




| Date       | Engagement (Describe) | Small group Meetings (Attendees) | Larger Group Meetings (Attendees) | Emails   | Workshops                    | Site Visits | Layout Map circulated | Meeting Summary   |
|------------|-----------------------|----------------------------------|-----------------------------------|--|------------------------------|-------------|-----------------------|---|
|            |                       |                                  |                                   |  |                              |             |                       | use of the 2006 WEGS in absence of new WEGS, 2 proposed turbines in NE not proceeding, property values workshop, Q&A.   |
|            |                       |                                  |                                   |  |                              |             |                       |   |
| 13/06/2019 |                       |                                  |                                   | Noise Workshop Agenda. Email to circulation list. Delivery to all others within near neighbour zone.                   |                              |             |                       |   |
| 24/06/2019 |                       |                                  |                                   | Minutes Issue. Email to circulation list. Delivery to all others within near neighbour zone.                           |                              |             |                       |   |
| 02/07/2019 |                       |                                  |                                   |  | Noise AWN (6 attendees)      |             |                       |   |
| 16/07/2019 |                       |                                  |                                   | Meeting Agenda and Project Update Issue. Email to circulation list. Delivery to all others within near neighbour zone. |                              |             |                       |   |
| 18/07/2019 |                       |                                  | 3                                 |  |                              |             |                       | EIAR & Studies update, noise and noise workshop, community benefit fund, community ownership, preplanning meetings with Leitrim & Sligo Co Co, property values, recreational potential as part of proposed project. |
| 19/07/2019 |                       |                                  |                                   | Noise Workshop Presentation. Email to circulation list. Delivery to all others within near neighbour zone.             |                              |             |                       |   |
| 01/08/2019 |                       |                                  |                                   | Minutes Issue. Email to circulation list. Delivery to all others within near neighbour zone.                           |                              |             |                       |   |
| 12/08/2019 |                       |                                  |                                   | Confirming meeting email to circulation list. Text to others.  |                              |             |                       |   |
| 14/08/2019 |                       |                                  | 3                                 |  | Ecology & Archaeology MW-MKO |             |                       |   |
| 21/08/2019 |                       |                                  |                                   | Archaeology & Ecology presentations email to circulation list. Delivery to all others within near neighbour zone.      |                              |             |                       |   |

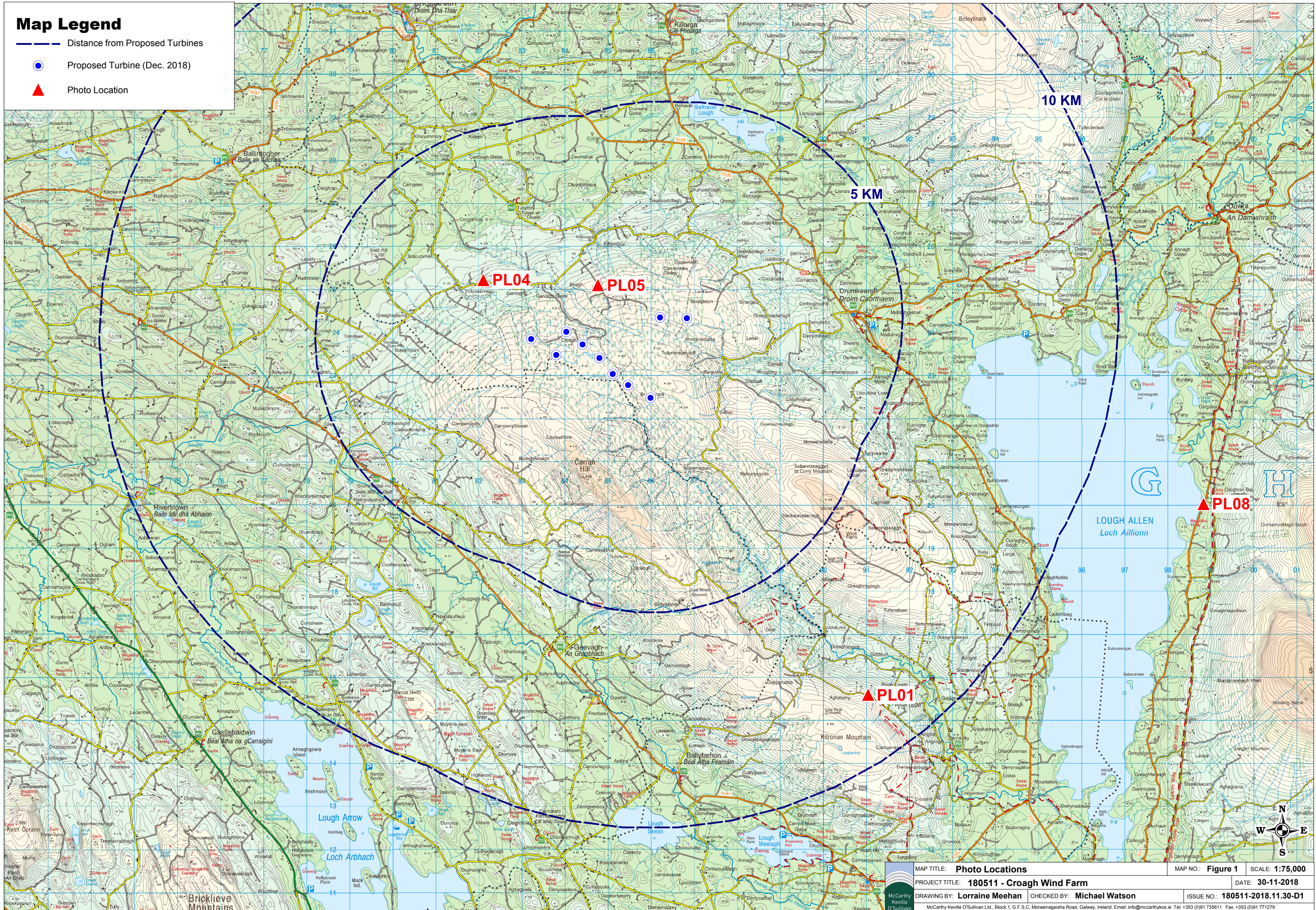
| Date   | Engagement (Describe)  | Small group Meetings (Attendees) | Larger Group Meetings (Attendees) | Emails  | Workshops | Site Visits | Layout Map circulated | Meeting Summary |
|--|--|----------------------------------|-----------------------------------|---|-----------|-------------|-----------------------|-----------------|
| 01/10/2019   |  |                                  |                                   | Email outlining that due to very low attendance, monthly meetings were not useful to people and outlining that we would revert to individual engagements to explain the design and address any queries. Email to circulation list. Delivery to all others within near neighbour zone. No feedback that suggested that neighbours wished to continue the monthly meetings. |           |             |                       |                 |
| 12/12/2019   |  |                                  |                                   | Email enclosing details on the new WEGS. Email to circulation list. Delivery to all others within near neighbour zone.  |           |             |                       |                 |
| 09 - 19/12/19  | Brochure Delivery. Delivery to all within 5km of the proposed development. Delivered by the project CLO, who was available to answer any queries.  |                                  |                                   |   |           |             |                       |                 |
| 13/12/2019   | Letter to Elected representatives, TDs, County Councillors, MEPs proximate to the proposed project. Brochure enclosed, request for meeting to discuss the proposed project.  |                                  |                                   |   |           |             |                       |                 |
| 19/12/2019   | Website Goes Live  |                                  |                                   |   |           |             |                       |                 |
| 08/01/2020   |  |                                  |                                   | Email giving update on expected planning submission date and upcoming met mast planning application. Email to circulation list. Delivery to all others within near neighbour zone.  |           |             |                       |                 |
| 19/02/2020   | Letter enclosing brochure to all community organisations within 10km of the proposed WF. Invitation to outline any queries in relation to the proposed project, to invite the group to become stakeholders.  |                                  |                                   |   |           |             |                       |                 |
| 01/04/2020   | Email giving update on progress of the planning application preparation and outlining that a submission would not be before the start of May. Details given and link attached to Government provisions on public consultations to be extended. Email to circulation list, text to others within near neighbour zone. |                                  |                                   |   |           |             |                       |                 |
| June 2018 to January 2019, ongoing and then main focus from October 2019 to date | Individual house engagements by the CLO.   |                                  |                                   |   |           |             |                       |                 |


## **Appendix B – Early Stage Photomontages**



# Map Legend

-  Distance from Proposed Turbines
-  Proposed Turbine (Dec. 2018)
-  Photo Location



|   |   |                                   |                        |
|---|---|-----------------------------------|------------------------|
|    | <b>MAP TITLE: Photo Locations</b>               | <b>MAP NO.: Figure 1</b>          | <b>SCALE: 1:75,000</b> |
|   | <b>PROJECT TITLE: 180511 - Croagh Wind Farm</b> | <b>DATE: 30-11-2018</b>           |                        |
|   | <b>DRAWING BY: Lorraine Meehan</b>              | <b>CHECKED BY: Michael Watson</b> |                        |
|   | <b>ISSUE NO.: 180511-2018.11.30-D1</b>          |                                   |                        |
| McCarthy Keville O'Sullivan<br>McCarthy Keville O'Sullivan Ltd., Block 1, G.F.S.C. Moneenagasha Road, Galway, Ireland. Email: info@mcCarthykos.ie Tel: +353 (0)91 735611 Fax: +353 (0)91 771279 |   |                                   |                        |









