



Marine Scotland

Proposals for onshore wind farms and transmission lines under sections 36 and 37 of the electricity act (1989) and the environmental impact assessment (scotland) regulations (2017)

Scoping advice on information required in environmental impact assessment reports in relation to assessing risk to freshwater and diadromous fish and associated fisheries

APRIL 2018

PROPOSALS FOR ONSHORE WIND FARMS AND TRANSMISSION LINES UNDER SECTIONS 36 AND 37 OF THE ELECTRICITY ACT (1989) AND THE ENVIRONMENTAL IMPACT ASSESSMENT (SCOTLAND) REGULATIONS (2017)

SCOPING ADVICE ON INFORMATION REQUIRED IN ENVIRONMENTAL IMPACT ASSESSMENT REPORTS IN RELATION TO ASSESSING RISK TO FRESHWATER AND DIADROMOUS FISH AND ASSOCIATED FISHERIES

Marine Scotland Science

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Onshore wind farm and transmission line developments have the potential to adversely affect freshwater and diadromous fish and associated fisheries through a number of mechanisms, including: increased sediment transport and deposition; pollution incidents e.g. fuel, concrete spillage, incorrect use of flocculants (for sediment control); altered hydrological pathways; removal or degradation of fish habitat, including spawning areas; reduction in food supply and obstruction to upstream and downstream migration of fish. It is important to avoid and/or reduce the possibility of such impacts occurring by careful pre-construction consideration; including site investigations to select a suitable site and design, and good practice throughout construction (see <http://www.snh.gov.uk/docs/A1168678.pdf>).

The principal fish species of concern are Atlantic salmon, sea trout, brown trout and European eel, but for some developments other species, such as lamprey species, may be of concern. All are of conservation interest, and Atlantic salmon, sea trout and brown trout support important fisheries of economic value which could also be affected, either directly or by impacts on population size.

Marine Scotland Science (MSS), which is part of the Scottish Government, regularly provides scientific advice to Energy Consents Unit (ECU) in relation to the potential impacts of wind farm developments on the above fish. ECU has the responsibility, under Sections 36 and 37 of the Electricity Act (1989), for processing applications for electricity generating stations of 50 megawatts or more, power lines and associated infrastructure for Scottish Ministers' consent. Under the Electricity Works (Environmental Impact Assessment) (Scotland) (EIA) Regulations (2017), Scottish Ministers are required to consider whether any proposal for a wind farm is likely to have a significant effect on the environment. An application for an Electricity Act consent for an EIA development must be accompanied by an Environmental Impact Assessment Report (EIAR). This guidance note outlines MSS advice on matters which should be addressed in the EIAR.

Information to be included in the EIAR is as follows:

1. A description of which fish species are present and the abundance of salmon and trout populations in the waterbodies and watercourses which could be impacted by the development, and whether they are important for conservation or supporting fisheries;
2. A description of the water quality of waterbodies which could be impacted and how the development may impact on these pre-construction conditions;
3. A description of what activities during construction, post-construction and decommissioning have the potential to impact on fish or associated fisheries and what mitigation measures will be put in place to avoid and/or reduce this impact;

4. Consideration of potential cumulative effects with adjacent and other developments;
5. Proposals for monitoring before construction, during construction, post-construction and decommissioning.

The above information allows an assessment of the likely significant effects of the development on fish populations, to mitigate any likely significant adverse effects on fish populations and to establish appropriate monitoring measures as outlined in the EIA (Scotland) regulations (2017).

1. Description of which fish species are present and the abundance of salmon and trout populations in the waterbodies and watercourses which could be impacted by the development, and whether they are important for conservation or supporting fisheries.

In order to assess the potential impact of developments the developer should provide information on fish of all species, the abundance of species of both high economic and conservation value e.g. salmon and trout within the development area and on fisheries which depend on these and present this data/information in the EIAR. Scottish Natural Heritage (SNH) should be consulted regarding other fish of high conservation interest. Within the EIA (Scotland) regulations (2017) biodiversity, particularly species and habitats protected under the European Habitats Directive, is listed as a factor on which direct and indirect significant effects of the proposed development are to be considered throughout the EIA.

Fish species of high conservation value include Atlantic salmon, sea lamprey, river lamprey and brook lamprey, which are listed under the European Habitats Directive. Atlantic salmon, brown / sea trout, European eel, river lamprey, sea lamprey, Arctic charr, powan, vendace, smelt (sparring) and shad are listed as species requiring conservation action under the UK Biodiversity Action Plan. The latter is now succeeded by the UK Post-2010 Biodiversity Framework with devolved countries within the UK producing their own strategies for conservation. The Scottish Biodiversity List outlines priority species for conservation including European eel, vendace, powan, smelt, Atlantic salmon, sea trout, Arctic charr, river lamprey, brook lamprey and sea lamprey. The European eel is also protected by EU regulation (EC No 1100/2007).

