptors will be mainly seasonal and limited by weather conditions<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Expansive view with the capacity to absorb the proposed development<br>› Intervening distance (c16 km) |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 2 – Castlebaldwin - Scenic Route No.3 | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken from a section of the N4 national road designated as Scenic Route No. 3 in Sligo CDP directly east of Lough Arrow in the townland of Castlebaldwin<br>› 12.28 km south-east of the of the nearest turbine<br>› Grid Reference: E176,687 N312,850<br>› No. of turbines visible: 9/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 2 Lough Arrow and Environs (Prov.) - **Moderate** | **Visual Receptor(s) & Sensitivity** | Residents-Low<br>Motorised Traffic-Low |
| **Description of 'Do Nothing Scenario'** | Across the N4 the stone boundary wall and entrance to a farm can be seen. A hedgerow continues on from the wall to the right of the image. Beyond the stone wall a sparse hedgerow and fields used for pasture can be seen followed by farm buildings and a stand of mature trees. There are long-distance views to the upland area to the east of Lough Arrow and beyond this to the peak and ridgeline of Carrane Hill. The existing Geevagh turbines can be seen just below the ridgeline in the centre of the image and some of the permitted and existing Carrane Hill turbines are just visible near Carrane Hill Summit. | | |
| **Proposed Photomontage Description** | Two of the proposed turbines will be visible just above hub height at the ridge, while the blades of seven more turbines may be seen appearing above the ridgeline. One turbine is entirely screened by landform. The spatial extent of the proposed turbines within the view is very limited. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**. However, distance greatly mitigates the cumulative visual effects.<br><br>**Mitigation Factors include:**<br><br>› The existing, permitted and proposed wind turbines appear as three separate groups on the ridgeline rather than one continuous line<br>› The Croagh turbines are at a significantly lower elevation to the other wind farms in the foreground and to the side, which mitigates any differences in tip heights.<br>› Extensive screening provided by the ridgeline<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Low** Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. | | |
| **Magnitude of Change** | **Negligible** Any change would only be barely distinguishable from the status quo "do-nothing scenario" in the surroundings. The composition and character of the view would be substantially unaltered, approximating to little or no change. | | |
| **Significance of Effect** | **Low x Negligible = Negligible = Imperceptible (EPA, 2017)**<br>An effect capable of measurement but without significant consequences | | |

| Viewpoint 2 – Castlebaldwin - Scenic Route No.3 | |
|---|---|
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› No adjacent residential visual receptors and road users will be travelling at speeds close to the speed limit of 100kmph on this straight section of road<br>› Direction of travel of road user visual receptors is broadly perpendicular to direction of proposed turbines<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c12 km)<br>› The focus of the designated view is not towards the proposed development |
| **Residual Effect (incl. mitigating factors)** | **Imperceptible (EPA, 2017)**<br>An effect capable of measurement but without significant consequences. |

| Viewpoint 3 - Doorly | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken off the N4 national road in the townland of Doorly,<br>› 14.19 km east of the of the nearest turbine<br>› Grid Reference: E 169,257, N 323,083<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 3 – Eastern Lowlands (Prov.) - **Low** | **Visual Receptor(s) & Sensitivity** | High-Speed Motorised Traffic-Low |
| **Description of 'Do Nothing Scenario'** | In this view across the N4, which is surrounded by grassed fields either side. In the mid-distance there are stands of trees to the right of the image and buildings and associated fencing in the towards the left. There are long-distance views to Carrane Hill in the centre of the view and to Slieve Dangan to the left of the image. The existing Garvagh Glebe turbines as well as the existing and permitted Carrane Hill Turbines are just discernible on the ridge in the centre of the image. There are other vertical elements in the form of telegraph poles and electricity pylons dotted around the landscape. | | |
| **Proposed Photomontage Description** | All of the turbines will be visible from this location, although the turbine towers will be partially screened to varying degrees. The spatial extent of the proposed turbines is minor within this view | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. here is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**.<br><br>**Mitigation Factors include:**<br><br>› The existing, permitted and proposed wind turbines appear as three separate groups on the ridgeline rather than one continuous line<br>› The Croagh turbines are at a significantly lower elevation to the other wind farms in the foreground and to the side, which mitigates any differences in tip heights.<br>› Screening provided by the ridgeline<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Low** - includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. | | |
| **Magnitude of Change** | **Slight** - the proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **Low x Slight = Minor/Negligible = Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types. | | |

| Viewpoint 3 - Doorly | |
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| | › Small number of nearby visual receptors and road users will be travelling at speeds close to the speed limit of 100kmph on this straight section of road<br>› Direction of travel of road user visual receptors is broadly perpendicular to direction of proposed turbines<br>› A proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c14 km) |
| **Residual Effect (incl. mitigating factors)** | **Imperceptible (EPA, 2017)**<br>An effect capable of measurement but without significant consequences. |

| Viewpoint 4 – Collooney South | | | |
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| **Viewpoint Description & Details** | › View from Radharc Na gCaisléan housing estate in the south of Collooney Town in the townland of Rathrippon<br>› 16.26 km east of the of the nearest turbine<br>› Grid Reference: E167,949 N325,527<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 3 – Eastern Lowlands (Prov.) - **Low** | **Visual Receptor(s) & Sensitivity** | GAA Club Visitors - Medium<br>Residents-Medium |
| **Description of 'Do Nothing Scenario'** | This view from the Radharc Na gCaislean estate across Owenmore Gaels GAA Club with the pitches and associated infrastructure dominating the foreground. The GAA club is surrounded by groups of shrubs and mature trees with medium distance views to an industrial building in gaps in the vegetation. Beyond this building there is dense line of mature trees, above which there are long-distance views to Carrane Hill. Three groups of turbines can be seen on Carrane Hill. Carrane Hill turbine at the summit and Garvagh Glebe and Derrysallagh turbines are either side of these. The existing Tullynamoyle turbines can also been seen in the far distance to the left of the image. | | |
| **Proposed Photomontage Description** | All of the proposed Croagh turbines will be seen from approximately mid-tower upwards in the distance and in the background. The spatial extent of the wind farm within the view is minor. | | |
| **Cumulative Effects** | The proposed Croagh turbines do not expand the spatial extent of wind turbines from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**. However, distance greatly mitigates the cumulative visual effects.<br><br>**Mitigation Factors include:**<br><br>› The existing, permitted and proposed wind turbines appear as three separate groups on the ridgeline rather than one continuous line<br>› The existing turbines are barely discernible in the baseline photograph, however, they are somewhat visible from this location when on the ground. The effect is not significant due to the open expansive view<br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farms in the background and to the side, which mitigates any differences in tip heights.<br>› Screening provided by the ridgeline<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view | | |

| Viewpoint 4 – Collooney South | |
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| | may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. |
| **Significance of Effect** | **Medium x Slight = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› View on outskirts of town at end of cul-de-sac, hence visual receptors will be limited to visitors to GAA grounds and small number of adjacent residences<br>› A proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c16 km) is a significant mitigating factor minimising the potential for significant effects. |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 5 – Lough Gill | | | |
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| **Viewpoint Description & Details** | › View from car park off Regional Road R286 on Lough Gill Drive marked as a Viewing Point over Lough Gill on OSi map in the townland of Corwillick.<br>› 12.8 km north-west of the of the nearest turbine<br>› Grid Reference: E177,241 N335,006<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 4 – Lough Gill, Sligo and Environs (Prov.) - **High** | **Visual Receptor(s) & Sensitivity** | Viewing point Visitors High Motorised Traffic-Medium |
| **Description of 'Do Nothing Scenario'** | This view looks across Lough Gill with the tarmacked parking area, low wall and shrubs in the foreground to the right of the image. There are medium-distance views to dense mixed forest on the opposite side of the lough. In the centre of the image there is a long-distance view to Carrane Hill. Although many existing and permitted turbines should be visible, they are not discernible in this image. The landscape on the far side of the lake is undulating and no man-made structures can be seen in this view. | | |
| **Proposed Photomontage Description** | All turbines will be visible from this location. The two turbines furthest to the right will be fully visible, while most of the towers of the remaining eight turbines will be screened by intervening landform and vegetation. The spatial extent of the proposed wind farm within the view is minor | | |
| **Cumulative Effects (incl. mitigation factors)** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**<br><br>**Mitigation Factors include:**<br><br>› The existing turbines are barely discernible in the baseline photograph, however, they are somewhat visible from this location when on the ground. The effect is not significant due to the open expansive view<br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends | | |

| Viewpoint 5 – Lough Gill | |
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| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Direction of travel of road user visual receptors is broadly perpendicular to direction of proposed turbines<br>› Intervening distance (c13km) |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 6 – Parke's Castle | | | |
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| **Viewpoint Description & Details** | › View taken from Parke's Castle between the R286 regional road and Lough Gill, in the townland of Kilmore<br>› 12.89 km north-west of the of the nearest turbine<br>› Grid Reference: E 178,285, N 335,075<br>› No. of turbines visible: 8/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 6 - Doons and Crockauns - **Low** | **Visual Receptor(s) & Sensitivity** | Visitors-High |
| **Description of 'Do Nothing Scenario'** | This view across Lough Gill was taken from the ramparts of Parke's Castle. In the foreground are treetops and views down to the carpark and jetty adjacent to Park's Castle. There are medium distance views to the near shore of Lough Gill with a mixture of pastoral fields and deciduous woodland beyond, with dense mixed forest on the opposite side of the lough. In the centre of the image there is a long-distance view to the summit of Carrane Hill with the existing and permitted Carrane Hill Turbines just visible. No other turbines can be seen in this view. The landscape on the far side of the lake is undulating and no man-made structures can be seen in this view. | | |
| **Proposed Photomontage Description** | Six of the proposed Croagh turbines will be mainly fully visible with only part of the towers screened, two will be screened by intervening trees apart from the blade tips and the remaining two will be screened by landform and vegetation. Hence, the spatial extent of the proposed wind farm within the view is very limited. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**.<br><br>**Mitigation Factors include:**<br><br>› The existing turbines are barely discernible in the baseline photograph, however, they are somewhat visible from this location when on the ground. The effect is not significant due to the open expansive view<br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |