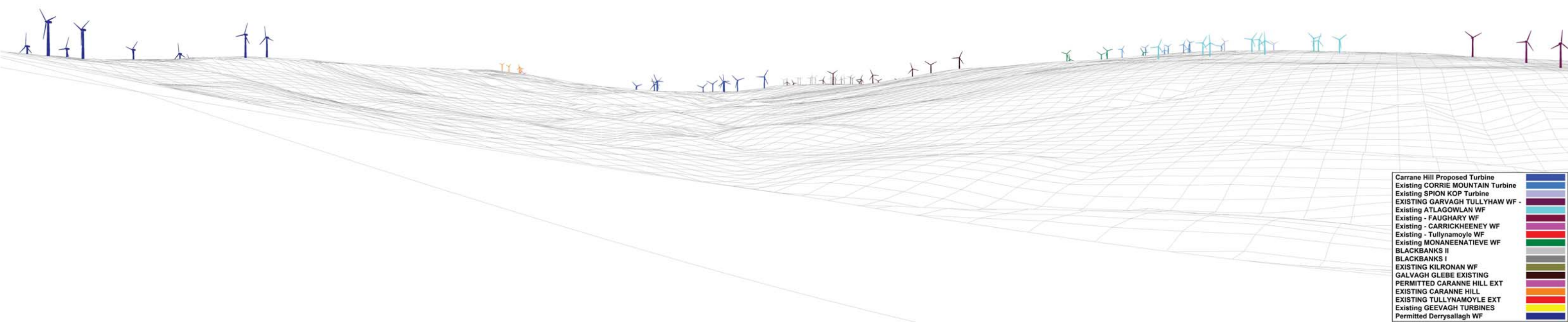


Permitted Derrysallagh WF

PERMITTED CARRANNE HILL EXT  
EXISTING CARRANNE HILL

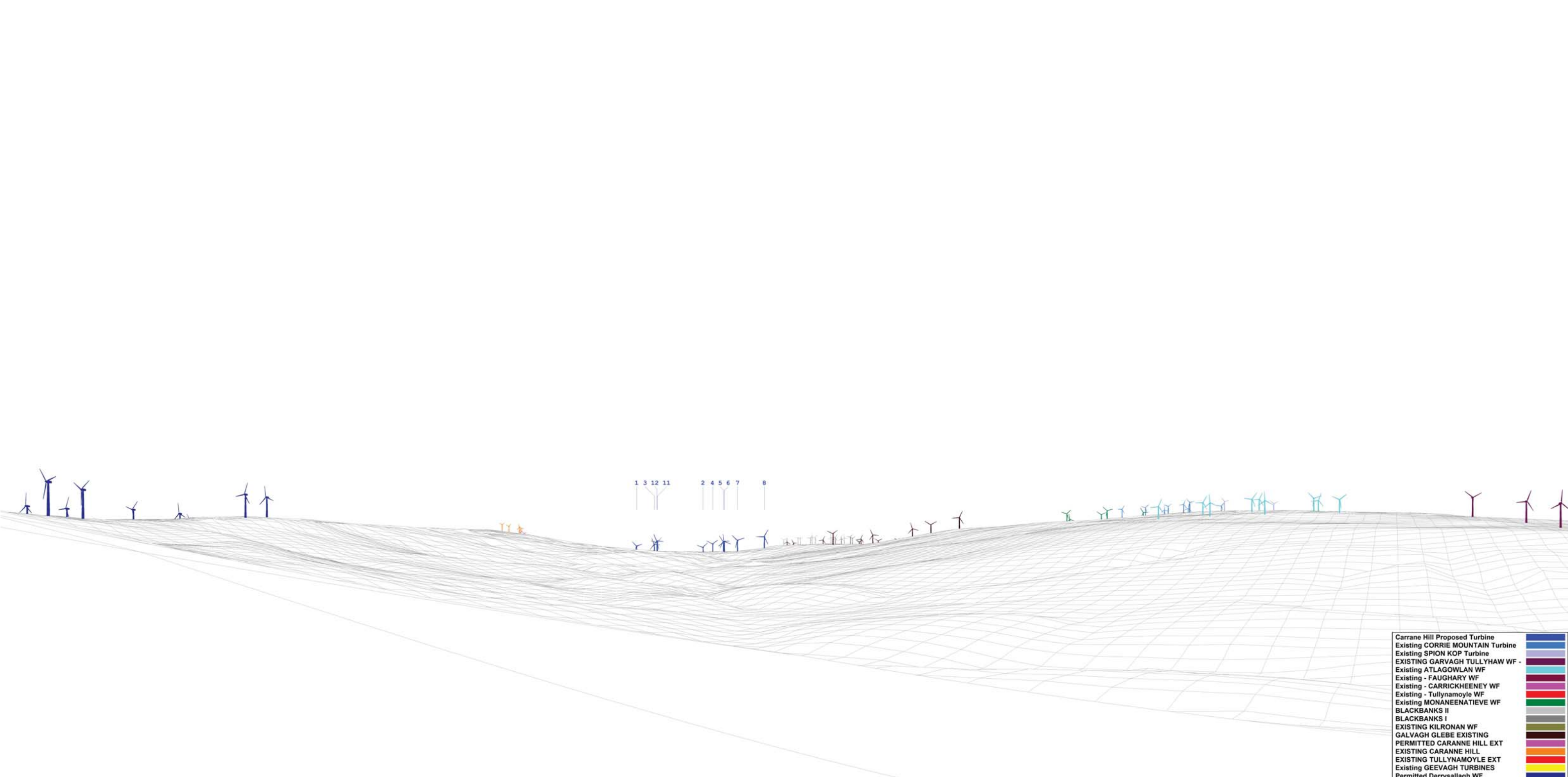
Carrane Hill Proposed Turbine  
BLACKBANKS II  
BLACKBANKS I  
GALVAGH GLEBE EXISTING

Existing CORRIE MOUNTAIN Turbine  
Existing SPION KOP Turbine  
Existing MONANEENATIEVE WF  
Existing ATLAGOWLAN WF



|                                  |                 |
|----------------------------------|-----------------|
| Carrane Hill Proposed Turbine    | Blue            |
| Existing CORRIE MOUNTAIN Turbine | Light Blue      |
| Existing SPION KOP Turbine       | Light Purple    |
| EXISTING GARVAGH TULLYHAW WF     | Dark Purple     |
| Existing ATLAGOWLAN WF           | Teal            |
| Existing - FAUGHARY WF           | Light Green     |
| Existing - CARRICKEENEY WF       | Green           |
| Existing - Tullynamoyle WF       | Yellow-Green    |
| Existing MONANEENATIEVE WF       | Yellow          |
| BLACKBANKS II                    | Light Grey      |
| BLACKBANKS I                     | Dark Grey       |
| EXISTING KILRONAN WF             | Light Blue-Grey |
| GALVAGH GLEBE EXISTING           | Light Blue      |
| PERMITTED CARRANNE HILL EXT      | Orange          |
| EXISTING CARRANNE HILL           | Light Orange    |
| EXISTING TULLYNAMOYLE EXT        | Red-Orange      |
| Existing GEEVAGH TURBINES        | Yellow          |
| Permitted Derrysallagh WF        | Dark Blue       |





- Carrane Hill Proposed Turbine
- Existing CORRIE MOUNTAIN Turbine
- Existing SPION KOP Turbine
- EXISTING GARVAGH TULLYHAW WF -
- Existing ATLAGOWLAN WF
- Existing - FAUGHARY WF
- Existing - CARRICKEENEY WF
- Existing - Tullynamoyle WF
- Existing MONANEENATIEVE WF
- BLACKBANKS II
- BLACKBANKS I
- EXISTING KILRONAN WF
- GALVAGH GLEBE EXISTING
- PERMITTED CARANNE HILL EXT
- EXISTING CARANNE HILL
- EXISTING TULLYNAMOYLE EXT
- Existing GEEVAGH TURBINES
- Permitted Derrysallagh WF

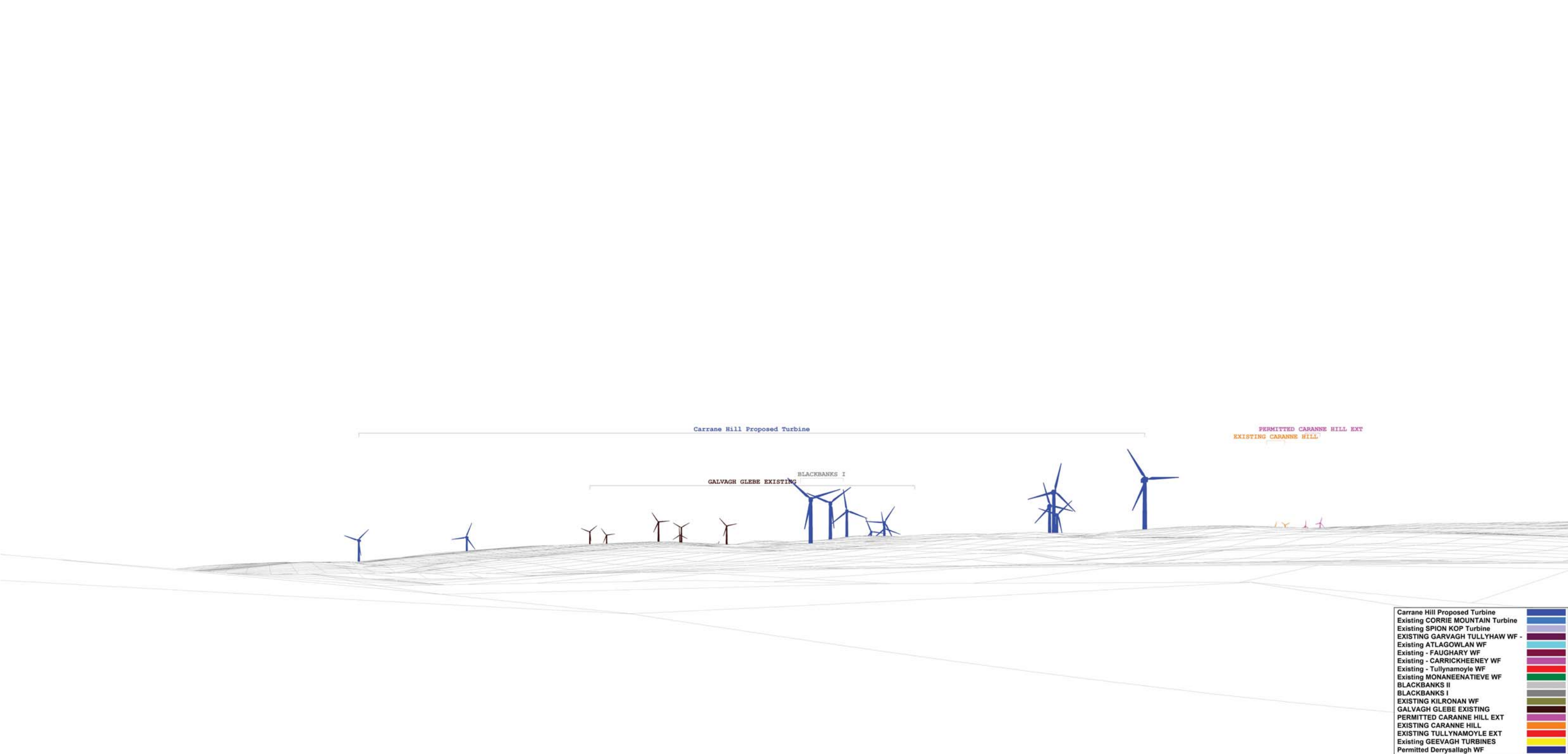














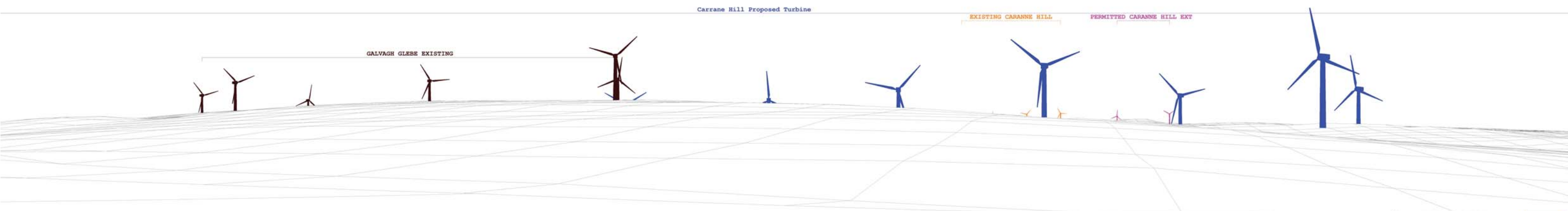


- Carrane Hill Proposed Turbine
- Existing CORRIE MOUNTAIN Turbine
- Existing SPION KOP Turbine
- EXISTING GARVAGH TULLYHAW WF -
- Existing ATLAGOWLAN WF
- Existing - FAUGHARY WF
- Existing - CARRICKHEENEY WF
- Existing - Tullynamoyle WF
- Existing MONANEENATIEVE WF
- BLACKBANKS II
- BLACKBANKS I
- EXISTING KILRONAN WF
- GALVAGH GLEBE EXISTING
- PERMITTED CARANNE HILL EXT
- EXISTING CARANNE HILL
- EXISTING TULLYNAMOYLE EXT
- Existing GEEVAGH TURBINES
- Permitted Derrysallagh WF



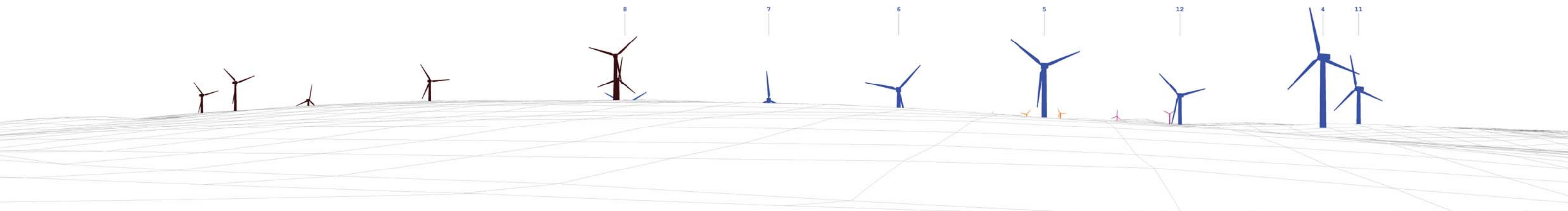






|                                  |   |
|----------------------------------|---|
| Carrane Hill Proposed Turbine    |  |
| Existing CORRIE MOUNTAIN Turbine |  |
| Existing SPION KOP Turbine       |  |
| EXISTING GARVAGH TULLYHAW WF -   |  |
| Existing ATLAGOWLAN WF           |  |
| Existing - FAUGHARY WF           |  |
| Existing - CARRICKEENEY WF       |  |
| Existing - Tullynamoyle WF       |  |
| Existing MONANEENATIEVE WF       |  |
| BLACKBANKS II                    |  |
| BLACKBANKS I                     |  |
| EXISTING KILRONAN WF             |  |
| GALVAGH GLEBE EXISTING           |  |
| PERMITTED CARANNE HILL EXT       |  |
| EXISTING CARANNE HILL            |  |
| EXISTING TULLYNAMOYLE EXT        |  |
| Existing GEEVAGH TURBINES        |  |
| Permitted Derrysallagh WF        |  |





|                                  |              |
|----------------------------------|--------------|
| Carrane Hill Proposed Turbine    | Blue         |
| Existing CORRIE MOUNTAIN Turbine | Light Blue   |
| Existing SPION KOP Turbine       | Light Purple |
| EXISTING GARVAGH TULLYHAW WF -   | Dark Purple  |
| Existing ATLAGOWLAN WF           | Light Cyan   |
| Existing - FAUGHARY WF           | Light Green  |
| Existing - CARRICKEENEY WF       | Pink         |
| Existing - Tullynamoyle WF       | Red          |
| Existing MONANEENATIEVE WF       | Green        |
| BLACKBANKS II                    | Grey         |
| BLACKBANKS I                     | Light Grey   |
| EXISTING KILRONAN WF             | Olive Green  |
| GALVAGH GLEBE EXISTING           | Brown        |
| PERMITTED CARANNE HILL EXT       | Purple       |
| EXISTING CARANNE HILL            | Orange       |
| EXISTING TULLYNAMOYLE EXT        | Red          |
| Existing GEEVAGH TURBINES        | Yellow       |
| Permitted Derrysallagh WF        | Dark Blue    |







