RWE npower renewables

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

PROOF OF EVIDENCE: HYDROLOGY AND HYDROGEOLOGY

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of
SLR Consulting Limited

October 2013

1. Qualifications and Relevant Experience

1 I am a Director of SLR Consulting Ltd (SLR), based in their Bristol office, and I hold a BSc (Hons) in Geography and a Ph.D. in Hydrogeology. I am also a Fellow of the Geological Society of London, a Chartered Geologist and a European Geologist. I also lead the SLR's Hydrology and Hydrogeology Technical Discipline Team.

2 SLR is a leading environmental consulting consultancy providing a wide range of services to the utilities and wind farm sectors. As such therefore, the Company has significant experience in the fields that are relevant to this Inquiry.

3 I have been a practising hydrologist and hydrogeologist for over 20 years and have been involved in many projects involving geology, hydrogeology and hydrology of, amongst other, wind farms, mineral extraction sites, waste management facilities, industrial facilities, industrial developments and water resources projects.

4 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. I have, over the course of several projects, worked closely with Mr Piper, Mr Lowther and Dr Mills and I have co-authored a paper with Mr Lowther on the potential impacts of wind farms on peat habitats.

5 SLR 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 wind farm construction, operation and decommissioning. 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.

6 I have reviewed both the submitted Environmental Statement (ES) as well as the additional hydrological and hydrogeological information that has been set out within the submitted Supplementary Environmental Information (SEI) prepared in 2009, 2011 and 2013. I have contributed to the SEI prepared in 2013 (the SEI 2013) and agree with what is there said on the topics within my area of expertise. It is accordingly not my intention to repeat that material here. As a consequence of this, my proof of evidence is divided into the following sections:

- Section 2 summarises the scope of my evidence and matters listed by the Secretary of State that are addressed in my proof;
- Section 3 presents the baseline conditions of the site, which includes the site's geology, hydrology and hydrogeology;
- Section 4 details legislation and guidance relevant to the water environment;
- Section 5 summarises the objections and concerns raised in respect to the water environment;
- Section 6 sets out the potential effects of the proposed development on hydrology and hydrogeology

- Section 7 provides a summary of the identified site specific mitigation and proposes possible conditions and obligations that can be used to secure these measures; and
- Section 8 presents a summary of my proof and my conclusions.

2. Scope of Evidence

7 My proof deals primarily with hydrological and hydrogeological matters with particular reference to hydrology, flood risk and hydrogeology. Whilst I have worked very closely with Mr Piper, Dr Mills and Mr Lowther, I do not cover issues relating to forestry, peat morphology and stability (including depth of peat) or ecology in my proof as these are not areas in which I have the necessary expertise. These matters are addressed on behalf of RWE by Mr Piper, Mr Mills and Mr Lowther respectively.

Matters listed by the Secretary of State which are addressed in the Proof

8 This proof addresses item 12 and 13 of the Statement of Matters, where relevant to hydrology, flood risk and hydrogeology:

'(12) the impact of the proposed developments on hydrology and hydrogeology, to include impacts on sensitive water features (streams, ponds, wetlands); impacts on private water supplies; fisheries and watercourses; and impacts on groundwater; and the likely effectiveness of proposed mitigation measures;

(13) the impact of the proposed developments on peat;'

3. Baseline Environment

Geology

9 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.

10 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.

11 Overlying the solid and drift deposits across much of the site are deposits of peat. There have been a number of investigations to assess the depth, distribution and characteristics of the peat and these are considered in greater detail in Section 12 – Geology of the SEI 2013 as well as the proof of Dr Mills.

Hydrology

12 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 a Special Protection Area (SPA) for its ornithological interest.

13 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.

14 The current land use is predominantly coniferous plantation forestry. The remaining area comprises neutral and acid grassland, marshy grassland, heath, bog and mire (see Chapter 7 Non-Avian Ecology of the ES and SEI 2013 as well as the Forest Management Plan and the Habitat Restoration and Management Plan presented in the SEI 2013 for further details).