| Viewpoint 6 – Parke's Castle | |
|---|---|
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Recreational visual receptors will be mainly seasonal and limited by weather conditions<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c13 km) |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 7 - Dromahair | | | |
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| **Viewpoint Description & Details** | › View from the townland of Dromahair taken on the R288 outside the Caste Ct estate<br>› 8.25 km north-west of the of the nearest turbine<br>› Grid Reference: E 180,495 N331,092<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Moderate** | **Visual Receptor(s) & Sensitivity** | Residents-High<br>Motorised Traffic-Low |
| **Description of 'Do Nothing Scenario'** | This view follows the R288 road in the southern outskirts of Dromahair Village. To the right of the road is an ivy-covered old stone wall with mature trees beyond. Left of the road is a pavement alongside ornamental planting and a row of residential houses behind a stone wall. There are long-distance views to Corry Hill and Carrane Hill above the road in the centre of the image. The existing Carrane Hill turbines can be seen on the crest of Carrane Hill as well as blade tips of the existing Garvagh Glebe above Corry Hill. | | |
| **Proposed Photomontage Description** | All proposed Croagh turbines are visible in the proposed view shows clear visibility of the proposed Croagh Turbines. The two most eastern turbines will be screened to hub height by topography and vegetation, while the remaining turbines will be nearly completely visible. The proposed turbines will appear in front of the existing Carrane Hill turbines The spatial extent of the proposed turbines is not major in this view and is amplified by the view towards the turbines being framed by trees and buildings either side. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**<br><br>**Mitigation Factors include:**<br><br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› The existing turbines are at a significant distance behind the proposed turbines and therefore the difference in height will be perceived as a difference in distance rather than scale.<br>› Screening provided by the ridgeline and trees<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |

| Viewpoint 7 - Dromahair | |
|---|---|
| **Significance of Effect** | **Medium x Slight= Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› This was the only area in Dromohair, where clear visibility of the proposed turbines could be established<br>› Majority of the residential visual receptors views are not directed towards the proposed turbines as can be seen in the photomontage<br>› The road users will have a very brief view of the proposed turbines from this location until the road crosses the river, from where roadside vegetation will screen the proposed turbines.<br>› Limited spatial extent of the proposed development within the view<br>› Intervening distance (c8 km)<br>› Framing of the view accentuates the visual effect<br>› Some of the proposed development is screened |
| **Residual Effect (incl. mitigating factors)** | **Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |

| Viewpoint 8 - Carrigeencor | | | |
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| **Viewpoint Description & Details** | › View taken from a local road in the townland of Carrigeencor, to the north of Carrigeencor Lough<br>› 10.66 km north of the of the nearest turbine<br>› Grid Reference: E 183,367, N 334,416<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Moderate** | **Visual Receptor(s) & Sensitivity** | Designated View-High<br>Residents- High<br>Motorised Traffic-Medium |
| **Description of 'Do Nothing Scenario'** | This view has been designated as protected view and prospect No. 15 in Leitrim CDP and is described as 'view towards Carrigeencor Lake from Local Roads LS08162 and LS08164'. In the foreground is a grassed lake foreshore and the lough to the south is surrounded by mixture of deciduous and coniferous. There are limited man-made structures within this viewpoint, apart from in the foreground of the image where there are electricity posts a lakeside storage shed and a manhole cover. The land is relatively flat in the nearby and medium distance landscape. In the far distance there are is a view to the ridge of Carrane Hill. Existing and permitted turbines although theoretically visible on the ridge are barely discernible. | | |
| **Proposed Photomontage Description** | All the proposed turbines are visible from this location, most from mid-tower upwards, but four are screened just below hub height by landform and forestry. The spatial extent in the view is minor in this view. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Moderate**.<br><br>**Mitigation Factors include:**<br><br>› The existing turbines are barely discernible in the baseline photograph, however, they are somewhat visible from this location when on the ground. The effect is not significant due to the open expansive view<br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Screening provided by the hill and tree line to the rear of the lake<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |

| Viewpoint 8 - Carrigeencor | |
|---|---|
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c11km)<br>› Small number of residential receptors<br>› Designated view is focused on the lake and the wind turbines do not obstruct or interrupt this view. They become a small part of the view in that they are partially visible at a distance in the background. |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 9 - Manorhamilton | | | |
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| **Viewpoint Description & Details** | › View from McDermott Terrace housing estate in Manorhamilton Town in the townland of Manorhamilton<br>› 16.03 km north-north-west of the of the nearest turbine<br>› Grid Reference: E188867 N339320<br>› No. of turbines visible: 5/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Moderate** | **Visual Receptor(s) & Sensitivity** | Local residents- High |
| **Description of 'Do Nothing Scenario'** | This viewpoint is within McDermott Terrace housing estate and looks down through the adjacent Benbo Heights housing estate with low boundary walls surrounding the front gardens either side of the street. Hence, the character of the foreground of the view is suburban in character. Beyond this, houses are dotted around an undulating rural farmland landscape with a mixture of mature trees and pastoral fields. This landscape pattern continues to the distant horizon on the right of the image, while to the left steep northern slopes up to Larkfield Hill dramatically contrast. Although the existing Geevagh turbines are indicated in the wireframe image, they are not discernible in the image. | | |
| **Proposed Photomontage Description** | The proposed view indicates that five of the proposed Croagh turbines will be screened by topography and vegetation. The blade tips of two turbines will appear above the slope of Larkfield Hill. Two turbines will appear above hub height and a single turbine will be fully visible. | | |
| **Cumulative Effects** | Cumulative visual effects do not arise in this viewpoint. | | |
| **Sensitivity of Visual Receptor(s)** | **High** - includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** - the proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› This was the only area in Manorhamilton, where clear visibility of the proposed turbines could be established<br>› Majority of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c16km)<br>› Majority of the residential visual receptors views are not directed towards the proposed turbines | | |

| Viewpoint 9 - Manorhamilton | |
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| | › The proposed turbines are significantly lower than the northern slopes of Larkfield Hill |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 10 - Killarga | | | |
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| **Viewpoint Description & Details** | › View taken from the R280 in the village of Killarga, in the townland of Killarga<br>› 7.56 km north-east of the of the nearest turbine<br>› Grid Reference: E 186,354, N 331,126<br>› No. of turbines visible: 8/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Low** | **Visual Receptor(s) & Sensitivity** | Village Centre-High<br>Residents-High<br>Motorised Traffic- Low |
| **Description of 'Do Nothing Scenario'** | This view was taken adjacent to Killarga church and looks between the local pub and post office and a residential house on the other side of the R280. These buildings frame medium and long-distance views. In the image foreground is the R280 with pavement, retaining wall and a densely vegetated embankment to the right. To the left of the image a car park can be seen bounded by a wall and mature trees behind. A sloping field can be seen in the medium distance ending in a hedgerow and groups of mature trees. Beyond this there are long-distance views to Carrane Hill, where the existing Garvagh Glebe and the existing and permitted Carrane Hill turbines are visible. | | |
| **Proposed Photomontage Description** | Eight turbines will be visible from this location the other two being screened by buildings. The eight turbines will be generally visible from mid-tower upwards, although a treeline on an intervening ridge provides substantial screening. The spatial extent of the wind farm within the view is moderate. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines moderately from this location. There is a **Slight** visual separation between existing and proposed turbines and the difference in scale is **Moderate**.<br><br>**Mitigation Factors include:**<br><br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farms in the background and to the side, which mitigates any differences in tip heights.<br>› Screening provided by the ridgeline<br>› Distance mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |

| Viewpoint 10 - Killarga | |
|---|---|
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited adjacent residential visual receptors<br>› A proportion of the proposed development is screened<br>› Limited spatial extent of the proposed development within the view<br>› Intervening distance (c8 km)<br>› Framing of the view accentuates the visual effect however the rise in topography in the middle ground as well as the intermittent mature trees interrupts the view and means that the turbines do not appear to dominate. |
| **Residual Effect (incl. mitigating factors)** | **Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |

| Viewpoint 11 - Drumkeeran | | | |
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| **Viewpoint Description & Details** | › View from the R280 regional road in the village of Drumkeeran in the townland of Drumkeeran<br>› 4.78 km east-north-east of the of the nearest turbine<br>› Grid Reference: E190530 N324520<br>› No. of turbines visible: 4/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Moderate** | **Visual Receptor(s) & Sensitivity** | Residents-Medium<br>Motorised Traffic-Low |
| **Description of 'Do Nothing Scenario'** | The view looks across and along the R280 with adjacent pavements, road infrastructure, grassed verges, mature trees and a stone wall on the far side. Beyond the stonewall the ground level is lower for a short stretch and then rises to the northern foothills of Corry Mountain. Above the near ridgeline there is a long-distance view to a small part of Carrane Hill. The hill slope is a mixture of rough-grazing fields and broadleaf and coniferous woodland. Some of the houses on the outskirts of Drumkeeran can be seen in parts of the image. A number of existing turbines are visible on the brow of the hill. | | |
| **Proposed Photomontage Description** | One of the proposed Croagh turbines can be seen from mid tower upwards and the blade tips of another will cross the horizon. All other proposed turbines will be screened by landform and vegetation. | | |
| **Cumulative Effects** | The proposed Croagh turbines do not expand the spatial extent of wind turbines from this location. There is a **Slight** visual separation between existing and proposed turbines and the difference in scale is **Slight**.<br><br>**Mitigation Factors include:**<br><br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Screening provided by ridgeline | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **Medium x Slight= Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› View on outskirts of village with limited residential visual receptors<br>› Vast majority of the proposed development is screened by topography | | |

| Viewpoint 11 - Drumkeeran | |
|---|---|
| | › Very limited spatial extent of the proposed development within the view<br>› Direction of travel of road user visual receptors is broadly perpendicular to direction of proposed turbines |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 12 – Corry Strand | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken Corry Strand on the shore of Lough Allen. This location is situated within the townland of Cavan,<br>› 8.77 km north-east of the of the nearest turbine<br>› Grid Reference: E 194,675, N 323,911<br>› No. of turbines visible: 8/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 9 – The Northern Glens, Central Lowlands and Lough Allen- **Low** | **Visual Receptor(s) & Sensitivity** | Visitors-High |
| **Description of 'Do Nothing Scenario'** | In the foreground of the view is the northern part of Lough Allen and its densely forested shoreline. The far shore seen in the medium distance also has dense broadleaved woodland interspersed occasionally by lakeside meadows. From the shore the land rises gently at first then more steeply to Corry Mountain, which is covered in a mixture of fields and coniferous forest on the lower slopes and mountain moorland on the summit. Multiple existing and permitted windfarms can be seen on the ridgeline from this location. | | |
| **Proposed Photomontage Description** | Eight turbines will be visible from this location. Only the blade tips of four turbines will be visible, three will be visible above hub-height and one from mid-tower upwards. The spatial extent of the proposed wind farm within the view is minor. | | |
| **Cumulative Effects** | The proposed Croagh turbines do not expand the spatial extent of wind turbines from this location. There is a **Slight** visual separation between existing and proposed turbines and the difference in scale is **Slight**.<br><br>**Mitigation Factors include:**<br><br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Screening provided by the ridgeline and trees mitigates cumulative effects<br>› Distance mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **High** Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **High x Slight = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types. | | |