EXISTING GARVAGH TULLYHAW WF -  
Permitted Derrysallagh WF

Existing CORRIE MOUNTAIN Turbine  
Existing SPION KOP Turbine  
Existing ATLAGOWLAN WF  
Existing MONANEENATIEVE WF

BLACKBANKS II  
BLACKBANKS I  
GALVAGH GLEBE EXISTING

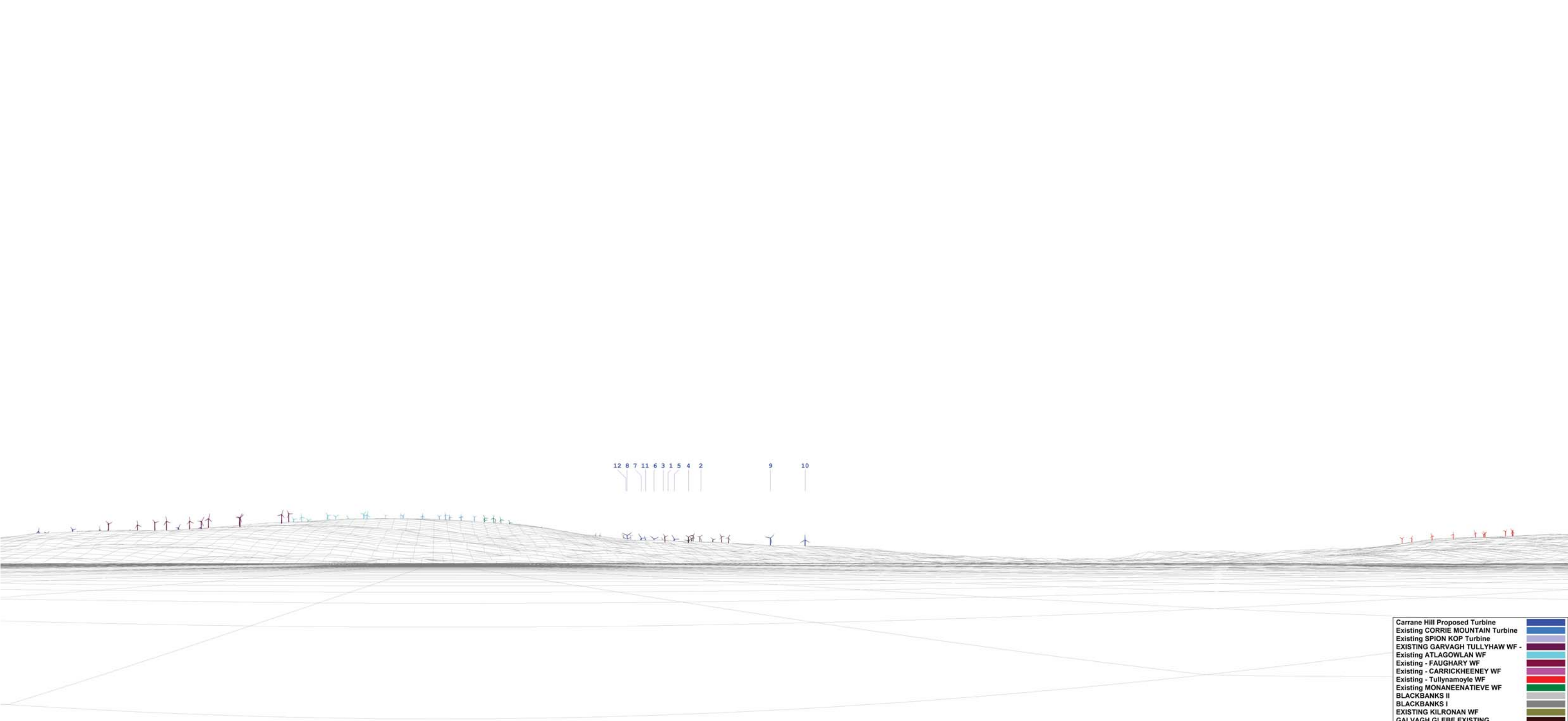
Carrane Hill Proposed Turbine

Existing - Tullynamoyle WF  
EXISTING TULLYNAMOYLE EXT



|                                  |             |
|----------------------------------|-------------|
| Carrane Hill Proposed Turbine    | Blue        |
| Existing CORRIE MOUNTAIN Turbine | Light Blue  |
| Existing SPION KOP Turbine       | Dark Blue   |
| EXISTING GARVAGH TULLYHAW WF -   | Light Green |
| Existing ATLAGOWLAN WF           | Light Blue  |
| Existing - FAUGHARY WF           | Light Green |
| Existing - CARRICKHEENEY WF      | Light Green |
| Existing - Tullynamoyle WF       | Light Green |
| Existing MONANEENATIEVE WF       | Light Green |
| BLACKBANKS II                    | Light Green |
| BLACKBANKS I                     | Light Green |
| EXISTING KILRONAN WF             | Light Green |
| GALVAGH GLEBE EXISTING           | Light Green |
| PERMITTED CARANNE HILL EXT       | Light Green |
| EXISTING CARANNE HILL            | Light Green |
| EXISTING TULLYNAMOYLE EXT        | Light Green |
| Existing GEEVAGH TURBINES        | Light Green |
| Permitted Derrysallagh WF        | Light Green |





12 8 7 11 6 3 1 5 4 2 9 10

- Carrane Hill Proposed Turbine
- Existing CORRIE MOUNTAIN Turbine
- Existing SPION KOP Turbine
- EXISTING GARVAGH TULLYHAW WF -
- Existing ATLAGOWLAN WF
- Existing - FAUGHARY WF
- Existing - CARRICKHEENEY WF
- Existing - Tullynamoyle WF
- Existing MONANEENATIEVE WF
- BLACKBANKS II
- BLACKBANKS I
- EXISTING KILRONAN WF
- GALVAGH GLEBE EXISTING
- PERMITTED CARANNE HILL EXT
- EXISTING CARANNE HILL
- EXISTING TULLYNAMOYLE EXT
- Existing GEEVAGH TURBINES
- Permitted Derrysallagh WF

## **Appendix C – Workshop Handouts**



Croagh Wind Farm – Noise Workshop 2<sup>nd</sup> July 2019

## Wind Farm Noise Assessment



1

AWN is responsible for the noise and vibration assessment associated with the construction and operation of the proposed development, this role involves:

- Establishing the appropriate assessment methodology to be used;
- Completing a background noise monitoring survey of the site;
- Reviewing outputs from interim noise model; and
- Preparing the Noise and Vibration Chapter of the Environmental Impact Assessment Report (EIAR).

The EIAR chapter will present full details of the assessment undertaken. This information contained in the Chapter is technical due to the nature of the assessment – the details are required for transparency.



2

## Overview of Presentation - Key Items of the Operational Phase

3

1. The Decibel Scale
2. Assessment Guidelines & Noise Criteria
3. Background Noise Surveys
4. Assessment of Turbine Noise Impacts
5. Brief Summary
6. Other Topics
7. Questions



3

## 1. The Decibel Scale

4

- The Decibel Scale is a logarithmic scale used for measuring and comparing energies or powers.
- Expressed in dB
- Convenient due to the very large range of audible sound pressures:
  - Audible sound pressure scale (Pascals) of 5 million:1 is compressed into a more manageable range of ~120 dB.
  - Similar to the Richter Scale for measuring earthquakes.



4



## The Richter Scale

Understanding the Richter Scale:

| Richter Magnitude | Feels like KG of TNT              | Extra Information   |
|-------------------|-----------------------------------|---|
| 0-1               | 0.6-20 kilograms of dynamite      | We can not feel these   |
| 2                 | 600 kilograms of dynamite         | Smallest Quake people can normally feel   |
| 3                 | 20,000 kilograms of dynamite      | People near the epicenter feel this quake   |
| 4                 | 60,000 kilograms of dynamite      | This will cause damage around the epicenter. It is the same as a small fusion bomb                                  |
| 5                 | 20,000,000 kilograms of dynamite  | Damage done to weak buildings in the area of the epicenter  |
| 6                 | 60,000,000 kilograms of dynamite  | Can cause great damage around the epicenter   |
| 7                 | 20 billion kilograms of dynamite  | Creates enough energy to heat New York city for one year. Can be detected all over the world. Causes serious damage |
| 8                 | 60 billion kilograms of dynamite  | Causes death and major destruction. Destroyed San Francisco in 1906   |
| 9                 | 20 trillion kilograms of dynamite | Rare, but would cause unbelievable damage!  |



5

## The Decibel Scale

- Tenfold increase in sound intensity = +10dB
- Sound intensity ratio expressed in dB

|          |   |        |
|----------|---|--------|
| – 100    | = | 20 dB, |
| – 1000   | = | 30 dB, |
| – 10000  | = | 40 dB  |
| – 100000 | = | 50 dB  |

A 10 dB increase is equal to a tenfold increase in sound intensity energy. A 10 dB increase in noise is perceived by most people as being twice as loud.



6

## Addition of Decibels (dB)

- Combining Decibels (dB)
- Decibels do not follow the rules of ordinary arithmetic
  - 40 dB + 40 dB = **43 dB** (+3 dB just noticeable difference).
  - 40 dB + 45 dB = **46 dB** (+1 dB ~imperceptible change).
  - 40 dB + 50 dB = **50 dB** (no change to the higher level, 10 dB rule).
  - (40 dB + 40 dB = **43 dB**) + 50 dB = **51 dB**.



7

## Addition of Multiple Noise Sources

Doubling the number of identical noise sources?



All things being equal this results in a 3 dB increase in noise (i.e. just noticeable). A detailed assessment of wind turbine noise will consider many factors, the source sound power, distance to receiver, height etc. Addition sources = potential change to the noise environment



8



## A-Weighted Decibels (dBA)

- A-weighting is a standardised frequency correction applied to noise.
- Based on the human response to noise at different frequencies (equal loudness studies in 1950's, ISO 226:2003).
- Used for the vast majority of noise measurements, referenced in standards and regulations e.g. roads, aircraft, wind turbine noise etc.
- Common criticism is that it undervalues effects of low frequency noise as it apply more correction at lower frequencies.



## Acoustical Parameters

**dB(A)** an "A" weighted decibel value

**$L_{Aeq}$**  the equivalent continuous sound level - a type of "average"

**$L_{A90}$**  used to quantify background noise level. The  $L_{A90}$  parameter is used for the assessment of wind turbine noise.



## 2. Assessment Guidelines



- Section 5.6 of the “*Planning Guidelines on Wind Energy*” published by the Department of the Environment, Heritage and Local Government (DoEHLG) published in 2006 outlines the appropriate noise criteria in relation wind farm developments.



