

Electricity Act 1989: Section s36

Town and Country Planning Act 1990: Section 90

Electricity Works (Environmental Impact Assessment) (England and
Wales) Regulations 2000

Electricity Generating Stations and Overhead Lines (Inquiries Procedure)
(England and Wales) Rules 2007

Application by RWE npower renewables Limited
for a 150 MW wind farm and habitat restoration
at Carnedd Wen

**SUMMARY
PROOF OF EVIDENCE:
HYDROLOGY AND HYDROGEOLOGY**

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of
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Qualifications and Relevant Experience

- S1 I am a Director of SLR Consulting Ltd and was retained by RWE in 2011 to review opportunities for habitat restoration at Carnedd Wen and the potential hydrological and hydrogeological impacts associated with the proposed wind farm.
- S2 I have worked closely with Mr Piper, Mr Lowther and Dr Mills, co-witnesses to this Inquiry in specialist areas of forestry, ecology and peat respectively, to assess the potential effects of the proposed development on the site's hydrology and hydrogeology and to identify appropriate mitigation measures to minimise these.
- S3 As a consequence of this review, further site investigation and site design was completed and in addition, further forest, habitat restoration, peat and drainage management and mitigation measures were identified and used in the iterative design of the proposed development.

Scope of Evidence

- S4 My proof deals primarily with hydrological and hydrogeological matters with particular reference to hydrology, flood risk and hydrogeology.

Baseline Environment

Geology

- S5 The bedrock in the vicinity of the site comprises finely grained sedimentary rocks. The site is predominantly underlain by mudstones of the Penstrowed Grits Formation which is interbedded with thick beds of medium to coarse-grained greywacke sandstones. It forms the upland plateau of the proposed wind farm site.
- S6 Glacial till is present across the majority of the site and overlies the bedrock. The till is generally clayey in nature, with minor sand lenses and increasing rock fragments with depth.
- S7 Overlying the solid and drift deposits across much of the site are deposits of peat and there have been a number of investigations to assess the depth, distribution and characteristics of the peat.

Hydrology

- S8 The site application boundary straddles the watershed of the River Severn and the Afon Dyfi (River Dovey), which flow to the east and west of the site respectively. The Afon Dyfi flows to the coastal Pen Llŷn a'r Sarnau SAC, which is designated for a range of features including estuaries and European otter. The Dyfi Estuary is designated as an SPA for its ornithological interest.
- S9 The proposed development is wholly outside the Pen Llŷn a'r Sarnau SAC and Dyfi Estuary SPA, however three of the five principal catchments draining the site (Afon Dugoed, Afon Tafolog and Afon Cwm) form part of the Afon Dyfi catchment.
- S10 The current land use is predominantly coniferous plantation forestry. The remaining area comprises neutral and acid grassland, marshy grassland, heath, bog and mire.

- S11 To allow development of the forest many open surface water drains have been established at site and this has significantly impacted the site's natural drainage.
- S12 Some areas of the site have maintained significant environmental and ecological value despite the afforestation. Within the site boundary there is one SSSI, Corsydd Llanbrynmair (Llanbrynmair Moors).
- S13 There are also two freshwater lakes adjacent to the proposed application boundary: Llyn Coch-hywiad and Llyn Gwyddior. Whilst these sites do not benefit from a formal designation, NRW considers that they are of national value for oligotrophic lake habitats.

Hydrogeology

- S14 The application site is not located in a groundwater Source Protection Zone.
- S15 The localised and remnant superficial deposits are not classified by NRW. The glacial till that is present will not store or allow the movement of large quantities of groundwater as a consequence of the low bulk permeability of the deposits and its limited thickness.
- S16 The bedrock deposits are classified by NRW as a Secondary Aquifer (undifferentiated), which is typical of a unit that has low or limited groundwater potential.

Water Resources

- S17 A detailed review has established that, whilst there are many water abstractions within 3km of the boundary, no water abstraction is recorded closer than 500m from proposed wind farm infrastructure.

Objections Received

Representations from Statutory Consultees

- S18 Following submission of the ES and SEI 2011, the Countryside Council for Wales raised concerns or objections to the proposed development with respect to the potential impact of drainage of the peat as a consequence of construction of wind farm infrastructure
- potential significant effect on the Pen Llŷn a'r Sarnau Area of Special Area of Conservation (SAC) as a result of sediment runoff during felling operations
 - potential effects on the freshwater lakes - Llyn Gwyddior & Llyn Coch-hwyad as a consequence of proposed felling and construction activities
- S19 Following review of the SEI 2013 by NRW and subsequent discussions, NRW has removed their objections to the proposed development on ecological and hydrological grounds and noted that any potential environmental impacts associated with their interests can be addressed as part of the regulatory process e.g. planning conditions or through a Section 106 Agreement.