| Viewpoint 12 – Corry Strand | |
|---|---|
| | › Recreational visual receptors will be seasonal and limited by weather conditions<br>› Substantial proportion of the proposed development is screened with only partial visibility of 3-4 turbines.<br>› Limited spatial extent of the proposed development within the view<br>› Intervening distance (c9 km) |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 13 – Ballinagleragh Village | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken from a road off the R207 road in the village of Ballinagleragh in the townland of Drumreilly<br>› 14.94 east of the of the nearest turbine<br>› Grid Reference: E 199,891 N323,043<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 10 – Sliabh An Iarainn - **Moderate** | **Visual Receptor(s) & Sensitivity** | Residents-Medium<br>Motorised Traffic-Low |
| **Description of 'Do Nothing Scenario'** | This view looks down a local road bordered by a low hedge to the left and a boundary wall to the right in the eastern part of Ballinagleragh Village. There are gardens and fields either side of the road followed by a line of mature trees that screen most of the valley around Lough Allen. There are long-distance views to the Corry Mountain ridgeline between the trees where a long row of existing and permitted wind turbines can be seen. | | |
| **Proposed Photomontage Description** | The proposed photomontage shows all ten proposed turbines behind the existing Garvagh Glebe turbines. The proposed turbines will generally be visible from hub height upwards. While the proposed turbines will be taller than the existing turbines they do not appear so from this perspective as they have been sited at lower elevations to the existing Garvagh Glebe turbines. | | |
| **Cumulative Effects** | The proposed Croagh turbines do not expand the spatial extent of wind turbines from this location. There is a **Slight** visual separation between existing and proposed turbines and the difference in scale is **Slight**.<br><br>**Mitigation Factors include:**<br><br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights.<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **Medium x Slight= Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› View from outskirts of village with limited residential visual receptors<br>› Significant proportion of the proposed development is screened behind the Corry Mountain ridgeline | | |

| Viewpoint 13 – Ballinagleragh Village | |
|---|---|
| | › Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c15 km) |
| **Residual Effect (incl. mitigating factors)** | **Not Significant (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |

| Viewpoint 14 – Drumshanbo Town | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken off the R208 regional road in north of the town of Drumshanbo in the townland of Carriknabrack<br>› 16.05 south-east of the of the nearest turbine<br>› Grid Reference: E 197,347 N 311,167<br>› No. of turbines visible: 8/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA - 13 South Leitrim Drumlins & Shannon Basin - **Moderate** | **Visual Receptor(s) & Sensitivity** | Residents-Low<br>Motorised Traffic-Medium |
| **Description of 'Do Nothing Scenario'** | The view is along the R208 at the end of which is a building in the middle distance. To the left of the road is a pavement and boundary walls and trees belonging to the adjacent Drumshanbo Mart. There is roadside verge and a well-maintained hedge to the right of the R208 in the foreground, beyond which an undulating, overgrown field bordered by some trees. Much of the middle ground is screened by the roadside hedgerow and nearby trees, but the rooftops of residential houses and numerous electricity pylons can be seen amongst tree crowns. While the terrain gently undulates in the until the middle distance, Kilronan Mountain can be seen followed by Carrane Hill, which are separated by a valley from Corry Mountain to the right. A large group of turbines are spread over Corry Mountain and two clusters can be seen on Kilronan Mountain, while the turbines on Carrane Hill are barely discernible in the distance. | | |
| **Proposed Photomontage Description** | Four of the proposed turbines and three of the blade tips will be partially visible from this viewpoint in the valley between the two mountain ranges. The other five proposed turbines are screened by landform and vegetation. The spatial extent of the proposed turbines is very minor within the view and the proposed turbines are at a significant distance from the receptors here. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is **Complete** visual separation between existing and proposed turbines and the difference in scale is **Negligible**.<br><br>**Mitigation Factors include:**<br><br>› Complete visual separation from other wind farms<br>› Extensive screening provided by the ridgeline and trees<br>› The Croagh turbines are at a significantly lower elevation to the other wind farms in the background, which mitigates any differences in tip heights.<br>› Distance greatly mitigates the potential for cumulative visual effects. | | |
| **Sensitivity of Visual Receptor(s)** | **Low** Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. | | |
| **Magnitude of Change** | **Negligible** - any change would only be barely distinguishable from the status quo "do-nothing scenario" in the surroundings. The composition and character of the view would be substantially unaltered, approximating to little or no change. | | |

| Viewpoint 14 – Drumshanbo Town | |
|---|---|
| **Significance of Effect** | **Low x Negligible = Negligible = Imperceptible (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment but without significant consequences. |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› No adjacent residential visual receptors<br>› Substantial proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view<br>› Intervening distance (c16 km) |
| **Residual Effect (incl. mitigating factors)** | **Imperceptible (EPA, 2017)**<br>An effect capable of measurement but without significant consequences. |

| Viewpoint 15 – Ballynashee - Scenic Route No.66 | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View from local road designated as Scenic Route No. 66 in Sligo CDP in the townland of Ballynashee<br>› 4.96 south-east of the of the nearest turbine<br>› Grid Reference: E 187,753 N 317,957<br>› No. of turbines visible: 4/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 1 - Carrane Hill (Prov.) - **High** | **Visual Receptor(s) & Sensitivity** | Residents-Low<br>Motorised Traffic-Low<br>Scenic Route-High |
| **Description of 'Do Nothing Scenario'** | This view looks out over the Arigna River Valley to the south-western slopes of Corry Mountain and its ridgeline extending to the north-west. To the right of the image the view follows the local road bordered by a fence line to the right and with the peak of Carrane Hill seen in the distance. From the road the land slopes down to the Arigna River with landcover in the foreground being predominantly rough-grazing fields and coniferous plantation in the middle distance. This landcover is mirrored on the other side of the valley, but the top of Corry Hill is covered in moorland. Many existing and permitted wind turbines can be seen in the medium distance along the Corry Mountain ridge. | | |
| **Proposed Photomontage Description** | Four of the proposed turbines will be visible from this viewpoint with the remaining turbines being screened by landform and vegetation. Hence, the spatial extent of the proposed turbines within the view is not significant. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines slightly from this location. There is a **Medium** visual separation between existing and proposed turbines and the difference in scale is **Slight**.<br><br>**Mitigation Factors include:**<br><br>› The proposed wind farm is in keeping with siting design requirements as it follows the ridgeline in the same manner as the existing and permitted turbines.<br>› Extensive screening provided by the ridgeline and trees<br>› The Croagh turbines are at a lower elevation to the other wind farm in the background which mitigates any differences in tip heights. | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. | | |
| **Magnitude of Change** | **Slight** The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration. | | |
| **Significance of Effect** | **Medium x Slight= Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities | | |

| Viewpoint 15 – Ballynashee - Scenic Route No.66 | |
|---|---|
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› No nearby residential visual receptors and road users are infrequent<br>› Large proportion of the proposed development is screened by the Carrane Hill ridgeline to the left of the image. This screening effect continues as you travel along the roadway towards the site.<br>› Limited spatial extent of the proposed development within the view<br>› Designated view is focused on Carrane Hill, which is to the left of the proposed turbines |
| **Residual Effect (incl. mitigating factors)** | **Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |

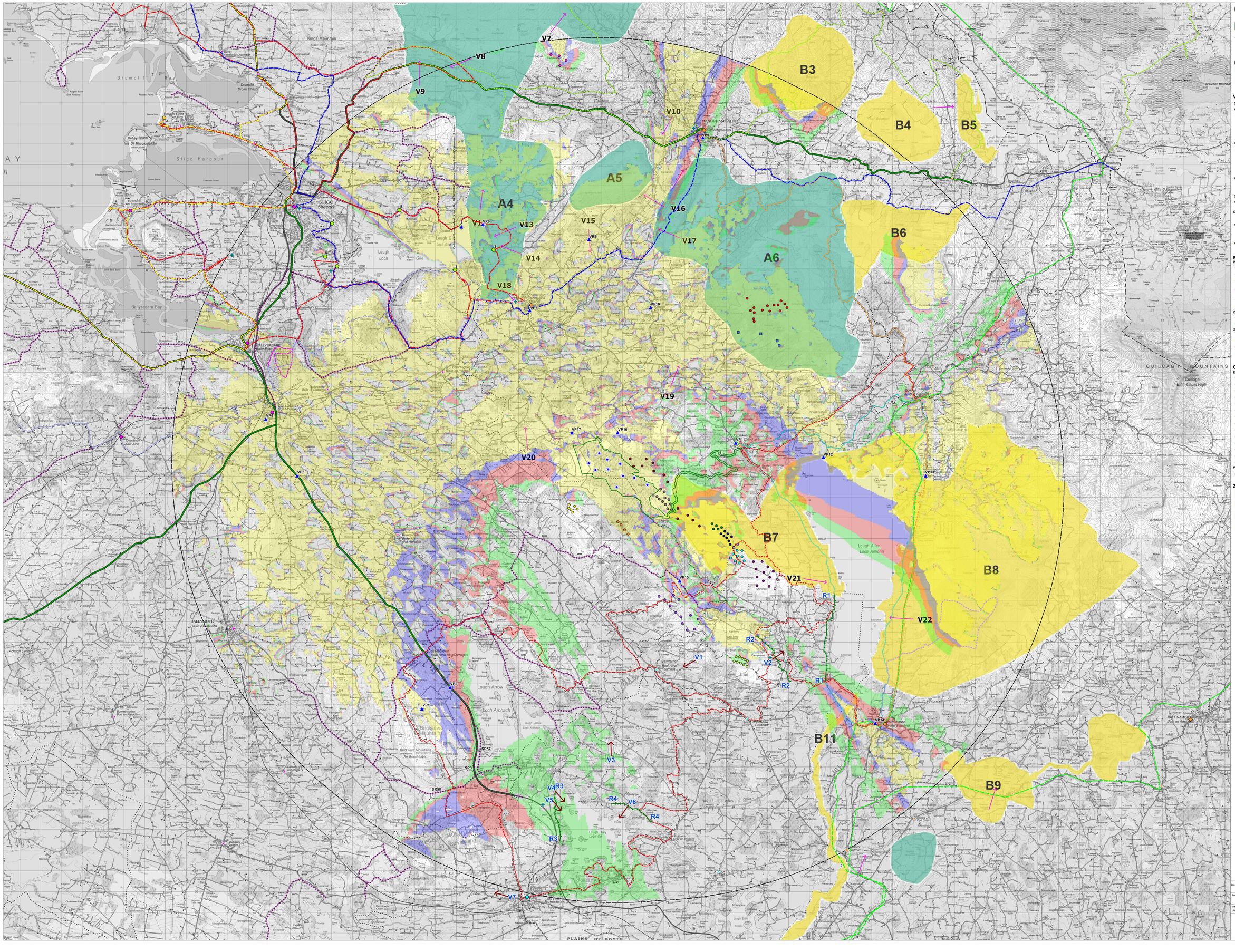
| Viewpoint 16 - Beagh | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken from a road in the townland of Beagh,<br>› 1.37 km north-west of the of the nearest turbine<br>› Grid Reference: E 184,766, N 325,113<br>› No. of turbines visible: 10/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 11 - Corry Mountain - **High** | **Visual Receptor(s) & Sensitivity** | Residents-Medium<br>Motorised Traffic-Medium |
| **Description of 'Do Nothing Scenario'** | The view shows a road rising up the hill to the left of the image with fields either side of the road. Coniferous plantation forestry dominates the landscape in the middle distance except for two expanses of moorland towards the left of the image. Five of the existing Garavagh Glebe turbines can be seen on the ridge to the left of the image all other existing and permitted turbines are screened by landform and vegetation. Other man-made structures are electricity pylons and a few residential houses. | | |
| **Proposed Photomontage Description** | All turbines will be visible from this location, albeit three will be wholly screened save for the blade tips. Of the seven other turbines two will be visible above hub height and five from approx. mid-tower upwards. The rise in the landform from the foreground into the middle ground obstructs open views of the proposed turbines. The mature forestry present on the ridgeline also acts to further screen the turbines. The spacing and heights of the turbines appear as a coherent development from this location and due to the screening and positioning behind the ridgeline don't dominate their surroundings. The spatial extent of the proposed wind farm in the image is significant which is not unexpected as this location is so close to the proposed development. | | |
| **Cumulative Effects** | The proposed Croagh turbines expand the spatial extent of wind turbines significantly from this location. There is a **Slight** visual separation between existing and proposed turbines and the difference in scale is **Slight**.<br><br>**Mitigation Factors include:**<br><br>› The proposed turbines are located to the fore of the existing turbines which provides for a more coherent spacing and heights comparison.<br>› The Croagh turbines are at a lower elevation to the other wind farms in the background and to the side, which mitigates any differences in tip heights.<br>› Extensive screening provided by the ridgeline and mature forestry | | |
| **Sensitivity of Visual Receptor(s)** | **Medium** Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic. | | |
| **Magnitude of Change** | **Moderate** - the change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting. | | |

| Viewpoint 16 - Beagh | |
|---|---|
| **Significance of Effect** | **Medium x Moderate = Moderate/Minor = Moderate (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Limited nearby residential visual receptors<br>› Significant proportion of the proposed development is screened by the rise in the landform from the foreground into the middle ground obstructing open views of the proposed turbines. The mature forestry present on the ridgeline also acts to screen further the turbines.<br>› Low volumes of traffic on this local road |
| **Residual Effect (incl. mitigating factors)** | **Moderate (EPA, 2017)**<br>An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends |

| Viewpoint 17 - Tullynascreen | | | |
|---|---|---|---|
| **Viewpoint Description & Details** | › View taken from a road in the townland of Tullynascreen<br>› 1.9 km north-west of the of the nearest turbine<br>› Grid Reference: E 182,162, N 325,179<br>› No. of turbines visible: 6/10 | | |
| **LCA & Sensitivity to Wind Farms** | LCA 11 - Corry Mountain- **High** | **Visual Receptor(s) & Sensitivity** | Motorised Traffic - Low |
| **Description of 'Do Nothing Scenario'** | There are fields bounded by hedgerows either side of the road. Tree lines, hedgerow and groups of trees and shrubs are dotted around the landscape while there is dense coniferous plantation on higher ground. The land dips to the right of the road and then rises continuously. Telegraph poles and buildings can also be seen in this view | | |
| **Proposed Photomontage Description** | The wireframe shows that all turbines are potentially visible from this location however there is only partial visibility of six turbines shown in the photomontage. One turbine will be visible from mid tower upwards, while only blade tips of the others will be visible. The spatial extent in this view is minor due to extensive screening by intervening topography and multiple layers of vegetation. | | |
| **Cumulative Effects** | Cumulative visual effects do not arise in this viewpoint. | | |
| **Sensitivity of Visual Receptor(s)** | **Low** Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape. | | |
| **Magnitude of Change** | **Moderate** - the change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting. | | |
| **Significance of Effect** | **Low x Moderate = Minor = Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. | | |
| **Mitigation Factors** | › Siting and design were developed in accordance with the DoEHLG guidelines (2006) for Mountain Moorland landscape character types.<br>› Small number of nearby visual receptors<br>› A large proportion of the proposed development is screened<br>› Very limited spatial extent of the proposed development within the view | | |
| **Residual Effect (incl. mitigating factors)** | **Slight (EPA, 2017)**<br>An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. | | |

# APPENDIX 12-4

***ZTV, VIEWPOINTS, LANDSCAPE DESIGNATIONS AND CUMULATIVE BASELINE MAP***




## Map Legend

- Proposed Turbine
- EIAR Site Boundary
- Visual Baseline and Landscape Designation Study Area
- Viewpoint Locations

### Landscape Designations

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

### Visual Baseline

**Settlements**

*County Leitrim*
- Tier 2A Centres
- Tier 2B Centres
- Tier 3 Centres
- Tier 4 Centres

*County Sligo*
- Gateway City
- Gateway Satellites
- 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
- Sliabh 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

### Cumulative Baseline

*Existing Turbines*
- Altagowlan
- Black Banks
- Caranne Hill
- Carrickhenney
- Corrie Mountain
- Garvagh Glebe
- Garvagh Tullyhaw
- Geevagh
- Kilronan
- Monaeneantaeve
- Seltannaveeny
- Spion Kop
- Tullynamoyle
- Derrysallagh

*Permitted Turbines*
- Tullynamoyle Extension

### Zone of Theoretical Visibility

- 1 to 3 turbines
- 4 to 6 turbines
- 7 to 8 turbines
- 9 to 10 turbines

| | | | | | |
|---|---|---|---|---|---|
| Drawing Title: | Appendix 12-4 ZTV, Viewpoints, Landscape Designations and Cumulative Baseline | | | | |
| Project Title: | 180511 - Croagh Wind Farm EIAR | | | | |
| Drawn By: JM | Checked By: EM | Scale: 1:55,000 | Date: 30/06/2020 | Project No: 180511 | Drawing No.: Figure 12-4 |

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# APPENDIX 14-1

***AUTOTRACK ASSESSMENT***


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.6 Location 1 - Bend on R280, autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 29.06.20 | DRAWN BY: | AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.7 Location 1 - Bend on R280, autotrack assessment for tower extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 29.06.20 | DRAWN BY: | AL |

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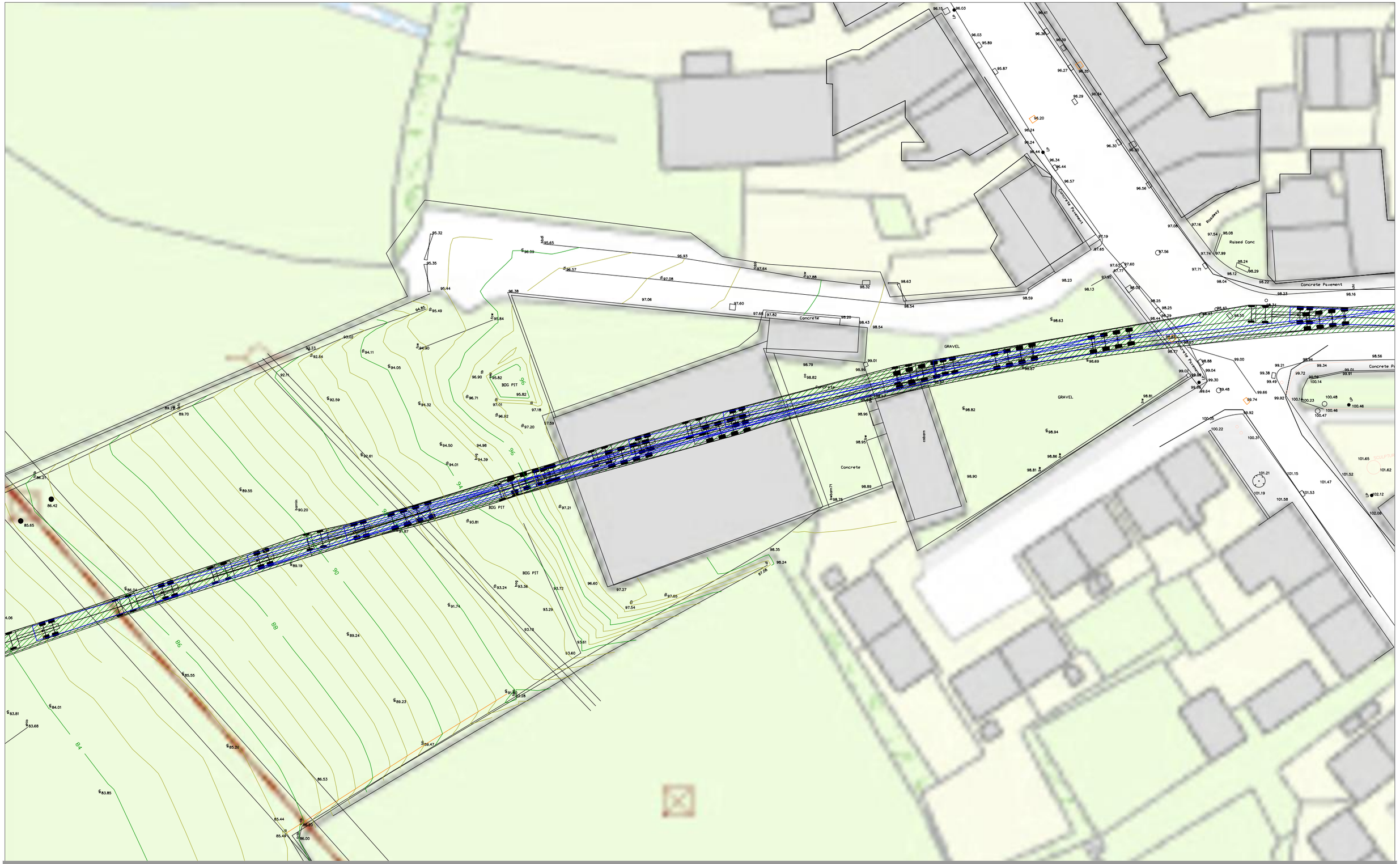