15 To allow development of the forest many open surface water drains have been established at site. The characteristics of the drains, their potential influence on the peat hydrology and effects on the response of the site to rainfall is considered in detail in the SEI 2013.

16 Some areas of the site have maintained significant environmental and ecological value despite the afforestation and are classified as Sites of Special Scientific Interest (SSSI). Within the site boundary there is one SSSI, Corsydd Llanbrynmair (Llanbrynmair Moors), which is split into three distinct areas.

17 In addition, there are two freshwater lakes adjacent to the proposed application boundary: Llyn Coch-hywad and Llyn Gwyddior. Whilst these sites do not benefit from a formal designation, CCW (now Natural Resources Wales) considers that they are of national value for oligotrophic lake habitats. There are no superficial deposits mapped in the vicinity of the two lakes, and there is little groundwater present within the solid geology underlying the site. It is therefore considered that the lakes receive the majority of their water input from rainfall and rainfall-fed surface water runoff; hence their oligotrophic status.

18 A detailed review of the hydrology of the deposits of peat at site was given in the SEI 2013 and was informed by comprehensive site investigations and review of published literature. In summary:

- no evidence of peat cracking was recorded in any of the hand-dug trial pits advanced at site which suggests the current drains and forest has not significantly dried the in-situ deposits of peat at site; and

- permeability testing of the peat has confirmed the generally low permeability of the peat and that the extent of the potential drainage drawdown induced by peat drains was limited.

<u>Hydrogeology</u>

19 Review of mapping published on the Natural Resources Wales (NRW) website confirms that the application site is not located in a groundwater Source Protection Zone.

20 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.

21 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. Previously, before the new aquifer designations were introduced on 1st April 2010, this unit would have been given a minor and/or a non-aquifer designation.

Water Resources

22 A detailed review of licensed and unlicensed water use within the site boundary and near to site was undertaken as part of the ES and SEI 2013. In summary whilst there are many water abstractions within 3km of the boundary, no water abstraction is recorded closer than 500m from proposed wind farm infrastructure.

4. Relevant Legislation and Guidance

23 There is much legislation and guidance relevant to hydrology and hydrogeology and this has been referenced in the ES and SEI 2013. A summary of key legislation and guidance is given below.

European Legislation

24 The key piece of European Legislation that protects the UK's water environment is the Water Framework Directive (2000/60/EC). This Directive protects all elements of the water cycle and enhances the quality of groundwaters, surface waters, estuaries and coastal waters.

25 The Groundwater Directive 80/68/EEC and the Groundwater Daughter Directive 2006/118/EC aims to protect groundwater from pollution. Under Article 22 of the Water Framework Directive the 1980 Directive is due to be repealed in December 2013.

National Legislation

26 The Water Resources Act 1991 (Amendment) Regulations 2009 SI 3104 (Environment Agency) extends the use of Water Protection Zones and Works Notices, in particular to deal with harm to aquatic ecosystems caused by the physical characteristics of a watercourse.

27 The Environmental Permitting (England and Wales) Regulations (EPR) (2010) includes controls to protect groundwater quality by preventing inputs of hazardous substances and limiting pollution from non-hazardous pollutants under the Water Framework Directive and the Daughter Groundwater Directive.

28 The Welsh Assembly Government's Environment Strategy for Wales (2006) identifies the Assembly's approach to sustainable development including water resources.

29 Planning Policy Wales Edition 5 (November 2012) requires Local Planning Authorities to take a strategic approach to flood risk and considering the catchment as a whole.

30 The Local Authorities Flood and Water Management Act (2010) and Technical Advice Note (TAN) 15: Development and Flood Risk, Welsh Assembly Government (2004) consider flood risk.