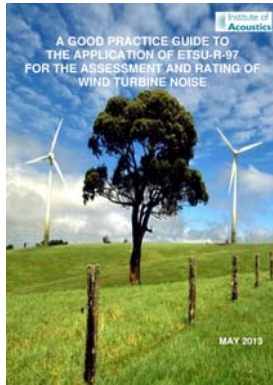
## Assessment Guidance

### ETSU-R-97

- ETSU-R-97 document ‘*The Assessment and Rating of Wind Farms*’ was published in 1996
- Provides a methodology for generating noise limits for a wind turbine and wind farms – referenced by the UK Government in current UK legislation.
- The noise criteria set out in the 2006 Irish Guidelines are based on ETSU-R-97.



## Assessment Guidance



### IOA Good Practice Guide (GPG)

- Published in 2013.
- Presents comprehensive advice on how to apply ETSU-R-97.
- Recognised as current best practice in the field.
- Informs the assessment methodology for this project.
- With the noise criteria taken from the 2006 DoEHLG Guidance.



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## 2006 DoEHLG Noise Criteria

- Noise criteria is based on the existing background noise level in the environment. The following noise criteria are contained in the guidance:
  - 35 to 40dB  $L_{A90,10min}$  for quiet daytime environments of less than 30dB  $L_{A90,10min}$ ;
  - 45dB  $L_{A90,10min}$  for daytime environments greater than 30dB  $L_{A90,10min}$ , or a maximum increase of 5dB(A) above background noise, whichever is the highest; and,
  - 43dB  $L_{A90,10min}$  for night time.



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### 3. Background Noise Survey

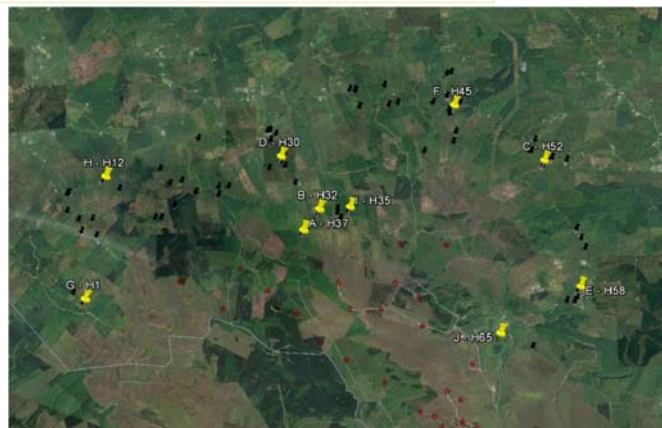
- Background noise surveys undertaken at 10 locations in early 2019 in accordance with the IOAGPG guidance.
- Identify background noise levels in order to set turbine noise limits (criteria) at noise sensitive locations (i.e. houses and amenity areas)
- Noise from existing wind turbines; IOA GPG:

**SB3:** Any contribution to background noise levels of noise from an existing wind farm must be excluded when assigning background noise and setting noise limits for a new development.



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### Locations of Background Noise Monitoring Location



16

## Analysis of Noise Data

Background noise levels are measured until adequate data sets are obtained across a range of windspeeds. Screened in line with best practice guidance for:

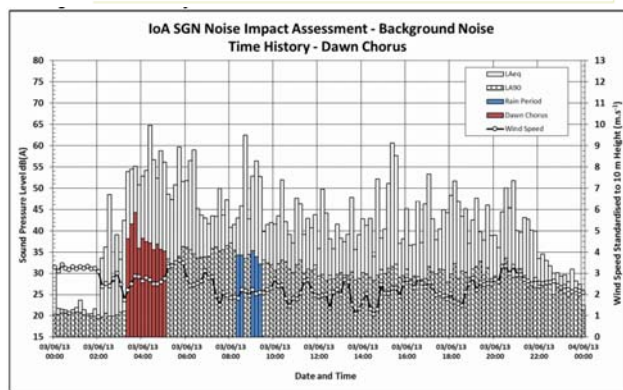
- quiet periods of day and night.
- removing periods affected of rainfall.
- removing atypical noise sources.
- removing noise from existing turbines.

The above steps yield a conservative assessment to ensure that background noise levels are not elevated.



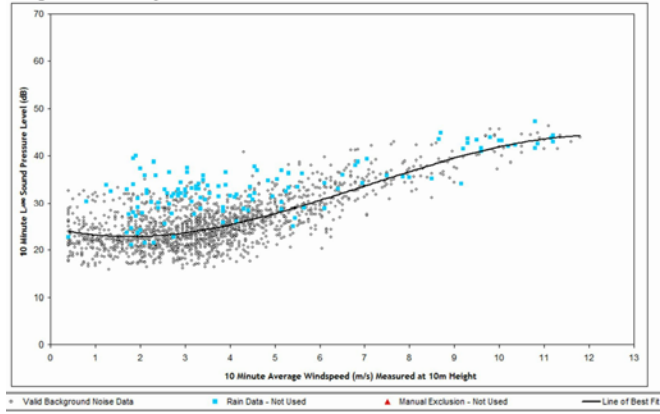
17

## Measured Noise Data

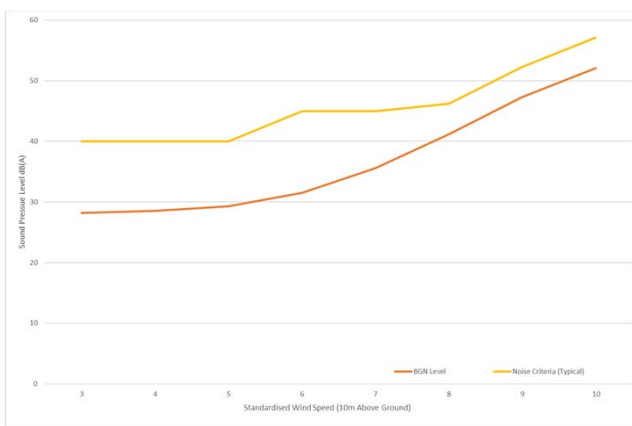


18

### Screened Data Sets for Deriving Background Noise Levels



### Noise Criteria Curve Derived from Background Noise Levels





## Noise Criteria Curve Derived from Background Noise Levels

- Cumulative turbine noise levels (proposed and existing turbines) should not exceed the criteria curves.
- The developer has no control over existing wind turbine noise.
- Consider the relevant increase in turbine noise level (existing + proposed turbines) as part of the impact appraisal.



21

## 4. Assessment of Turbine Noise

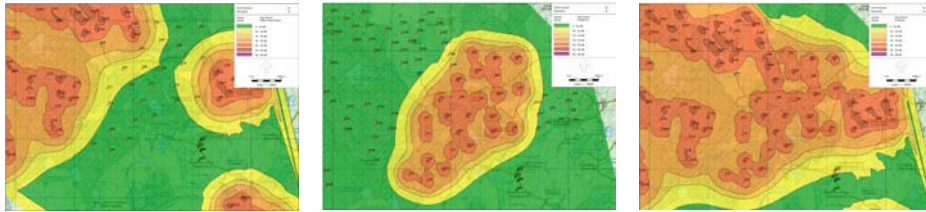
- Receive turbine layout and details from Coillte:
  - Turbine noise emissions at various operational Wind speed from the manufacturer;
  - Assessment Hub Height (HH) for the turbine; and
  - Noise Sensitive Locations (NSL) and Topography data (height lines).
- Develop a detailed noise prediction model using noise prediction calculation software in accordance with international standards (ISO1613) and the procedures set out in the IOAGPG. All details reported in the EIAR.



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## Assessment of Turbine Noise

- Noise predictions are compared against the noise criteria for all NSL's for both day and night.
- Cumulative noise predictions include existing turbines.
- Initial omni-directional predictions are a worst-case - consider directionality propagation due to wind direction.



awnconsulting

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## Assessment of Turbine Noise

- Do the cumulative noise predictions comply with the noise limits (criteria)?
- If yes, the assessment is complete subject to any changes to the design.
- If not, slight exceedances can be mitigated with curtailment i.e. running turbines in low noise modes – if significant exceedances, this may require redesign of turbine layout.
- Comment on the predicted impacts - significance of effects at nearest NSL's. The information contained in the EIAR presents the relevant info for all NSL's.

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## 5. Brief Summary

- Determine the study area and identify monitoring locations;
- Assess the background noise to establish appropriate turbine noise limits;
- Predict turbine noise levels, do they comply with the noise limits?
- If not - mitigate or redesign scheme.
- If yes - report results of assessment.



25

## 6. Other Topics

1. Amplitude Modulation
2. Low Frequency Noise (LFN)
3. Infrasound
4. WHO Guidelines
5. Future Irish Guidelines

A detailed discussion on each of these topics will be presented in the EIAR Chapter the following information is provided to give an overview.



26



## Amplitude Modulation (AM)

- What is it? Periodic fluctuations in the level of audible noise from a wind turbine (or wind turbines).
- Amplitude depth of fluctuations excessive.
- It is not possible to predict AM in wind turbines.
- Research has shown that occurrences at sites are rare and AM will typically only presents in specific conditions (wind speed/direction).
- Complaints relating to AM associated with the proposed development will be investigated in line with best practice.



## Mitigation for AM

- The turbine manufacture and operator shall investigate the potential causes of the AM and implement appropriate adjustments to mitigate for it, this may ultimately involve curtailment of some turbines under specific conditions where no other engineering solutions can be found.



## Low Frequency Noise (LFN)

- A-weighting not used in assessment of LFN.
- In the unlikely event that an issue with low frequency noise is associated with the proposed development.
- Recommend assessment of LFN if potential issues presents.
- EPA document Guidance Note for Noise: *Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (EPA, 2016).
- Salford University document *Procedure for the assessment of low frequency noise complaints*, Revision 1, December 2011.



## Infrasound

- Published documents from the Environmental Protection Agency (EPA) Ireland, UK Health Protection Agency, South Australian EPA and the World Health Organisation (WHO) have shown that there is no credible evidence that infrasound from wind turbines can be perceived or that it is associated with any negative health impacts.



## Infrasound

- Infrasound can be measured (ISO 7196:1995 – dB(G)).
- A recent study undertaken in Germany at a number of wind farm sites showed that the dB(G) measured in the vicinity of the sites were found to be below thresholds of perceptibility.
- At 700m no difference in dB(G) with turbines on/off.
- On the limited number of wind farm sites where AWN has conducted infrasound measurements there was no evidence of perceptible infrasound associated with operation of the wind turbines found.



## World Health Organisation (WHO) 2018 Guidelines

- Recommended to serve as the basis for a policy-making process e.g. inform new guidelines.
- The  $L_{den}$  parameter reference by the WHO is a yearly average level and is considered to be a poor characterisation of wind turbine noise.
- In relation to wind turbine noise the WHO recommendations are 'conditional' as the quality evidence available for research is low.





## Future Changes to the Guidelines

- The 'Preferred Draft Approach' was issued as an Information Note by the Department of Environment, Community and Local Government (DECLG) in June 2017.
- The noise limits discussed are similar to the current guidelines in that a lower threshold of 35 dB  $L_{90}$  is suggested with an allowable increase of 5 dB relative to the background noise.
- Updated guidelines are yet to be published.



## 7. Questions

- Please ask any question you may have.