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.8 Location 2 - Access Junction A - R280, for turbine artics only, autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:500 |
| PROJECT NO: 7410 | DATE: 29.06.20 | DRAWN BY: | AL |

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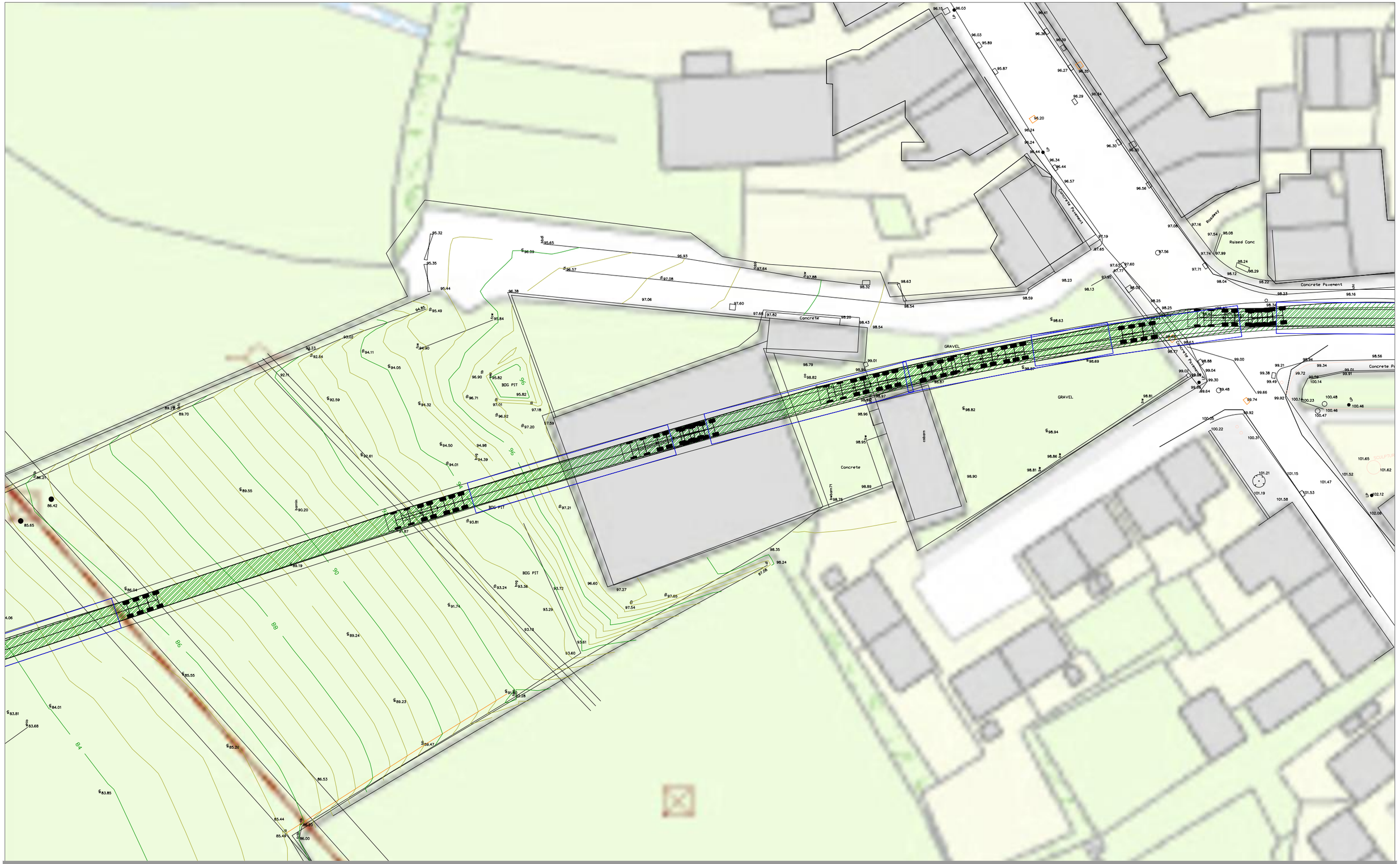


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.9 Location 2 - Access Junction A - R280, for turbine artics only, autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:500 |
| PROJECT NO: 7410 | DATE: 29.06.20 | DRAWN BY: | AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.10 Location 3 - Access Junction B - L4282, for turbine artics only, autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 29.06.20 | DRAWN BY: | AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.11 Location 3 - Access Junction B - L4282, for turbine artics only, autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 29.06.20 | | DRAWN BY: AL |

ALAN LIPSCOMBE
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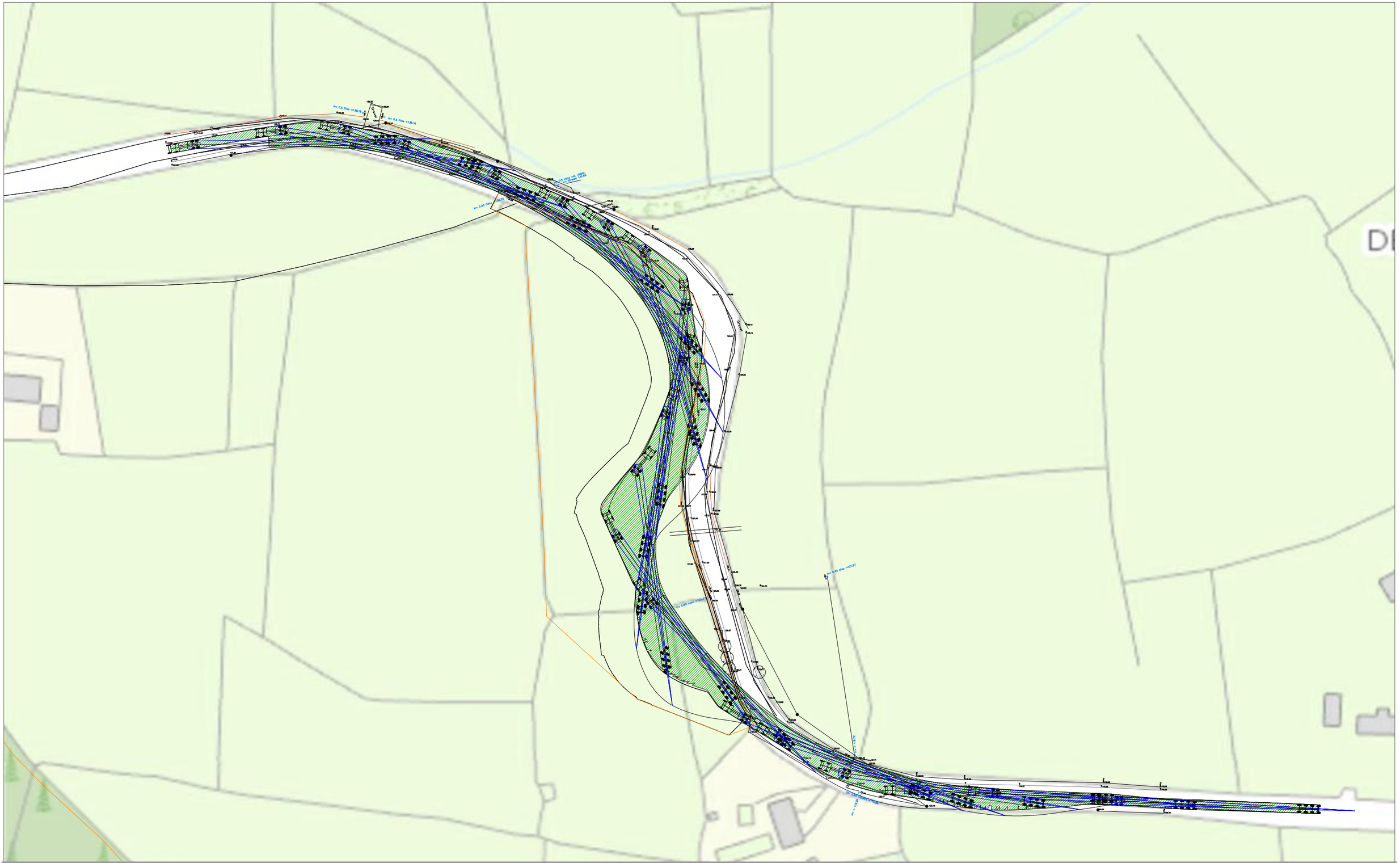


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.12 Location 4 - L4282, autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | | DRAWN BY: AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.13 Location 4 - L4282, autotrack assessment for tower extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