Other Representations

S20 Following submission of the SEI 2013 a number of general representations were made by third parties relating to;

- Water Pollution and Effects on Water Supplies and Water Resources
- Hydrology and Flooding
- Uncertainty

Potential Effects on Hydrology and Hydrogeology

S21 The potential impacts of proposed forest felling, habitat restoration and of the wind farm have been considered and three stages of development have been considered; construction, operation as well as decommissioning.

S22 These potential impacts could have detrimental effects to habitats and designated sites as well as other ecological interests and public and private water supplies. They could also lead to increased flood risk. These potential impacts have been assessed and all of the potential significant impacts have been addressed through risk avoidance mitigation measures.

Proposed Mitigation, Conditions and Obligations

Proposed Mitigation Measures

S23 Elements of the original wind farm design and habitat restoration strategy have been revised to take account of discussions held with CCW and to reflect the findings of additional site investigation completed.

S24 Wherever possible the proposed site infrastructure have been located in areas of lower environmental sensitivity and the proposed mitigation measures have been developed using best practice guidance.

S25 It is demonstrated that, with appropriate controls and mitigation measures, there would be no significant impact on any surface watercourses. This includes a consideration of flood risk.

S26 Equally the development would have no significant impact on the geology or hydrogeology of the area. Further, the proposed habitat restoration works would seek to restore conditions that would have prevailed at site prior to planting of the forest and draining of the peat.

Proposed Conditions and Obligations

Pollution Prevention and Construction and Environment Management Plan

S27 All of the mitigation measures would be set out within a Construction and Environment Management Plan (CEMP). The CEMP would be submitted to Powys County Council and NRW for approval prior to development occurring on site.

S28 In addition, and as a means of ensuring that impacts on peat are minimised, agreement has also been reached with NRW that a Peatland Impact Minimisation Protocol would be implemented, which would apply to all of the infrastructure elements of the development.

Habitat Restoration, Peat and Forest Management Plans

S29 Proposals for the forest management, peat management and habitat restoration have been specified in the draft Habitat Restoration Management Plan (HRMP), Peat Management Plan (PMP) and Forest Management Plan (FMP). These Plans would be submitted to Powys County Council and NRW for approval prior to development occurring on site.

Works Near to and Within Watercourses, Water Abstraction, Flood Risk and Water Management

S30 Works near to and within watercourses would only be undertaken with prior approval from NRW and where appropriate in accordance with a Flood Defence Consent.

S31 Any proposal for water abstraction would only occur after consent has been obtained from NRW and Powys County Council.

Ecological Clerk of Works and Geotechnical Specialist

S32 It is proposed that at least one Ecological Clerk of Works (ECoW) would be deployed at site to ensure that the site specific mitigation measures are adhered to.

S33 At least one onsite geotechnical specialist will be appointed to the project for the period of civil design and construction works.

Conclusions

S34 My hydrological and hydrogeological assessment of the proposed Carnedd Wen Habitat Restoration and Wind Farm project demonstrates that, with appropriate site procedures and mitigation measures, there would be no significant impact on any surface watercourses, which may be potentially affected by runoff, sedimentation and drainage from the wind farm. This includes Pen Llŷn a'r Sarnau SAC and Llyn Gwyddior & Llyn Coch-hwyad freshwater lakes.

S35 Equally the development would have no significant impact on the geology or hydrogeology of the area, which includes the consideration of saturated peat, groundwater, aquifers, local water supplies and geological sites of interest.

S36 Following the submission of additional information and further discussions, NRW has removed their objections to the proposed development on ecological and hydrological grounds.

S37 I have suggested where planning conditions or Section 106 obligations might be used to secure the use of identified mitigation measures and to ensure that appropriate regulatory consents are obtained prior to works being undertaken on site.

S38 I therefore consider that the Inspector should find in our favour in relation to the issues that I have addressed.

A handwritten signature in black ink that reads "Alan Edwards". The signature is written in a cursive style with a period at the end.

Dr Alan Edwards

7th October 2013