# Archaeology & Cultural Heritage

- The intention is to assess potential effects on archaeological, architectural and cultural heritage
- European Convention on the Protection of the Archaeological Heritage (Valletta Convention). This was ratified by Ireland in 1997.
- Completed within the framework set out by
  - *National Monuments Acts 1930 to 2004*
  - *Cultural Institutions Act 1997*
  - *The Record of Monuments and Places (RMP)*
  - *Heritage Act (1995) (architectural heritage)*
  - *Granada Convention*
  - *County Development Plan Obligations*





## Sources of Information

- Records of Monuments and Places
- [www.webgis.archaeology.ie/historicenvironment](http://www.webgis.archaeology.ie/historicenvironment)
- Cartographic Sources & Aerials
- [www.OSI.ie](http://www.OSI.ie)
- National Museum of Ireland
- [www.heritagemaps.ie](http://www.heritagemaps.ie)
- Leitrim & Sligo County Development Plans
- [www.sligococo.ie/planning/DevelopmentPlans/](http://www.sligococo.ie/planning/DevelopmentPlans/)
- [http://www.leitrimcoco.ie/eng/Services\\_A-Z/Planning-and-Development/Development-Plans/](http://www.leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/)
- Excavations Locally
- [www.excavations.ie](http://www.excavations.ie)
- National Inventory of Architectural Heritage (NIAH)
- [www.buildingsofireland.ie](http://www.buildingsofireland.ie)

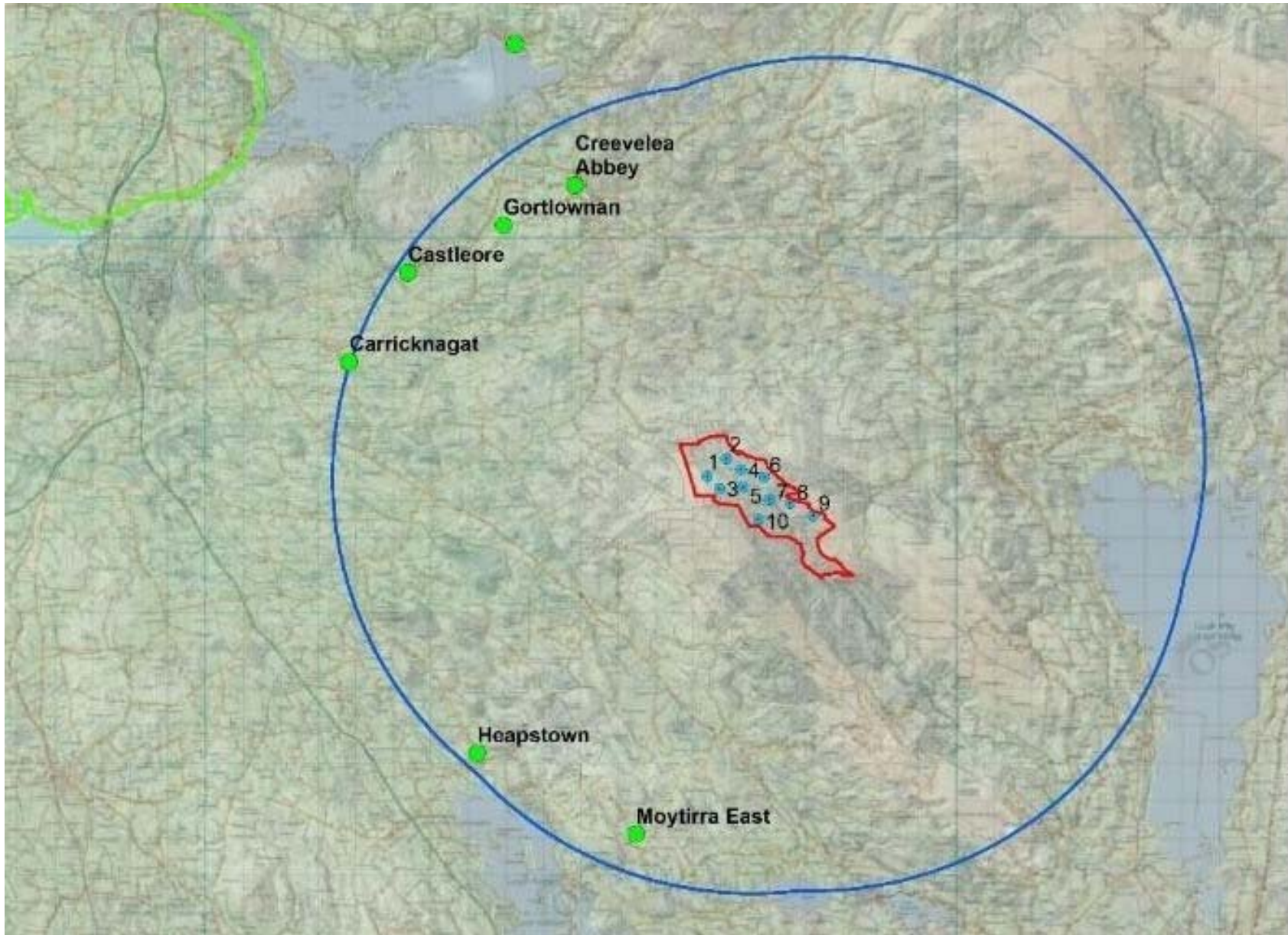




## Field Surveys

- Collating data to confirm the desk survey and looking for any unknown features
- Four site visits completed in February 2019
- Walkover Inspection of the site and surrounds
- Visit to National Monuments within 10km of the site





National Monuments in State Care





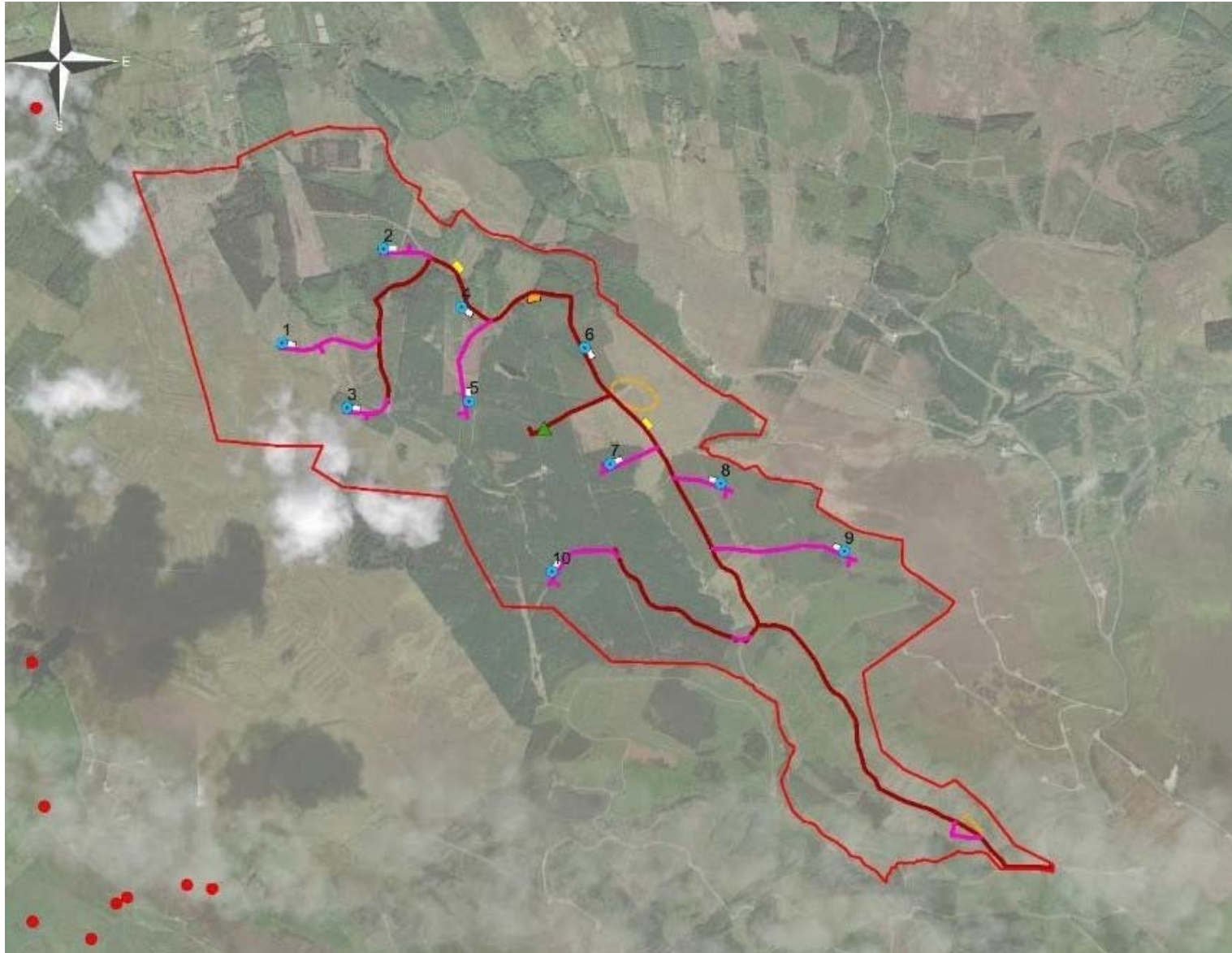
# National Monuments

- NM 69 LE014-004001 Creevelea Abbey Friary (Franciscan)
- NM 277 SL021-012 Gortlowan Motte
- NM 277 SL021-028 Castleore Cashel
- NM 277 Carricknagat Megalithic Tombs SL021-062 SL021-104
- NM 152 Heapstown Cairn SL034-128



Interior of Cashel, National Monument 277 at Castleore.



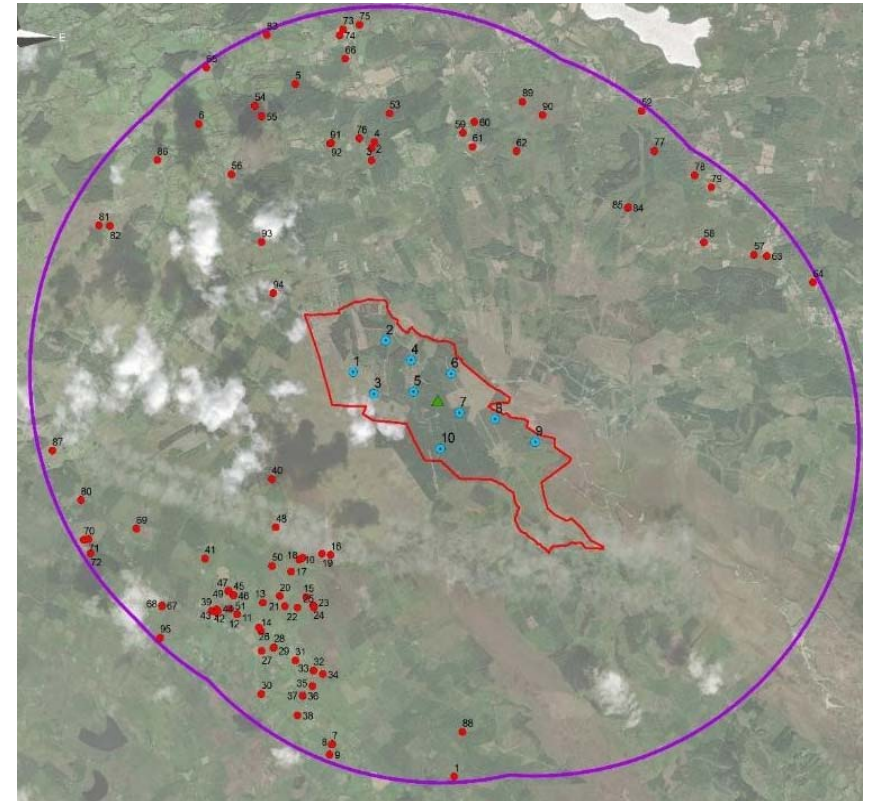


Croagh – Closest Record of Monuments & Places



## Record of Monuments & Places

- None within or adjacent the site boundary
- 1 between 1km & 2km of a turbine
- 11 between 2km & 3km
- 38 between 3km & 4km
- Majority are between 4km & 5km