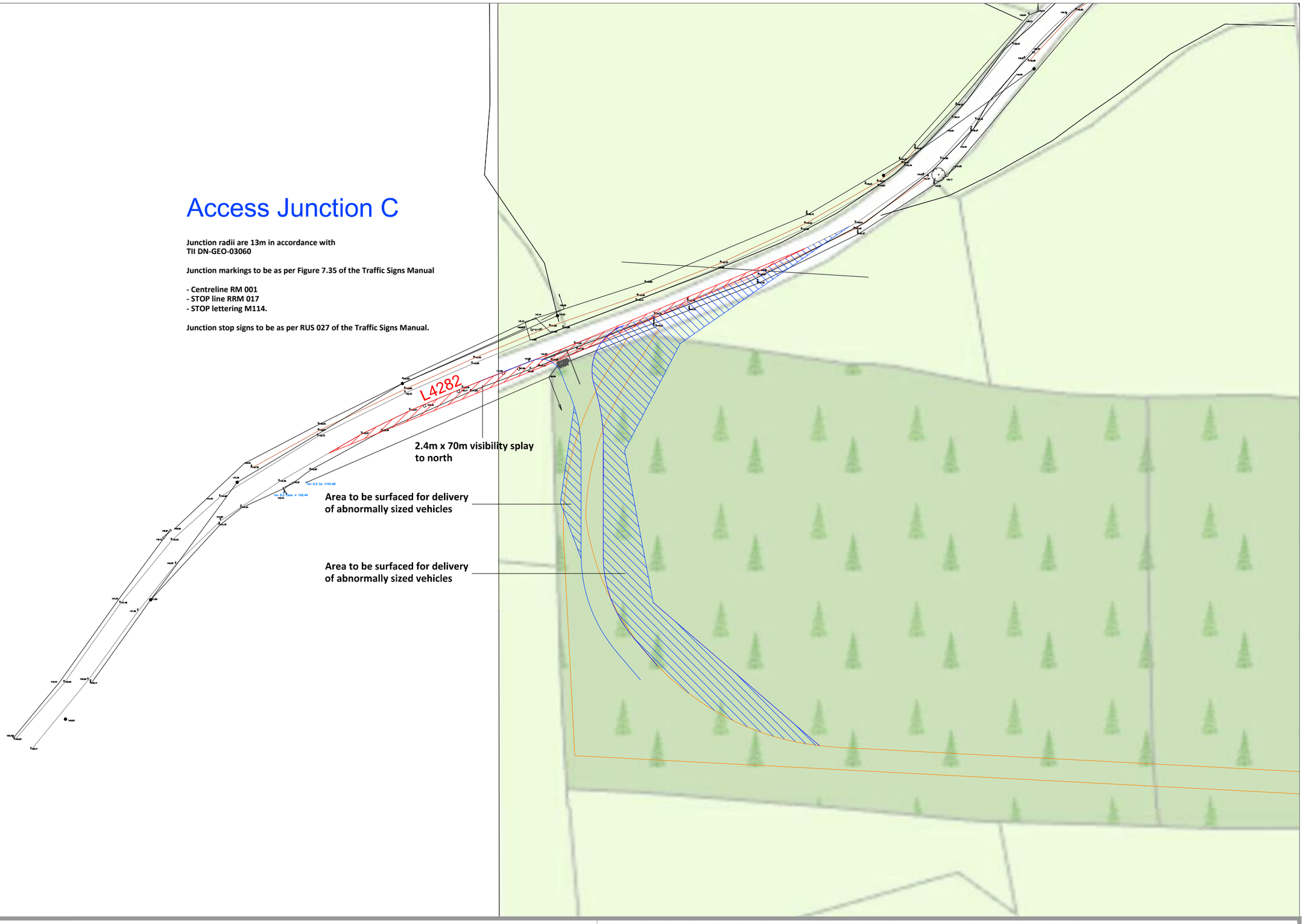
# Access Junction C

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**




NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.14 Location 5 - Access C - L4282 - Turbine access and general construction access, proposed layout and visibility splays

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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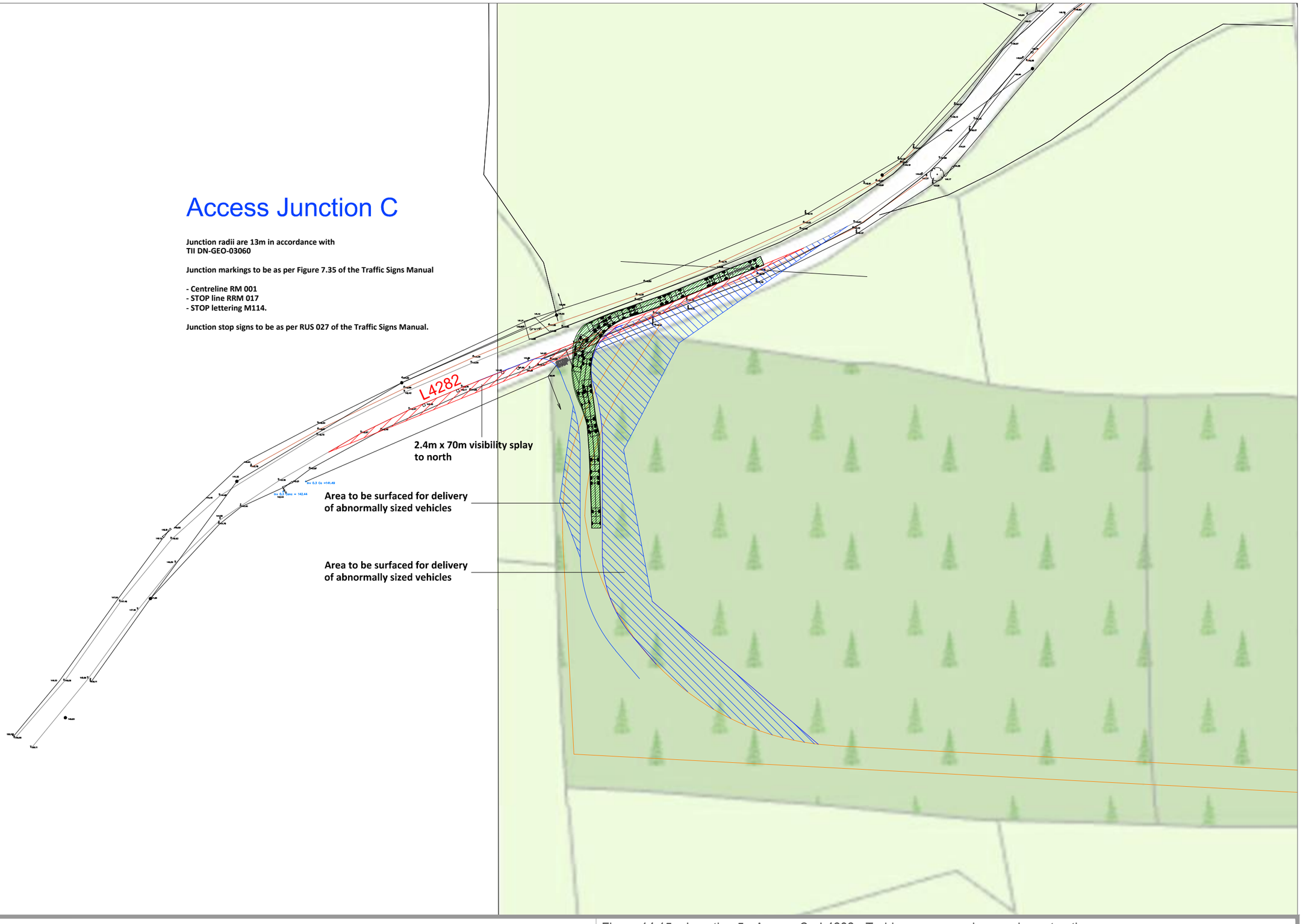
# Access Junction C

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**




NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.15 Location 5 - Access C - L4282 - Turbine access and general construction access, autotrack assessment for large standard artic HGVs

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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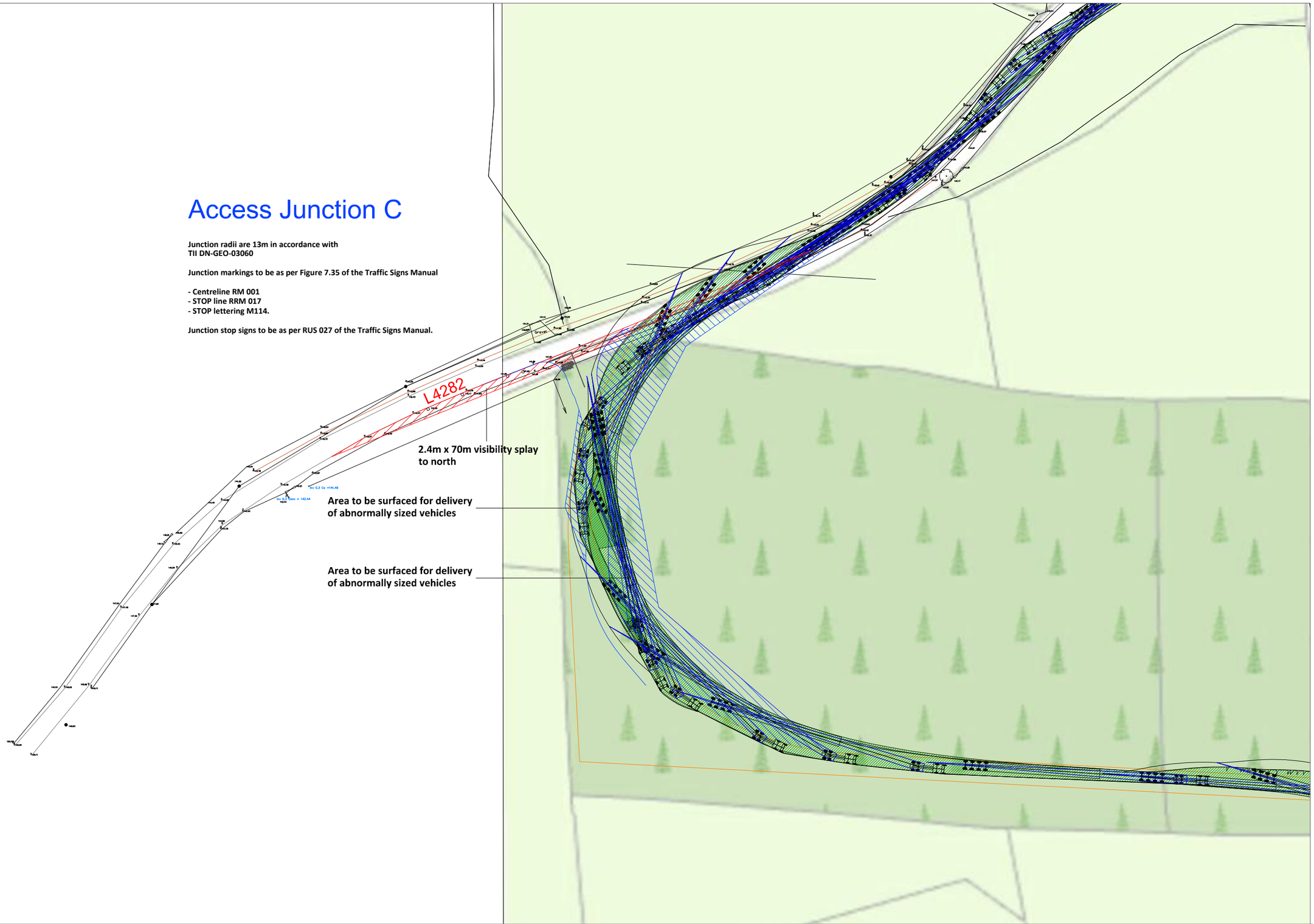
# Access Junction C