Salmon and trout fisheries are recognised as an important and significant sector of the Scottish economy. The Scottish Government has classified salmon rivers based on conservation limits. Developers can seek further information on the categorisation of fishery districts, rivers and Special Areas of Conservation (SAC) at the following web site <http://www.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status>.

Where salmonid populations are present and the development has the potential to have an impact on the freshwater environment, a site characterisation study of the development site should be carried out to assess all species and the abundance of salmonids in standing and running waters likely to be affected by the proposed development. Fish habitat surveys describing available habitats for salmon and trout and all age ranges in terms of flow regime, substrate type, cover etc. should be provided and a description of possible physical barriers to migratory fish movement. Results from this site

characterisation survey should be presented in the EIAR in addition to the potential impacts on fish, together with proposals for appropriate site specific mitigation measures and a monitoring programme, if required.

Salmonid population assessment in watercourses should be carried out using electrofishing techniques. Fully quantitative electrofishing survey is the preferred methodology as it allows for enumeration of a stock within a given site and provides a reasonably accurate estimate of a given population. Standards outlined by the Scottish Fisheries Co-ordination Centre (<http://www.scotland.gov.uk/Topics/marine/science/sfcc/Protocols/ElectrofishingSurveys>) are recommended with late summer/autumn the preferred time of year for carrying out the work. The electrofishing survey should include all habitat types available for salmonid use (electrofishing techniques are best suited to the capture of salmon and trout), including a consideration of potential impacts on still waters. The location of sample areas and their upstream and downstream boundaries should be fully documented so that they can be revisited in the future by other parties. Control sites, where an impact is unlikely, should also be included in the site characterisation thereby allowing differentiation of impacts associated with the development and non-development e.g. climatic. The following publication may be helpful in providing a description of the geographical distribution and characteristics of salmon rivers in Scotland and the processes by which important salmon habitats are identified and designated as salmon are a key species of interest http://www.nasco.int/pdf/far_habitat/HabitatFAR_Scotland.pdf. Standard protocols outlined by the Scottish Fisheries Co-ordination Centre (<http://www.scotland.gov.uk/Topics/marine/science/sfcc/Protocols/ElectrofishingSurveys>) are recommended. Developers should ensure that all fish work complies with the Animal (Scientific Procedures) Act (1986) and Animal Health and Welfare (Scotland) Act (2006) where required.

Standard biosecurity practices should be carried out at all times to minimise the risk from pathogens of fish (<http://www.scotland.gov.uk/Resource/0038/00385854.pdf>).

Where there is potential for “likely” significant effects on listed interests of SAC

http://www.jncc.gov.uk/ProtectedSites/SACselection/SAC_species.asp

http://www.jncc.gov.uk/ProtectedSites/SACselection/SAC_list.asp?Country=S, information to allow a Habitats Regulations Appraisal and, if necessary, an Appropriate Assessment to be carried out must be provided. <http://www.snh.gov.uk/planning-and-development/environmental-assessment/habitat-regulations-appraisal/>

2. A description of the water quality of waterbodies which could be impacted and how the development may impact on these pre-construction conditions.

Potential impacts on fish are often a result of deterioration in the water quality which can have an indirect effect on spawning success, hatching of eggs and production of juveniles.

Water quality parameters to be considered in any site characterisation and discussed in the EIAR could include the following depending on anticipated impacts:

- turbidity (NTU) in relation to site disturbance;
- dissolved organic carbon (DOC) (mg l^{-1} (ppm)) in relation to site disturbance and peat deposits;
- pH, alkalinity (ALK) ($\mu\text{eq l}^{-1}$), acid neutralising capacity (ANC) ($\mu\text{eq l}^{-1}$) and aluminium ($\mu\text{g l}^{-1}$ (ppb))

in relation to changes in hydrology, DOC export and acidification. The Cantrell approach of calculating ANC (see below) is a better predictor of salmonid fry presence than the ion balance method.

- $ANC = ALK (\mu eq l^{-1}) + 5 \times DOC (mg l^{-1})$ when $pH > 5.5$
- $ANC = ALK (\mu eq l^{-1}) + 4.5 \times DOC (mg l^{-1})$ when $pH < 5.5$
- These equations are applicable to the ALK being measured by dual endpoint titration or Gran titration. If the alkalinity has been analysed using a single endpoint titration then the following conversion equation should be used:
- $ANC = ALK (\mu eq l^{-1}) + 0.65 \sqrt{ALK (\mu eq l^{-1})}$;
- total oxidised nitrogen (nitrate and nitrite) ($mg l^{-1} N$ (ppm)) and phosphate ($\mu g l^{-1} P$ (ppb)) in relation to nutrient leaching;
- temperature; and
- dissolved oxygen concentration (DO) ($mg l^{-1}$) and biological oxygen demand (BOD) ($mg l^{-1}$) can be an indicator of the health of a water body, where low DO and high BOD levels indicate poor water quality.