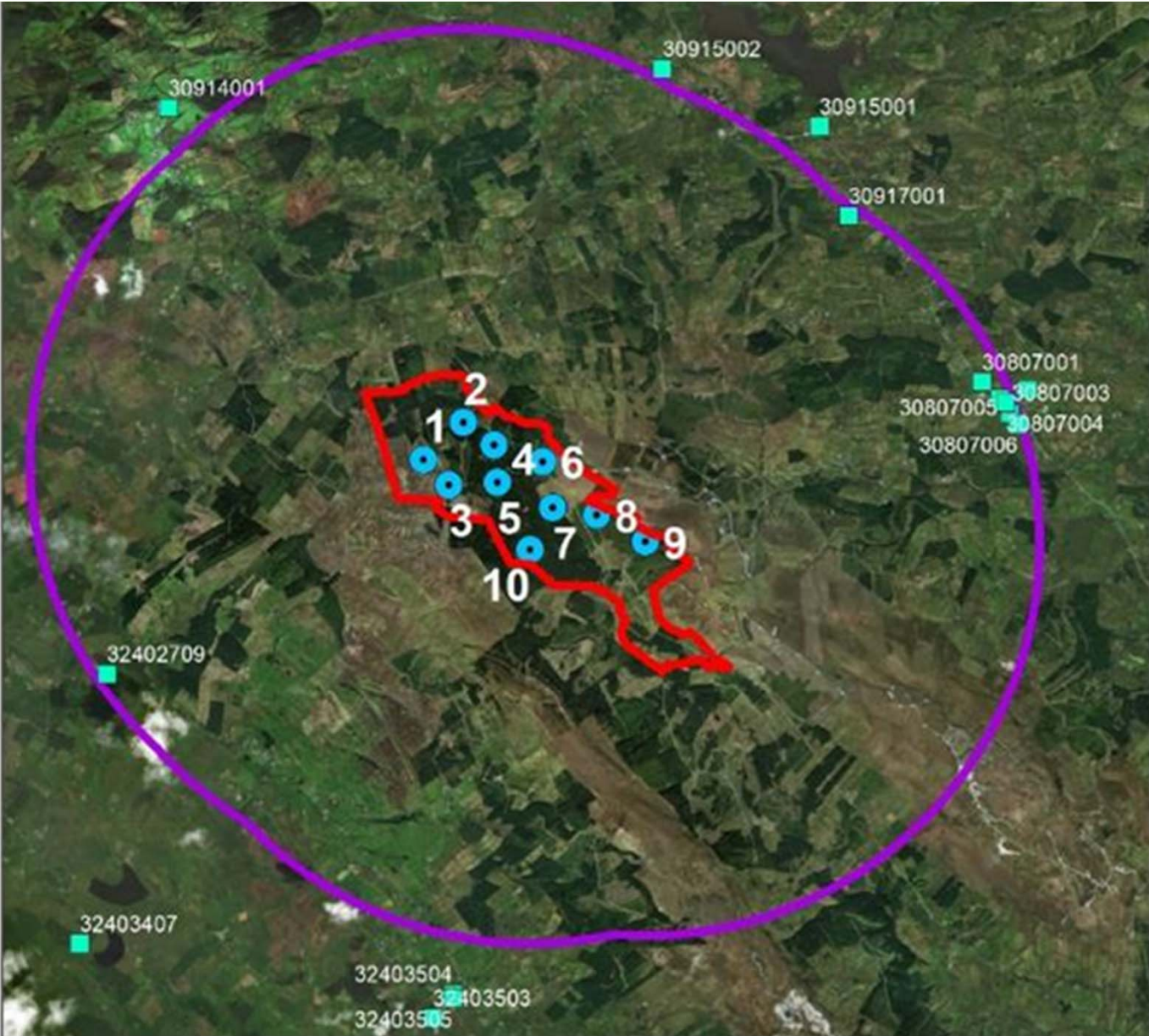
RMPs within 5km



## Architectural & Cultural Heritage

| NIAH     | NAME                                | TOWNLAND               | ITM E  | ITM N  | Distance    |
|----------|-------------------------------------|------------------------|--------|--------|-------------|
| 30917001 | Glasdrumman House                   | Glasdrumman More       | 588720 | 826734 | 4.8km to T9 |
| 30807001 | water pump                          | Drumkeeran [Drum. By.] | 590413 | 824618 | 4.8km to T9 |
| 30807003 | Kelly House                         | Lugmeen                | 590642 | 824410 | 4.8km to T9 |
| 30807005 | House (Sheena)                      | Sheena                 | 590769 | 824220 | 4.9km to T9 |
| 30807006 | Drumkeeran Church of Ireland Church | Sheena                 | 590873 | 824089 | 4.9km to T9 |
| 30807004 | Drumkeeran Court House              | Lugmeen                | 590718 | 824360 | 4.9km to T9 |
| 32402709 | Saint Columbs Roman Catholic Church | Drumnasoohy            | 579305 | 820913 | 4.9km to T3 |





Built Heritage – 5km





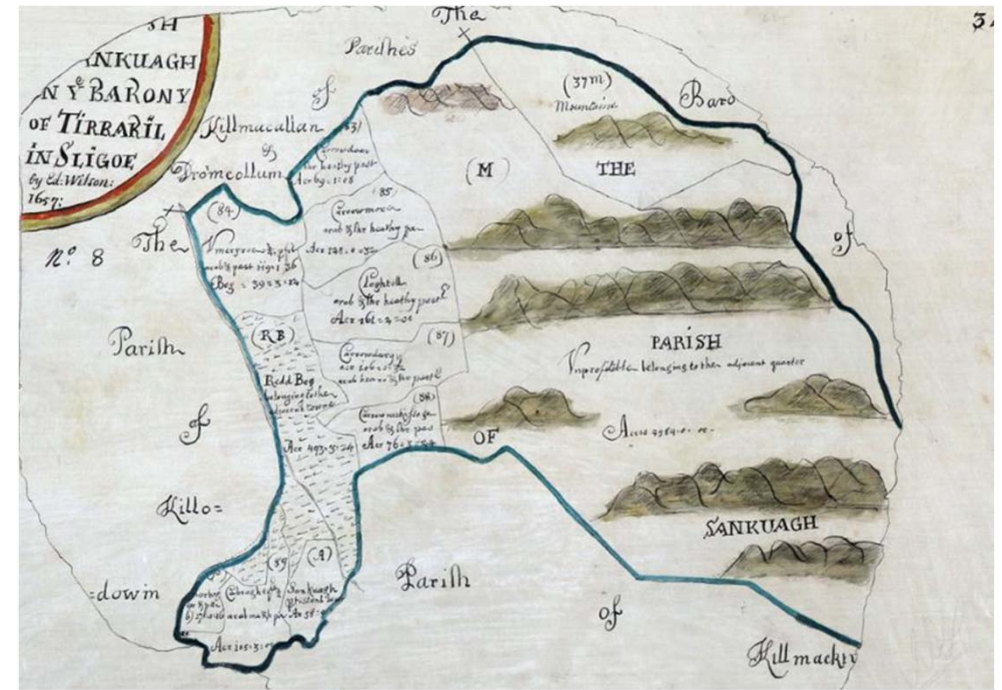
## Local Excavations

- 2008:756 - Garvagh Glebe and Tullnahaw, Leitrim
  - August to December 2008
  - Site type: No archaeological significance
- 2010:437 - Garvagh Glebe (Leitrim) and Tullnahaw (Roscommon), Leitrim
  - August 2008 until July 2010
  - Site type: No archaeological significance



# Impact Assessment

- Direct Effects (Known Features) –
  - These are generally avoided and or separation distances set
- Direct Effects (Unknown Features)
  - Protection against impacts on unknown features is achieved primarily by archaeological monitoring during earthworks
- Indirect Effects (Setting of Features)
  - Potential effects on the setting of features is assessed



Down Survey map (<http://downsurvey.tcd.ie/down-survey-maps.php#bm=Drumaheir&c=Leitrim&p=Killarga>)

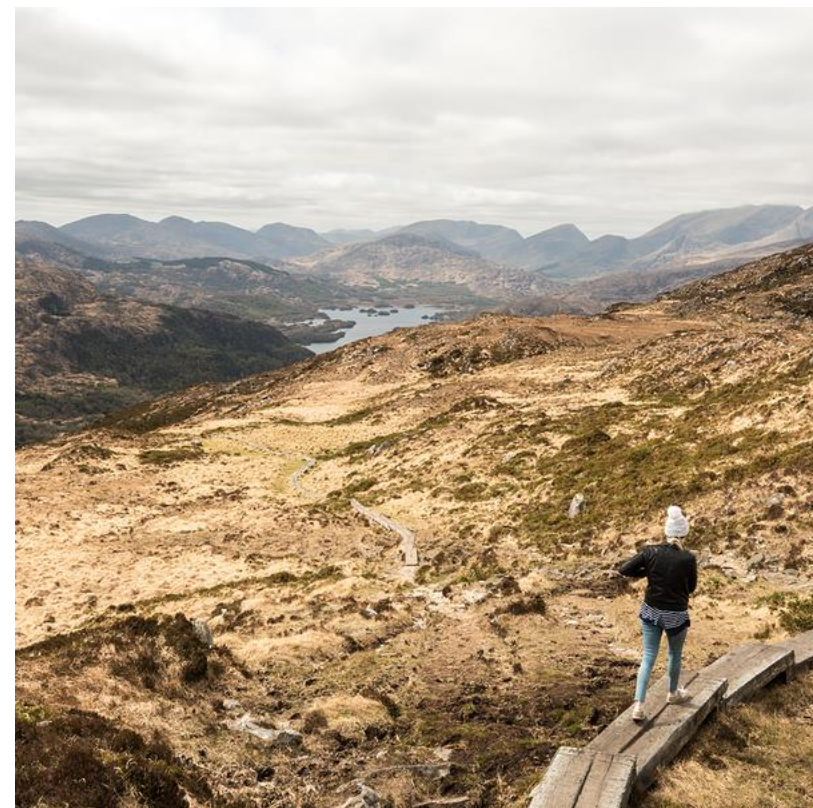
Down Survey map of 1657 showing the south-western section of the site in bog and mountainous pasture.

Area of the proposed wind farm as mountainous and bog and depicted as Protestant lands





Thank You!





## About MKO

- **MKO** delivers challenging and complex planning and environmental projects for our clients.
- Our team of over **65 professionals** work across **5 specialist teams**





**Planning**



**Environmental**



**Ornithology**



**Ecology**



**Estates & Project Management**





## Ecological Assessment - EIA

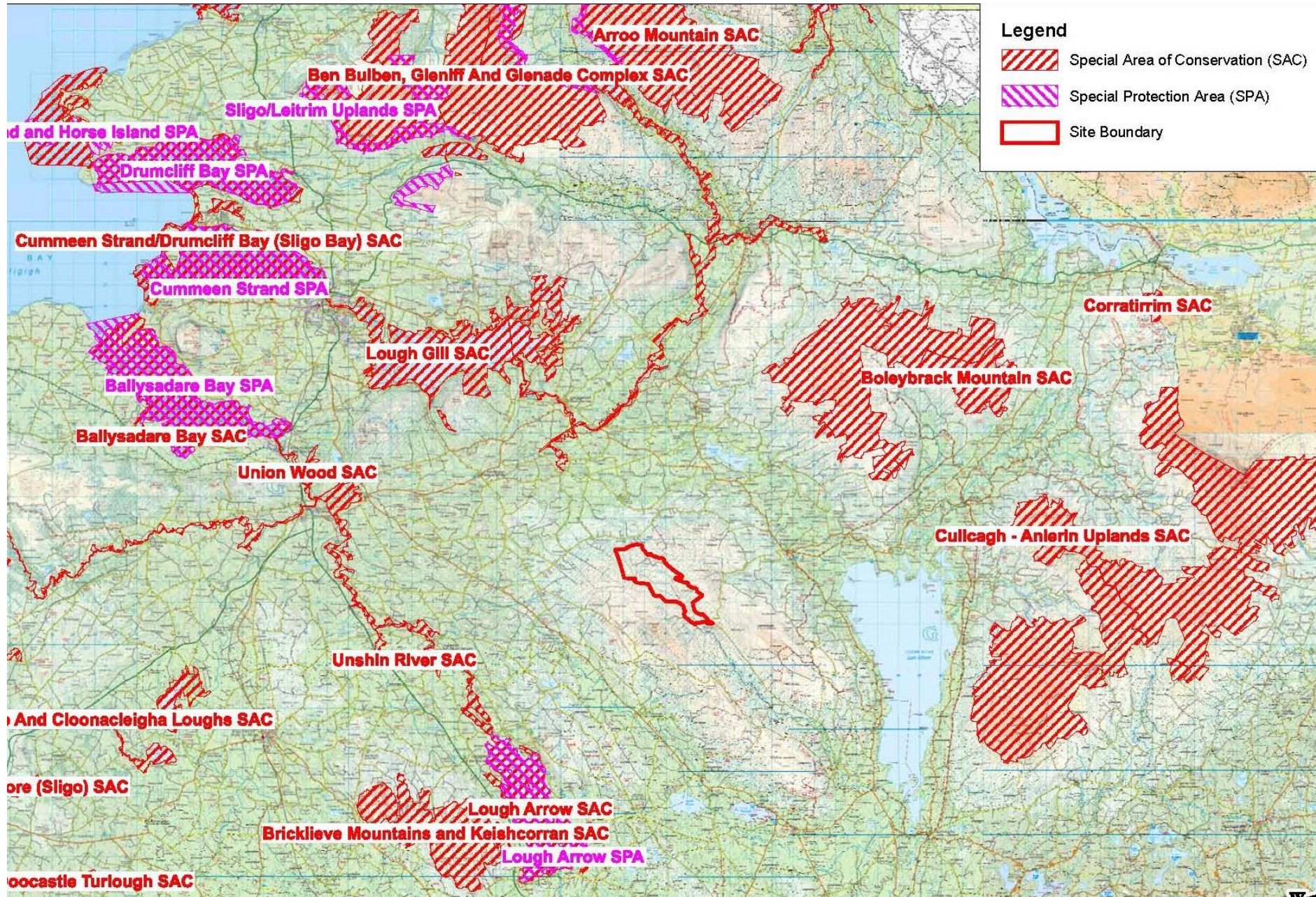
- Done within a framework to comply with legislation
- EIA Directive - European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment
  - Preparation of an EIAR Report
- In accordance with domestic legislation and latest guidance documents
  - *Irish Wildlife Acts 1976 to 2017*
  - *EPA (2017). Draft revised guidelines on the information to be contained in Environmental Impact Statements. Environmental Protection Agency.*
  - *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal, and Marine.*