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**




NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.16 Location 5 - Access C - L4282 - Turbine access and general construction access, autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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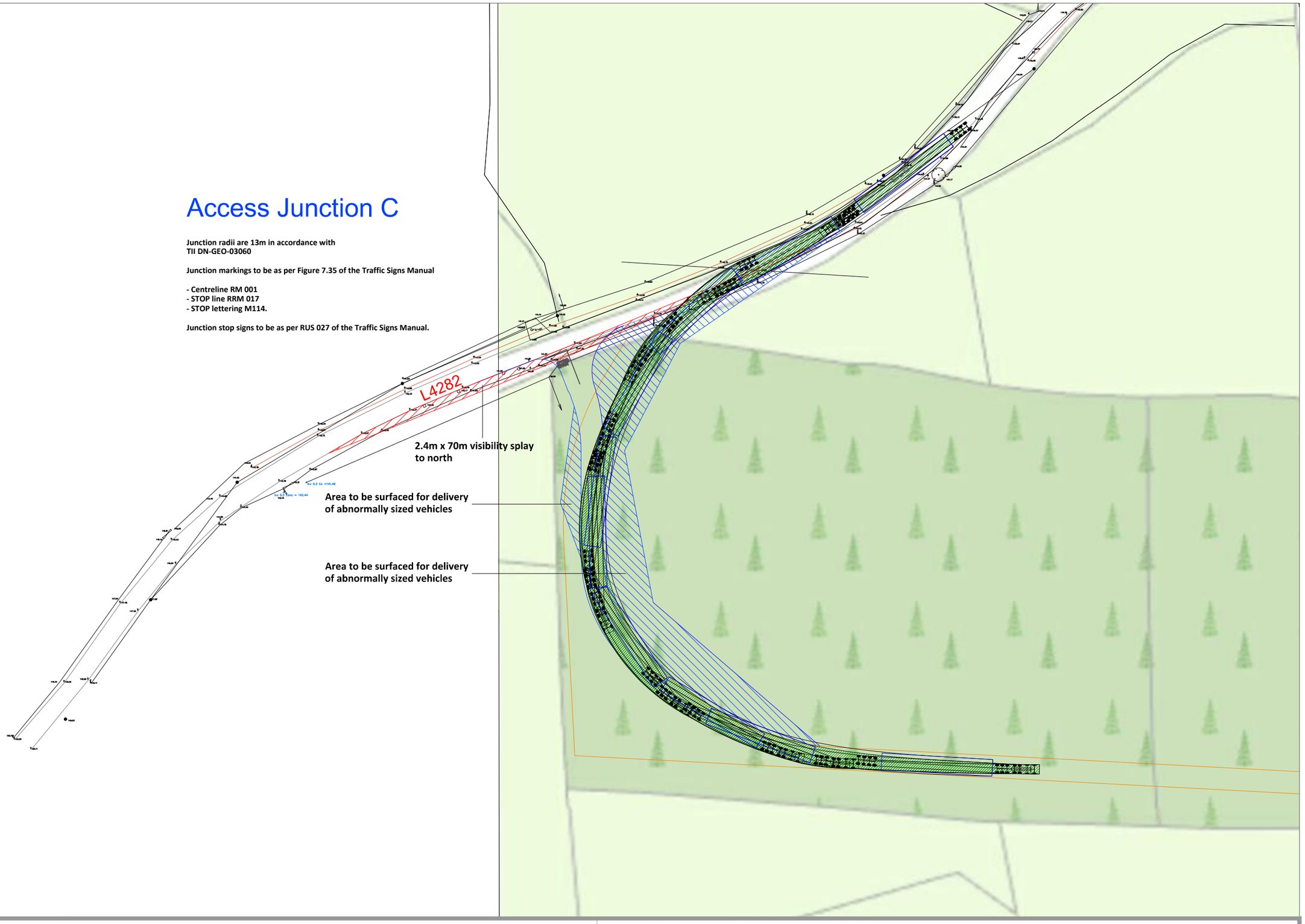
# Access Junction C

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**




NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.17 Location 5 - Access C - L4282 - Turbine access and general construction access, autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.18 Location 6 - Access D - L4282 - Turbine access and general construction access, proposed layout and visibility splay

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.19 Location 6 - Access D - L4282 - Turbine access and general construction access, autotrack assessment for large standard artic HGVs

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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# Access Junction D

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.20 Location 6 - Access Junction D - L4282 - autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | | DRAWN BY: AL |

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# Access Junction D

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.21 Location 6 - Access Junction D - L4282 - autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 26.02.20 | | DRAWN BY: AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.22 Location 7 - L4282 - autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.23 Location 7 - L4282 - autotrack assessment for tower extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.24 Location 8 - L4282 - autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.25 Location 8 - L4282 - autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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587716, 821

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.26 Location 9 - L4282 - autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.27 Location 9 - L4282 - autotrack assessment for tower extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.28 Location 10 - L4282 - autotrack assessment for blade extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.29 Location 10 - L4282 - autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | | DRAWN BY: AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.30 Location 11 - L4282 - autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.31 Location 11 - L4282 - autotrack assessment for tower extended artic

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | | | |
| CLIENT: | Coillte | | | SCALE: | 1:1000 |
| PROJECT NO: | 7410 | DATE: | 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.32 Location 12 - L4282 - autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | DRAWN BY: | AL |

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NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.33 Location 12 - L4282 - autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | | SCALE: 1:1000 |
| PROJECT NO: 7410 | DATE: 26.06.20 | | DRAWN BY: AL |

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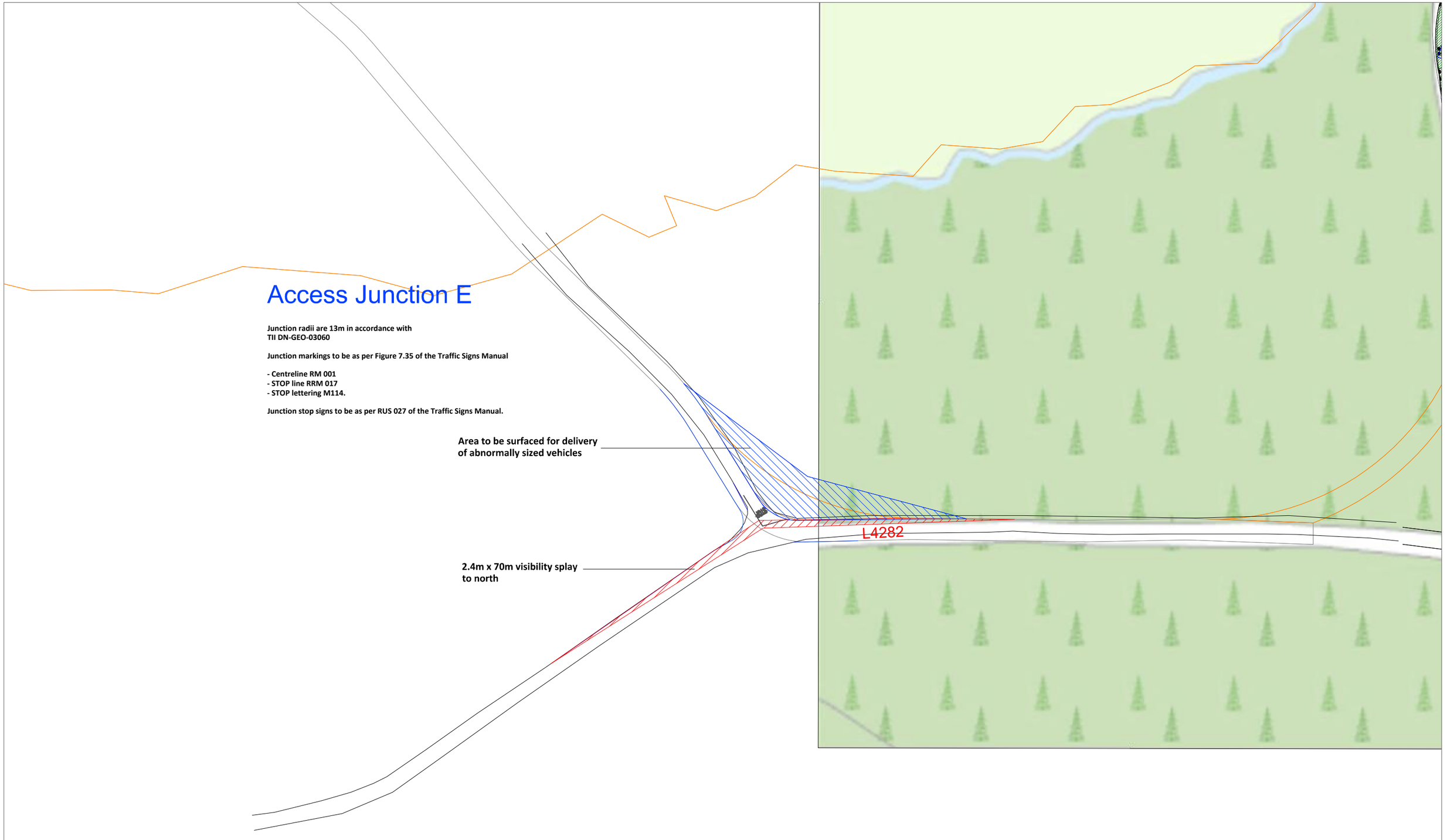