Best Practice Guidance

31 In addition to the best practice guidance used in the ES the following recent best practice guidance is relevant to the development proposals:

- Forests and Water – UK Forestry Standard Guidelines. Forestry Commission, 2011 (RWE/HYD/59);
- Guidance Note - Assessing the Impact of Wind Farm developments on Peatlands in Wales. Countryside Council for Wales, 14th January 2010 (RWE/HYD/09);
- Good Practice During Wind Farm Construction (Version 1). Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency and Forestry Commission, October 2010 (RWE/HYD/55); and
- The SuDS Manual (Report C697). CIRIA, 2007 (RWE/HYD/58).

32 In addition the Environment Agency Wales (now Natural Resources Wales) publishes a range of Pollution Prevention Guidelines (PPG) which are relevant to the control and management of water. Such guidance includes the following;

- PPG1 General Guide to the Prevention of Pollution, July 2013 (RWE/HYD/36)
- PPG2 Above Ground Oil Storage Tanks, August 2011 (RWE/HYD/40)
- PPG4 Treatment and disposal of sewage where no foul sewer is available, July 2006 (RWE/HYD/44)
- PPG5 Works and maintenance in or near water, October 2007 (RWE/HYD/37)
- PPG6 Working at Construction and Demolition Sites, March 2012 (RWE/HYD/38)
- PPG7 Safe Operation of Refuelling Facilities, July 2011 (RWE/HYD/45)
- PPG8 Safe Storage and disposal of used oils, February 2004 (RWE/HYD/46)
- PPG13 Vehicle washing and cleaning, July 2007 (RWE/HYD/39)
- PPG21 Pollution Incident Response Planning, March 2009 (RWE/HYD/41)
- PPG22 Incident Response – dealing with spills, April 2011 (RWE/HYD/42)
- PPG26 Drums & intermediate bulk containers, May 2011 (RWE/HYD/43)

5. Objections Received

Representations from Statutory Consultees

33 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 following issues:

34 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

35 Prior to preparing and submitting the SEI 2013 to the Countryside Council for Wales (CCW) (now Natural Resources Wales) I, Mr Piper, Mr Lowther and Dr Mills discussed with CCW the scope of further site work that would be required to allow CCW to further assess the potential impacts associated with the proposed forest felling, habitat restoration scheme and wind farm construction.

36 These site investigations and interpretation of the data gathered formed the basis of the SEI 2013 and allowed for stronger emphasis on the wider creation and management of habitats to support upland biodiversity, notably blanket bog and heathland, to be included in the scheme proposals. The investigations also allowed the wind farm design and mitigation measures to be further refined.

37 Following review of the SEI 2013 by NRW, a meeting I, Mr Lowther and Dr Mills had with NRW on 8th August 2013, subsequent discussions and a site visit that took place on the 2nd October 2012, 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

38 Following submission of the SEI 2013 a number of representations were made by third parties. With respect to the water environment the following potential concerns or impacts have been raised:

Water Pollution and Effects on Water Supplies and Water Resources

39 Concerns have been raised that the proposed development may give rise to the following impacts:

- construction of the wind farm may result in pollution that in turn might impair water supplies and/or effect important fisheries;

- mobilisation of silts as a consequence of construction of the site may lead to silting up of watercourses and wetlands, which in turn may increase flood risk;

Hydrology and Flooding

40 Concerns have been raised that the hydrology of the site and downstream of the site may be adversely effected by the proposed development which in turn might increase flood risk downstream of the site. The concerns raised include:

- removing areas of peat and replacing this with wind farm infrastructure that could increase the rate and volume of runoff shed from site;
- an increase the rate and volume of runoff from site exacerbating flood risk in the River Severn and its tributaries, which potentially could increase flood risk in flood prone areas already;
- change of baseline conditions and a change of rainfall runoff and soil water infiltration response as a consequence of development;

Uncertainty

41 Concerns have been raised with respect to the uncertainty, and in particular:

- potential effects of climate change on flood risk and its effect on the habitat creation proposals;
- difficulty implementing measures to protect and restore peat/bog habitat;
- supervision of construction staff and ensuring identified mitigation measures / construction techniques are deployed on site;

6. Potential Effects on Hydrology and Hydrogeology

42 The hydrological conceptual model summarised in Section 3 and set out in detail in the SEI 2013 (Section 13.3) is important for both the assessment of the potential impacts and for the design of appropriate mitigation measures.