# Ecological Assessment - NIS

- EU Habitats Directive and Birds Directive
  - Preparation of Natura Impact Assessment
  - Assesses potential impacts on European Designated Sites
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)







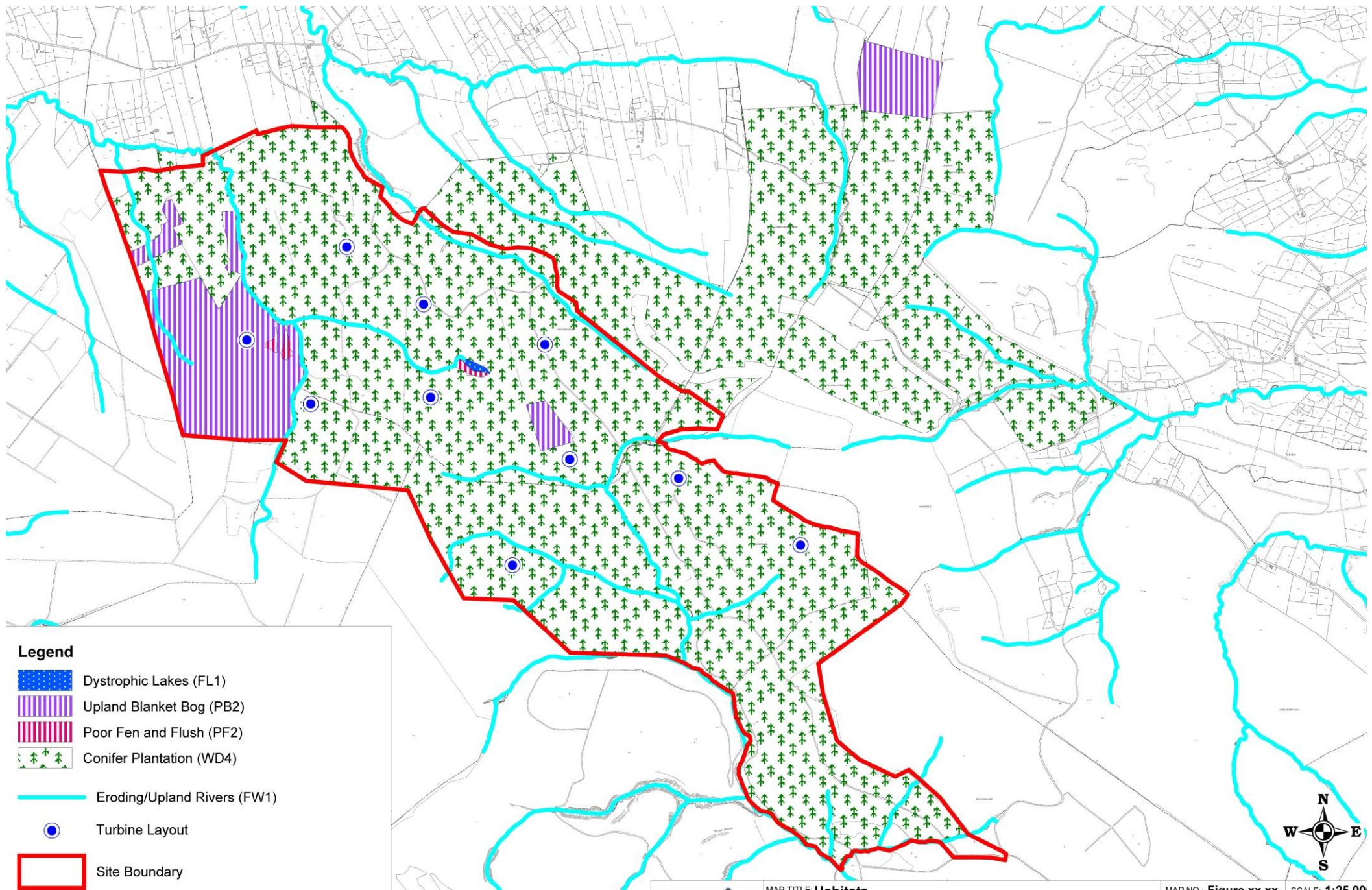


# Ecological Surveys

- Collating data to assess potential impacts on ecology
  - Terrestrial (Habitats & Terrestrial Mammals)
  - Bats
  - Birds
  - Aquatic
- Using most up-to-date guidance and best practice
  - *National Survey of Upland Habitats (Perrin et al. 2014)*
  - *Recommended bird survey methods to inform impact assessment of onshore wind farms. (Scottish Natural Heritage, 2017)*













# Impact Assessment

- Done in accordance with EPA and Transport Infrastructure Ireland Guidance documents
  - TII/NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).
  - EPA (2017). Draft revised guidelines on the information to be contained in Environmental Impact Statements. Environmental Protection Agency
- Potential Direct Impacts
  - Habitats loss, turbine collision
- Potential Indirect Impacts
  - Surface water impacts, disturbance, displacement





Planning and  
Environmental  
Consultants

Thank You!



**Appendix D – List of Community groups Contacted**



## **Voluntary Community Groups**

### **Arigna**

#### **Association**

Arigna Recreational Enhancement Association

Arigna Heritage

Arigna Foroige

Arigna Miners Way and Historical Trail- Walking Group

Strabaggan NS Parents Committee

Greaghnafarna NS Parents Committee.

### **Ballyfarnon**

Tidy Towns

Ballyfarnon Community Group

GAA

Parish Council

### **Ballintogher**

Tidy Towns

GAA

Hall Committee

Development Association

### **Dromahair**

Killenummery Hall Committee

Killenummary Womens Group.

Killenummary Old Church Committee

Dromahair Dev. Tidy Towns.

Dromahair Anglers.

Active Age.

Dromahair Arts and Recreation.

Ladies GAA

Mens GAA

Ardvarney Parents Association.

Drumlease P association

Dromahair Soccer Club

Gun Club

Lough Gill Players

Drumlease Residents Association

Dromahair Heritage Group

### **Drumkeeran**

Tidy Towns

Rowanberry Services

GAA

Mc Kenna Commemoration.  
Womens Club.  
Pastoral Council and Finance  
Drama Society  
Tourism Committee  
Fair Day commemoration  
Handball Club  
Drumkeeran Friendship Club.

## **Geevagh**

Mens Shed  
G.L.A.D ( Geevagh Local Area Development.  
Corrig, Graveyard Committee.  
Carrownadargny Group Water Scheme.  
Carn hill walking group.  
Community Alert  
Gun Club  
Community Resource.  
First Friends Play School  
GAA  
Valley Rovers Soccer Club  
Community Games  
Geevagh/Highwood Group Water Scheme.  
Geevagh Playground.  
Historical Society  
Mother and Toddler  
Legion Of Mary

## **Gleann**

C.L.A.S.P. Community of Lough Arrow Social Project.

## **Killargue**

Community Centre  
Fas Schemes  
Bowling Club

## **Riverstown**

Tidy Towns Committee  
Sligo Folk Park.  
Sligo Agricultural Show  
I.C.A.  
GAA  
Arrow Harps Soccer Club  
St Patricks Day Parade committee  
Playground Group.  
Community Park  
Xmas Lights Committee

## **Appendix E – Indicative Trueview Images**



Garvagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Garvagh, Sligo, County Leitr... |
| Location          | 582599 825068                   |
| Distance To       | 2.8 km                          |
| Observer Altitude | 160.0 m                         |
| Camera Altitude   | 161.5 m                         |
| Heading           | 136.0°                          |
| Date              | 2019-04-09                      |
| Time              | 13:26:14                        |
| Angle Of View     | 65.11°                          |
| □                 |                                 |



F91 H340, Sligo, Ireland



VIEWPOINT INFORMATION

|                   |                          |
|-------------------|--------------------------|
| Version Name      | Alternatives V5          |
| Image Name        | F91 H340, Sligo, Ireland |
| Location          | 583060 824731            |
| Distance To       | 2.2 km                   |
| Observer Altitude | 192.3 m                  |
| Camera Altitude   | 198.8 m                  |
| Heading           | 152.0°                   |
| Date              | 2019-04-09               |
| Time              | 13:30:41                 |
| Angle Of View     | 65.11°                   |



F91 RY65, Sligo, Ireland



| VIEWPOINT INFORMATION |                          |
|-----------------------|--------------------------|
| Version Name          | Alternatives V5          |
| Image Name            | F91 RY65, Sligo, Ireland |
| Location              | 581911 824848            |
| Distance To           | 3.3 km                   |
| Observer Altitude     | 161.2 m                  |
| Camera Altitude       | 162.7 m                  |
| Heading               | 123.0°                   |
| Date                  | 2019-04-09               |
| Time                  | 11:48:22                 |
| Angle Of View         | 65.11°                   |



Greaghnafarna, Sligo, County Leitrim, Ireland



| VIEWPOINT INFORMATION |                                |
|-----------------------|--------------------------------|
| Version Name          | Alternatives V5                |
| Image Name            | Greaghnafarna, Sligo, Count... |
| Location              | 581811 823538                  |
| Distance To           | 3.1 km                         |
| Observer Altitude     | 234.5 m                        |
| Camera Altitude       | 236.0 m                        |
| Heading               | 70.0°                          |
| Date                  | 2019-04-09                     |
| Time                  | 13:42:52                       |
| Angle Of View         | 65.11°                         |



Tullynascreen, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                  |
|-------------------|----------------------------------|
| Version Name      | Alternatives V5                  |
| Image Name        | Tullynascreen, Sligo, County ... |
| Location          | 581610 825080                    |
| Distance To       | 3.6 km                           |
| Observer Altitude | 135.0 m                          |
| Camera Altitude   | 136.5 m                          |
| Heading           | 116.0°                           |
| Date              | 2019-04-09                       |
| Time              | 11:40:32                         |
| Angle Of View     | 65.11°                           |



Tullynascreen, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                  |
|-------------------|----------------------------------|
| Version Name      | Alternatives V5                  |
| Image Name        | Tullynascreen, Sligo, County ... |
| Location          | 581610 825080                    |
| Distance To       | 3.6 km                           |
| Observer Altitude | 135.0 m                          |
| Camera Altitude   | 136.5 m                          |
| Heading           | 116.0°                           |
| Date              | 2019-04-09                       |
| Time              | 11:40:32                         |
| Angle Of View     | 65.11°                           |



Tullynascreen, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                  |
|-------------------|----------------------------------|
| Version Name      | Alternatives V5                  |
| Image Name        | Tullynascreen, Sligo, County ... |
| Location          | 582271 825083                    |
| Distance To       | 3.1 km                           |
| Observer Altitude | 159.5 m                          |
| Camera Altitude   | 161.0 m                          |
| Heading           | 140.0°                           |
| Date              | 2019-04-09                       |
| Time              | 13:19:54                         |
| Angle Of View     | 65.11°                           |