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.34 Location 13 - Access E - L4282 - Turbine access and general construction access, proposed layout and visibility splays

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 03.07.20 | DRAWN BY: | AL |

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# Access Junction E

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

**Area to be surfaced for delivery of abnormally sized vehicles**

**2.4m x 70m visibility splay to north**

L4282

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.35 Location 13 - Access E - L4282 - Turbine access and general construction access, autotrack assessment for large standard artic HGVs

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 03.07.20 | DRAWN BY: | AL |

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# Access Junction E

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

**Area to be surfaced for delivery of abnormally sized vehicles**

**2.4m x 70m visibility splay to north**

L4282

NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.36 Location 13 - Access E - L4282 - Turbine access and general construction access, autotrack assessment for blade extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 03.07.20 | DRAWN BY: | AL |

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

# Access Junction E

**Junction radii are 13m in accordance with TII DN-GEO-03060**

**Junction markings to be as per Figure 7.35 of the Traffic Signs Manual**

**- Centreline RM 001**
**- STOP line RRM 017**
**- STOP lettering M114.**

**Junction stop signs to be as per RUS 027 of the Traffic Signs Manual.**

**Area to be surfaced for delivery of abnormally sized vehicles**

**2.4m x 70m visibility splay to north**


NOTES:

PLANNING DRAWING ONLY - NOT FOR CONSTRUCTION PURPOSES

Base mapping provided by MKO

Figure 14.37 Location 13 - Access E - L4282 - Turbine access and general construction access, autotrack assessment for tower extended artic

| | | | |
|---|---|---|---|
| PROJECT: | Croagh Wind Farm, County Leitrim | | |
| CLIENT: | Coillte | SCALE: | 1:1000 |
| PROJECT NO: 7410 | DATE: 03.07.20 | DRAWN BY: | AL |

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# APPENDIX 14-2

***OUTLINE TRAFFIC MANAGEMENT PLAN***

## 1.1 Outline Construction Traffic Management Plan

### 1.1.1 Introduction

This outline Traffic Management Plan (outline TMP) will be a key construction contract document, the implementation of which will reduce possible impacts which may occur during the construction of the proposed development. In the event planning permission is granted for the proposed development, the final TMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

The Project Supervisor Construction Stage when appointed, along with the turbine supplier will also review and update of the Traffic Management Plan.

### 1.1.2 Construction Phases

The construction phase of the proposed development will run for between 12 - 18 months. Due to the size of the site, its general layout and the total number of turbines proposed, it is unlikely that the construction phase will require phasing. Therefore, the following sequence of construction activities are proposed:

- Construction of main road access and site entrances, including the proposed link road and site access road, as described in Chater 4 of the EIAR.
- Initial installation of on-site tracks and drainage.
- Installation of new access tracks and upgrade of existing.
- Development of the construction compound and any other temporary works.
- Construction of substation and control building.
- Preparation of crane hard standings.
- Construction of turbine foundations.
- Installation of internal site cabling within wind farm
- Installation of the grid connection cabling
- Wind Turbine erection
- Land reinstatement.

#### 1.1.2.1 Site Access Tracks

The internal access tracks will provide the required access to all turbines and associated infrastructure. The new and proposed upgraded access tracks have been designed to provide a minimum 5 meter running width along the straight sections of track with wider sections proposed at bends where required. Passing bays will be installed to allow a mechanism for two-way traffic. Appropriate signage at the location of these passing bays as well as instruction on priority vehicles will be installed throughout the site. The running surface on the existing and proposed new access tracks will facilitate the delivery of abnormally sized loads.

Where upgrades of or adjacent to existing public road junctions as well as the provision of the construction access ,road for turbine deliveries and other construction materials are to be completed, as outlined in Chapter 4 of the EIAR, the traffic management on the public road at these locations will be provided by the appointed contractor with the approval of the appropriate roads authority.

#### 1.1.2.2 Access to the Site from the Public Road Network

The site will be accessed via a forestry track off the L4282 leading to the site, in the townland of Boleymaguire. It is proposed to upgrade the existing forestry track for use as the site entrance during the construction and operational phases.
The delivery of all abnormally sized loads to the site will be via the R280 from the south to Drumkeeran, followed by the proposed link road between the R280 and the L4282, followed by sections of the L4282 and the proposed construction access road to the site access. Delivery of general construction traffic

will travel to Drumkeeran from either the south or the north and continue onto the site via the L4282 and the proposed construction access road. From here, the vehicles will use the internal site roads to access the proposed infrastructure locations within the site. The entrance to the proposed development site will be secured at the end of each working day with a gate.

The public roads on the turbine haul route as well as all other potential materials delivery routes will be subject to a confirmatory, condition survey prior to the commencement of any works at the proposed development site. This will include a structural integrity survey at all bridges and culverts which will be traversed by the grid connection cabling as well as the turbine delivery route.

#### 1.1.2.3 Turbine Components Delivery

The deliveries of turbine components to the site will be made in convoys of approximately three to five vehicles at a time, and mostly at night when roads are quietest. Convoys will be accompanied by escorts at the front and rear operating a transient "stop and go" system. Although the turbine delivery vehicles are large, they will not prevent other road users or emergency vehicles passing, should the need arise. The delivery escort vehicles will ensure the turbine transport is carried out in a safe and efficient manner with minimal delay or inconvenience for other road users.

It is not anticipated that any section of the local road network will be closed during transport of turbines, although there will be some delays to local traffic at pinch points. During these periods it may be necessary to operate local diversions for through traffic. All deliveries comprising abnormally large loads will be made outside the normal peak traffic periods to avoid disruption to work and school-related traffic.

Prior to the Outline Traffic Management Plan being finalised, a full dry run of the transport operation along the proposed route will be completed using vehicles with attachments to simulate the dimensions of the wind turbine transportation vehicles. This dry run will inform the final traffic management plan. All turbine deliveries will be provided for in a transport management plan which will have to be prepared in advance of the construction stage, when the exact transport arrangements are known, delivery dates confirmed and escort proposals in place. Such a transport management plan is typically submitted to the Planning Authority for agreement in advance of any abnormal loads using the local roads, and will provide for all necessary safety measures, including a convoy and Garda escort as required, off-peak turning/reversing movements and any necessary safety controls. The proposed turbine delivery route is shown in Figure 14.1 of the EIAR.

The delivery of the abnormally sized turbine components will be carried by a specialist haulage company who will complete a confirmatory trial run prior to delivery.

It will be the responsibility of the appointed haulage company to liaise with the relevant local authorities and An Garda Siochána to secure the necessary permits. A system of public notification will also be required to provide residents with the intended delivery schedule of these abnormal loads. This information will be passed on by a leaflet drop, local engagement and/or the provision of the project website with updated notifications if deemed necessary at the time. This will form part of the continued community engagement effort as set out in Appendix 2-2 of the EIAR.

#### 1.1.2.4 Grid Connection Consents

The proposed grid connection route will require a Road Opening License (ROL) prior to the commencement of any grid connection works on the public road.

### 1.1.3 Traffic Management Plan

A final Traffic Management Plan (TMP), incorporating all the mitigation measures set out in this Outline TMP, will be prepared by the appointed contractor which will detail in respect of traffic management agreed with the roads authority and An Garda Síochána prior to construction works commencing on site. The detailed TMP will include the following:

**Traffic Management Coordinator –** a competent Traffic Management Co-ordinator will be appointed for the duration of the project and this person will be the main point of contact for all matters relating to traffic management.

**Delivery Programme –** a programme of deliveries will be submitted to the County Council in advance of deliveries of turbine components to site. Liaison with the relevant local authorities and Transport Infrastructure Ireland (TII) will be carried out where required regarding requirements such as delivery timetabling. The programme will ensure that deliveries are scheduled in order to minimise the demand on the local network and minimise the pressure on the access to the site.

**Information to locals** – Locals in the area will be informed of any upcoming traffic related matters e.g. temporary lane/road closures (if required) or delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-ordinator, who will be the main point of contact for all queries from the public or local authorities during normal working hours. An "out of hours" emergency number will also be provided.

**A Pre and Post Construction Condition Survey –** A pre-condition survey of roads associated with the proposed development will be carried out prior to construction commencement to verify and record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.

**Liaison with the relevant local authority -** Liaison with the County Councils and An Garda Síochána, will be carried out during the delivery phase of the abnormally sized turbine vehicles, when an escort for all convoys will be required. Once the surveys have been carried out and "prior to commencement" status of the relevant roads established, the Roads section will be informed of the relevant names and contact numbers for the Project Developer/Contractor Site Manager as well as the Site Environmental Manager.

**Implementation of temporary alterations to road network at critical locations** – At locations highlighted in Section 14.1.8. of the EIAR. This includes the construction of the proposed link road between the R280 and the L4282, the proposed construction access road to re-route construction traffic off a section of the L4282, and local road widening at various locations on the L4282. In addition, in order to minimise the impact on the existing environment during turbine component deliveries the option of blade adaptor trailers will also be used where deemed practicable.

**Identification of delivery routes** – These routes are identified in Section 4.4 of Chapter 4 of the EIAR and will be adhered to by all contractors.

**Travel plan for construction workers –** While the assessment set out in the EIAR assumes the worst case that construction workers will drive to the site, the construction company will be required to provide a travel plan for construction staff.

**Temporary traffic signs** – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including all new junctions providing access to the site off the R280. All measures will be in accordance with the *"Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works"* (Department of Transport, Tourism and Sport (DoTT&S)) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times.

**Delivery times of large turbine components** - The management plan will include the option to deliver the large wind turbine plant components at night in order to minimise disruption to general traffic during the construction stage.

**Additional measures** - Various additional measures will be put in place in order to minimise the effects of the development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required.

**Re-instatement works** - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

**Road Opening Licence** – Roads works associated with the grid connection cabling will be undertaken in line with the requirements of a road opening licence as agreed with Leitrim County Council.

**Diversions and road closures –** reasonable access to residences, farms and businesses will be maintained at all times during any road closures associated with the cable works. The details of this will be agreed with the roads authority in advance of works taking place. The network of local roads in the area will be used for traffic diversions for local traffic in order to expedite the works and limit the duration of the impact owing to the cabling works.

**Trench Reinstatement -** Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the roads authority. Following temporary reinstatement of trenches sections of public roads along which the cable route travels will receive a surface overlay subject to agreement with the roads authority.