43 As part of my assessment I have considered the potential impacts of proposed forest felling, habitat restoration and of the wind farm (SEI 2013, Section 13.5). With respect to the wind farm I have considered three stages of development; construction, operation as well as decommissioning. Potential impacts I identified include the following:

- the contamination of ground and surface waters by, for example, suspended solids, oils and fuels as a consequence of forest felling, wind farm construction and operation, or earthworks associate with habitat restoration;
- the disruption and alteration of existing watercourses associated with track construction and traffic movement;
- drainage and damage of peat habitat through compaction and the alteration of the level of saturation within superficial deposits and peat as a result of wind farm construction or habitat restoration works;
- impedance of groundwater flow as a result of infrastructure construction; and

- the alteration of surface runoff rates, routes and discharge volumes as a consequence of construction activities.

44 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 (SEI 2013. Section 13.5) and all of the potential significant impacts have been addressed through risk avoidance mitigation measures. These measures are considered in more detail in Section 7.

7 Proposed Mitigation, Conditions and Obligations

Proposed Mitigation Measures

45 Elements of the original wind farm design, including layout, and habitat restoration strategy have been revised since the submission of the ES, the SEI 2009 and the SEI 2011 to take account of discussions held with CCW and to reflect the findings of additional site investigation completed. Details are given in the SEI 2013 (Chapter 2).

46 Wherever possible the proposed site infrastructure (tracks, turbines, borrow pits etc.) have been located in areas of lower environmental sensitivity.

47 The proposed mitigation measures are presented within the SEI 2013 (Section 13.6) and its supporting appendices (13.4 and 13.5) and have been developed in consultation with Dr Mills, Mr Piper and Mr Lowther. The mitigation measures have been developed using best practice guidance published by bodies such as Countryside Council for Wales (now Natural Resources for Wales), Forestry Commission and the Construction Industry Research and Information Association (CIRIA).

48 Rather than repeat all of the mitigation measures identified in the SEI 2013, key site specific mitigation measures are reproduced below:

Prevention of Water Pollution

- surface water management in accordance with SUDS to collect and manage runoff and allow dispersed discharge of water away from watercourses at predevelopment rates;

- maintenance of filter strips and buffers to existing watercourses;

- adherence to a Construction and Environment Management Plan (CEMP) which would be agreed with Powys County Council and Natural Resources Wales prior to any works commencing onsite (a draft CEMP was presented as part of the SEI 2013);

- use of a site specific Drainage Management Plan (a draft of which was presented in the SEI 2013);

- deployment of an Ecological Clerk of Works (ECoW) to supervise construction activities near to watercourses and with the authority to amend the method of working or halt all works should a pollution risk be witnessed;

- a water quality monitoring protocol with trigger or action levels;
- storage of fuels, oils and other potential pollutants in accordance with Pollution Prevention Guidelines;
- management of foul water, concrete wash water and other potential pollutants in accordance with Pollution Prevention Guidelines;
- staff induction that includes training on pollution risk and risk minimisation;
- maintenance of spill kits and vehicle movement management plan to minimise potential for accidents;
- controls for the placement of concrete;