Greaghnafarna, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                                 |                                |
|---------------------------------|--------------------------------|
| Version : a4 e                  | Alternatives V5                |
| Ma g e : a4 e                   | Greaghnafarna, Sligo, Count... |
| l o l a t i o n                 | 581218 83.238                  |
| c i s t a n L e D o             | . k m#                         |
| T O s e r v e r A l t i t u b e | 316k 4                         |
| C a 4 e r a A l t i t u b e     | 330k 4                         |
| d e a b i n g                   | 85k07                          |
| c a t e                         | 3016'09'06                     |
| D i 4 e                         | 1. -50-12                      |
| A n g l e T f V i e H           | 25k117                         |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 584337 825904                   |
| Distance To       | 2.4 km                          |
| Observer Altitude | 149.8 m                         |
| Camera Altitude   | 151.3 m                         |
| Heading           | 180.0°                          |
| Date              | 2019-04-09                      |
| Time              | 10:14:54                        |
| Angle Of View     | 65.11°                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 845543 478837                   |
| Distance To       | 729 0m                          |
| Observer Altitude | 9. k2k m                        |
| Camera Altitude   | 9. 928 m                        |
| Heading           | 9412k°                          |
| Date              | 7k93-k5-k3                      |
| Time              | 9k:77:86                        |
| Angle Of View     | 68299°                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 584468 825476                   |
| Distance To       | 2.0 km                          |
| Observer Altitude | 176.1 m                         |
| Camera Altitude   | 177.6 m                         |
| Heading           | 194.0°                          |
| Date              | 2019-04-09                      |
| Time              | 10:28:09                        |
| Angle Of View     | 65.11°                          |



Beagh, Sligo, County Leitrim, Ireland



| VIEWPOINT INFORMATION |                                 |
|-----------------------|---------------------------------|
| Version Name          | Alternatives V5                 |
| Image Name            | Beagh, Sligo, County Leitrim... |
| Location              | 584468 825476                   |
| Distance To           | 2.0 km                          |
| Observer Altitude     | 176.1 m                         |
| Camera Altitude       | 177.6 m                         |
| Heading               | 194.0°                          |
| Date                  | 2019-04-09                      |
| Time                  | 10:28:09                        |
| Angle Of View         | 65.11°                          |



Greaghnafarna, Sligo, County Leitrim, Ireland



| VIEWPOINT INFORMATION |                                |
|-----------------------|--------------------------------|
| Version Na0 e         | Alternatives V5                |
| IO age Na0 e          | Greaghnafarna, Sligo, Count... |
| Location              | 581222 832. 83                 |
| Distance To           | km 60                          |
| Observer Altitude     | 15kr 0                         |
| Ca0 era Altitude      | 152r 0                         |
| Heading               | 11kr 0°                        |
| Date                  | 3719-72-79                     |
| Ti0 e                 | 13:38:21                       |
| Angle Of View         | . 5r 11°                       |
| □                     |                                |



Greaghnafama, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                               |
|-------------------|-------------------------------|
| Version Na0 e     | Alternatives V5               |
| IO age Na0 e      | Greaghnafama, Sligo, Count... |
| Location          | 581222 832. 83                |
| Distance To       | km# 60                        |
| Observer Altitude | 15kr# 0                       |
| Ca0 era Altitude  | 152r# 0                       |
| Heading           | 11kr# °                       |
| Date              | 3719-72-79                    |
| Ti0 e             | 13:38:21                      |
| Angle Of View     | . 5r#11 °                     |
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Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 587512 835° 98                  |
| Distance To       | 0.9 km                          |
| Observer Altitude | 082.9 m                         |
| Camera Altitude   | 089.9 m                         |
| Heading           | 300.4-                          |
| Date              | 3409:47:49                      |
| Time              | 046° 5644                       |
| Angle Of View     | 15.00-                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 587512 835° 98                  |
| Distance To       | 0.9 km                          |
| Observer Altitude | 082.9 m                         |
| Camera Altitude   | 089.8 m                         |
| Heading           | 084.4-                          |
| Date              | 3409:47:49                      |
| Time              | 046° 7651                       |
| Angle Of View     | 15.00-                          |



Beagh, Sligo, County Leitrim, Ireland



| VIEWPOINT INFORMATION |                                 |
|-----------------------|---------------------------------|
| Version Name          | Alternatives V5                 |
| Image Name            | Beagh, Sligo, County Leitrim... |
| Location              | 584686 825164                   |
| Distance To           | 1.6 km                          |
| Observer Altitude     | 213.1 m                         |
| Camera Altitude       | 214.6 m                         |
| Heading               | 188.0°                          |
| Date                  | 2019-04-09                      |
| Time                  | 10:42:23                        |
| Angle Of View         | 65.11°                          |



Beagh, Sligo, County Leitrim, Ireland



| VIEWPOINT INFORMATION |                                 |
|-----------------------|---------------------------------|
| Version Name          | Alternatives V5                 |
| Image Name            | Beagh, Sligo, County Leitrim... |
| Location              | 585437 829709                   |
| Distance To           | 3.2 km                          |
| Observer Altitude     | 297.4 m                         |
| Camera Altitude       | 298.5 m                         |
| Heading               | 233.41                          |
| Date                  | 243° -49-4°                     |
| Time                  | 34:5°:34                        |
| Angle Of View         | 65.331                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 585433 837229                   |
| Distance To       | 0.3 km                          |
| Observer Altitude | 377.8 m                         |
| Camera Altitude   | 371.° m                         |
| Heading           | 304.4-                          |
| Date              | 3409:47:49                      |
| Time              | 00643600                        |
| Angle Of View     | 15.00-                          |



F91 CPN1, Sligo, Ireland



VIEWPOINT INFORMATION

|                    |                          |
|--------------------|--------------------------|
| Versign 4ame       | Alternatives V5          |
| maSe 4ame          | F91 HB410, liSg0 arelanl |
| Lgcatign           | 5d8d16 d28895            |
| Distance Tg        | 7.9 km                   |
| Observer Altitul e | 2°1.7 m                  |
| Hamera Altitul e   | 2°2.5 m                  |
| Ceal inS           | 276.7-                   |
| Date               | 2719:78:79               |
| Time               | 18N 11N9                 |
| AnSle Of View      | °5.11-                   |



F91 CPN1, Sligo, Ireland



| VIEWPOINT INFORMATION |                          |
|-----------------------|--------------------------|
| Versign 4ame          | Alternatives V5          |
| maSe 4ame             | F91 HB410, liSg0 arelanl |
| cgDatign              | 5d8d16 d28895            |
| TistanDe Og           | 7.9 km                   |
| buserver AltitCl e    | 2° 1.7 m                 |
| Hamera AltitCl e      | 2° - .2 m                |
| f eal inS             | 16d.7:                   |
| Tate                  | 2719N78N9                |
| Oime                  | 18L11L25                 |
| AnSle bwVieP          | ° 5.11:                  |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 585090 824344                   |
| Distance To       | 7.2 km                          |
| Observer Altitude | 245.6 m                         |
| Camera Altitude   | 243.7 m                         |
| Heading           | 290.9°                          |
| Date              | 2971-94-91                      |
| Time              | 77:91:24                        |
| Angle Of View     | 65.77°                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 585434 872922                   |
| Distance To       | 0.7 km                          |
| Observer Altitude | 725.1 m                         |
| Camera Altitude   | 72°.3 m                         |
| Heading           | 018.3-                          |
| Date              | 730°:32:3°                      |
| Time              | 0063° 604                       |
| Angle Of View     | 15.00-                          |



Beagh, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Beagh, Sligo, County Leitrim... |
| Location          | 585434 872922                   |
| Distance To       | 0.7 km                          |
| Observer Altitude | 725.1 m                         |
| Camera Altitude   | 729.0 m                         |
| Heading           | 771.3°                          |
| Date              | 730- :32:3-                     |
| Time              | 0063- 647                       |
| Angle Of View     | 15.00°                          |



Corratimore Glebe, Sligo, County Leitrim, F91, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Corratimore Glebe, Sligo, Co... |
| Location          | 586088 826281                   |
| Distance To       | 2.9 km                          |
| Observer Altitude | 152.7 m                         |
| Camera Altitude   | 154.2 m                         |
| Heading           | 205.0°                          |
| Date              | 2019-04-09                      |
| Time              | 10:00:14                        |
| Angle Of View     | 65.11°                          |



Corratimore Glebe, Sligo, County Leitrim, F91, Ireland



VIEWPOINT INFORMATION

|                   |                                 |
|-------------------|---------------------------------|
| Version Name      | Alternatives V5                 |
| Image Name        | Corratimore Glebe, Sligo, Co... |
| Location          | 586088 826281                   |
| Distance To       | 2.9 km                          |
| Observer Altitude | 152.7 m                         |
| Camera Altitude   | 154.2 m                         |
| Heading           | 205.0°                          |
| Date              | 2019-04-09                      |
| Time              | 10:00:14                        |
| Angle Of View     | 65.11°                          |



Killavoggy, Sligo, County Leitrim, F91, Ireland



VIEWPOINT INFORMATION

|                   |                                   |
|-------------------|-----------------------------------|
| Version Name      | Alternatives V5                   |
| Image Name        | Killavoggy, Sligo, County Leit... |
| Location          | 585981 826270                     |
| Distance To       | 2.9 km                            |
| Observer Altitude | 153.0 m                           |
| Camera Altitude   | 154.5 m                           |
| Heading           | 224.0°                            |
| Date              | 2019-04-09                        |
| Time              | 10:06:20                          |
| Angle Of View     | 65.11°                            |



Killavoggy, Sligo, County Leitrim, F91, Ireland



VIEWPOINT INFORMATION

|                   |                                   |
|-------------------|-----------------------------------|
| Version Name      | Alternatives V5                   |
| Image Name        | Killavoggy, Sligo, County Leit... |
| Location          | 585981 826270                     |
| Distance To       | 2.9 km                            |
| Observer Altitude | 153.0 m                           |
| Camera Altitude   | 154.5 m                           |
| Heading           | 224.0°                            |
| Date              | 2019-04-09                        |
| Time              | 10:06:20                          |
| Angle Of View     | 65.11°                            |



Corratimore Glebe, Sligo, County Leitrim, F91, Ireland



VIEWPOINT INFORMATION

|                    |                                 |
|--------------------|---------------------------------|
| Versign - ah e     | Alternatives V5                 |
| h aCe - ah e       | Ggrratih gre f le, eS diCgS Ggu |
| Ngl atign          | 5..8812 ...38381                |
| Listan le cg       | 2.3 kh                          |
| D, server AltitTOe | n54.1 h                         |
| Gah era AltitTOe   | n56.2 h                         |
| beaCnC             | 33m10                           |
| Late               | 31n7~14~17                      |
| cih e              | 1794792...                      |
| AnCle Dd VieH      | 85.rm0                          |
|                    |                                 |



Lisgavneen, Carrick-on-Shannon, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                |
|-------------------|--------------------------------|
| Version Name      | Alternatives V5                |
| Image Name        | Lisgavneen, Carrick-on-Shan... |
| Location          | 586903 826186                  |
| Distance To       | 3.3 km                         |
| Observer Altitude | 180.4 m                        |
| Camera Altitude   | 183.7 m                        |
| Heading           | 212.0°                         |
| Date              | 2019-04-09                     |
| Time              | 09:41:48                       |
| Angle Of View     | 65.11°                         |



N41 C650, Carrick-on-Shannon, Ireland



| VIEWPOINT INFORMATION |                              |
|-----------------------|------------------------------|
| Version Name          | Alternatives V5              |
| Project Name          | Lg, Cc5k- CarrickSh.nh86ann9 |
| Location              | 50c3c5 0250c5                |
| Distance To...        | 1., 5m                       |
| Observer Altitude     | , 03.1 m                     |
| Camera Altitude       | , 32. c m                    |
| Heading               | 2k4. k7                      |
| Date                  | 2k, 3hghk3                   |
| Time                  | k3*12*5,                     |
| Angle Of View         | c5., , 7                     |



Greaghnafarna, Sligo, County Leitrim, Ireland



VIEWPOINT INFORMATION

|                   |                                |
|-------------------|--------------------------------|
| Version Na7 e     | Alternatives V5                |
| Image Na7 e       | Greaghnafarna, Sligo, Count... |
| Location          | 581235 8. k5. m                |
| Distance To       | 464 07                         |
| Observer Altitude | 1216' 7                        |
| Camera Altitude   | 12. 65 7                       |
| Heading           | 1. k6' 9                       |
| Date              | . ° 1m ° k ° m                 |
| Time              | 1. :k4: ° °                    |
| Angle Of View     | 356119                         |
| □                 |                                |