Hydrology and Flood Risk

- application and use of SUDS to collect and manage runoff prior to controlled discharge (as recommended by Environment Agency Wales);
- controls on the rate and quality of water discharged from site infrastructure (roads, turbine foundations, compounds, borrow pits etc.) monitored by the site ECoW;
- design of watercourse crossings to convey flood water flows in accordance with details agreed with Natural Resources Wales and regulated by Flood Defence Consents issued by Natural Resources Wales where appropriate;
- water monitoring protocol that would include inspection for potential ground erosion as a result of concentrated or high rates of discharge and authority for an ECoW to amend method of working or halt all works should a flood or erosion risk be witnessed (water quality monitoring to include locations detailed in the draft CEMP and include the principle watercourses draining from site and Severn Trent Water intakes on the Afon Cwm);
- proposals, detailed in the draft CEMP, to limit works in periods of intense or prolonged rainfall;
- restatement of disturbed soils (e.g. flanks of tracks, surface of turbine foundations) with soils and turves sourced on site to mimic pre-development runoff rates;
- use of floating access tracks, the location of which would be agreed with the ECoW prior to construction, in areas of deeper peat and ecological sensitive areas so as to minimise construction impacts and maintain existing hydrological conditions / flow paths;

Forest Felling

- adherence to a Forest Management Plan developed specifically for this site;

- limiting the rate of forest felling in surface water catchments so as to minimise potential for effects on water quality in accordance with current guidance;

- specification in the CEMP and Forest Management Plan of measures relating to traffic movement and management, timing of felling operations, storage of timber and works near to water so as to minimise erosion / sediment production and to safeguard the quality of the water and control the rate of runoff from areas of forest felling;

Habitat Restoration

- deployment of an experienced ECoW to control and manage all habitat restoration works;

- placement of peat dams in forest drains only in consultation with the ECoW so as to maximise benefits and minimise potential for pollution risk;

- construction of peat dams in accordance with recognised and proven best practice as detailed in the Drainage Management Plan presented as an appendix to the SEI 2013;

49 As with a development of this nature, and given site circumstances, there is potential for slope instability that could impact both the hydrology and hydrogeology. However, as presented in Mr Mills's evidence, the overall conclusions regarding peat stability is that the peat at the site would be stable subject to standard mitigation.

50 The SEI 2013 (Chapter 13) and supporting appendices demonstrate that, with appropriate controls and mitigation measures, as detailed within the SEI, there would be no significant impact on any surface watercourses, which may be potentially affected by runoff, sedimentation and drainage associated with proposed forest operations, the wind farm and habitat restoration works. This includes a consideration of flood risk.

51 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, and local water supplies. 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.

<u>Proposed Conditions and Obligations</u>

Pollution Prevention and Construction and Environment Management Plan

52 All of the mitigation measures identified in the ES and subsequent SEIs would be set out within a Construction and Environment Management Plan (CEMP). A draft CEMP was presented as part of the SEI 2013.

53 The CEMP would be a 'live document' which would be subject to continual review and update as required to reflect site conditions and findings. For example the CEMP would include the results of further pre-commencement site investigation (e.g. that required to inform the design of the turbine foundations) and agreed

mitigation measures identified by any pre-development planning conditions or obligations deemed necessary by the Inquiry.

54 The CEMP would include both specific mitigation measures as well as proposals for monitoring and emergency procedures.

55 As recommended by the Environment Agency Wales, the CEMP would be submitted to Powys County Council and Natural Resources Wales for approval prior to felling, habitat restoration and wind farm construction occurring on site. It is envisaged, as is common for other consented developments of this nature, submission and approval of the CEMP would be secured by an appropriately worded planning condition or by an obligation as set out in a Section 106 Agreement.

56 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. This protocol would formally agreed prior to the commencement of the development and would be implemented following detailed surveys post-consent, under the supervision of an Ecological Steering Group. This Protocol applies to construction compounds, borrow pits, wind turbines, anemometry masks, access tracks and crane pads (the infrastructure elements)

Habitat Restoration, Peat and Forest Management Plans

57 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) presented as part of the SEI 2013. Like the CEMP (above) these will be developed further prior to any works commencing on site and be 'live documents' that would be subject to continual review and update to reflect site conditions.

58 The HRMP, PMP and FMP would be submitted to Powys County Council and Natural Resources Wales for approval prior to felling, habitat restoration and wind farm construction occurring on site. It is envisaged, as is common for other consented developments of this nature, submission and approval of the HRMP, PMP and FMP would be secured by an appropriately worded planning condition or by obligation as set out in a Section 106 Agreement.

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

59 Works near to and within watercourses would only be undertaken with prior approval from Natural Resources Wales and where appropriate in accordance with a Flood Defence Consent issued by Natural Resources Wales.

60 Any proposal for water abstraction (e.g. for concrete production, dust suppression or for welfare facilities) would only occur after consent has been obtained from Natural Resources Wales and Powys County Council.

61 It is suggested, as is common with other developments of this nature, that a schedule of watercourse crossings, details of the crossings, proposals for water management including the application of SUDS (to control water quality and the rate of runoff from site so as to minimise flood risk) and water abstraction could be

secured by planning condition or by obligation as set out in a Section 106 Agreement.

Ecological Clerk of Works and Geotechnical Specialist

62 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 identified in the ES and SEIs are adhered to. In addition, as detailed in the draft CEMP, the ECoW(s) would have authority to amend the method of working or halt all works should a pollution risk be witnessed during, for example, forest felling, habitat restoration or wind farm construction.

63 At least one onsite geotechnical specialist will be appointed to the project for the period of civil design and construction works. The geotechnical specialist will identify site specific investigation works, on-going monitoring / review of site conditions using instrumentation, and be responsible for maintaining a geotechnical risk register.

64 The deployment of suitably qualified ECoW(s) and geotechnical specialist(s) can be secured by use of an appropriately worded pre-commencement planning condition, as is common at other development sites in similar settings.

Developer's Obligation

65 All of the agreed environmental mitigation measures would be clearly stated at the tendering stage for the forest felling, habitat restoration, construction and turbine maintenance works.

66 All appointed sub-contractors would be made aware of the site specific conditions and the mitigation measures that would be required to be adopted at site. An independent and suitably qualified Owner's Engineer would also be present during the construction phase of the project so as to liaise with the various environmental and other advisers who will have input into the project and to provide specialist advice on hydrological and ecological matters.

8 Summary and Conclusions

67 I have shown that significant site investigation has been undertaken to inform the site design and site specific mitigation measures proposed. The mitigation measures proposed have been identified using best practice guidance and relevant experience from similar projects near to Carnedd Wen and throughout the UK.

68 In preparing my assessment and review of required mitigation measures I have worked closely with Dr Mills, Mr Lowther and Mr Piper so due regard is made to related issues of peat stability, ecology, habitat management and restoration and forestry.

69 Specifically I have addressed in the SEI concerns raised by CCW following review of the ES and SEI 2011, which has included an assessment of the following:

- possible impacts associated with drainage of peat attributable to the proposed construction works;

- the quality, rate and volume of runoff shed from all stages of proposed development;

- potential impacts on the Pen Llŷn a'r Sarnau Area of Special Area of Conservation (SAC) as a result of sediment runoff during felling operations;

- potential impact on the freshwater lakes - Llyn Gwyddior & Llyn Coch-hwyad as a consequence of proposed felling and construction activities;

70 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 Area of Special Area of Conservation (SAC) and Llyn Gwyddior & Llyn Coch-hwyad freshwater lakes.

71 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.

72 Following review of the SEI 2013 by NRW, a meeting I, Mr Lowther and Dr Mills had with NRW on 8th August 2013, subsequent discussions and a site visit that took place on the 2nd October 2012, 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.

73 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.

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

75 This concludes my evidence and finally, I confirm the following;

- I understand my duty to the Inquiry and have complied, and will continue to comply, with that duty.

- I confirm that my evidence identifies all facts which I regard as being relevant to the opinion which I have expressed, and that the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.

- I believe the facts stated within this proof are true and that the opinions expressed are correct.

Dr Alan Edwards 7th October 2013