These parameters should be measured under a full range of flow conditions (stream stage) at a minimum of monthly intervals at sites likely to be impacted and at control sites. From these data an assessment can be made of the potential impacts on water quality as a result of the proposed development. If the development is likely to have an impact on the water quality, appropriate mitigation measures and a monitoring programme, should be drawn up and presented in the EIAR.

An assessment of macroinvertebrate species and community composition can augment the interpretation of chemical analysis of water quality and therefore macroinvertebrate sampling is also recommended.

3. Description of what activities during construction, operation and decommissioning have the potential to impact on fish or associated fisheries and what mitigation measures will be put in place to avoid and/or reduce this impact.

In the EIAR, careful consideration should be given to the following activities during construction, post-construction and decommissioning which can have an impact on fish populations and fisheries: construction of turbine foundations; excavation of borrow pits; road construction/upgrading; cable laying; water abstraction and discharge.

Aspects requiring careful consideration are as follows:

Abstraction and discharge of water

Any activity which may affect the water environment is controlled under The Water Environment (Controlled Activities) (Scotland) Regulations 2011, more commonly known as Controlled Activity Regulations (CAR). Discharges, disposal to land, abstractions, impoundments and engineering works (water course crossings) are all regulated by the Scottish Environment Protection Agency (SEPA). (SEPA- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 A Practical Guide <http://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/>)

Waterbodies and stream crossings

It is recommended that construction avoids waterbodies and watercourses wherever possible. If construction is to be carried out near waterbodies and watercourses, a buffer zone of at least 50m should be established. Where river crossings are proposed the Scottish Executive consultation “River Crossings and Migratory Fish” (2012) should be consulted (<http://www.scotland.gov.uk/Topics/marine/science/Publications/publicationslatest/rivercrossings>) in addition to SEPA’s “Engineering in the Water Environment Good Practice Guide Construction of River Crossings”.

<http://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/>

Peat stability

Peat slides can have a direct impact on fisheries and peat disturbance can have indirect effects on water quality. Therefore, all construction should avoid areas of deep peat and where this is not possible appropriate mitigation measures, such as floating roads, should be put in place. Natural peat drainage channels should be preserved throughout the development; excavated material should not be stock piled in areas of unstable peat; concentrated water flows onto peat slopes should also be avoided. The following link provides a peat hazard and risk assessment guide.

<http://www.gov.scot/Publications/2017/04/8868>

Flooding

SEPA is the lead authority for flood risk management planning <https://www.sepa.org.uk/environment/water/flooding/responsibilities-for-flooding/>. The propensity of the development site to flooding, prior to any construction activities, should be considered. Drainage throughout the proposal should be designed such that it does not alter surface water runoff leading to a reduction in base flows or influence the magnitude and/or frequency of flooding. Changes in the hydrological regime can have a large impact on fish populations.

Acidification

Particular attention should be paid to acidification issues if they could be a problem in the area. Anthropogenic acidification of fresh waters is largely caused by the input of sulphur and nitrogen compounds, derived from the combustion of fossil fuels, exceeding the buffering capacity of the soils and underlying rocks through which the streams flow. Peat deposits and marine derived sulphates can also contribute to acidity. Salmonid fish are particularly sensitive to acid water, particularly due to the increased mobility of labile aluminium in acid conditions which is toxic to aquatic organisms. The developer should be aware of the increased sensitivity of such an area and include it in site management and monitoring programmes.

Forestry

The developer should consider the potential impacts of any tree felling on the aquatic environment including nutrient release, increased acidification risk, loss of habitat, impacts on hydrology, increased fine sediment transport and deposition, all of which can have a detrimental impact on fish populations and should therefore be addressed in the EIAR. The Forests and Water UK Forestry Standard Guidelines should be consulted for further information (<http://www.forestry.gov.uk/forestry/inf-d-8bvgx9>). SEPA provides guidance on the management of forestry waste which should be considered where felling forms part of the proposed development.

https://www.sepa.org.uk/media/153999/forestry_waste_guidance_note.pdf

Invasive non-native species

Where invasive non-native species (INNS) (e.g. North American signal crayfish which can predate on juvenile salmonids and damage stream habitats) have the potential to have adverse impacts on water quality and/or fish populations the developer should seek advice from SEPA which is the organisation responsible for INNS in freshwater habitats (still and flowing water).

<http://www.sepa.org.uk/environment/biodiversity/invasive-non-native-species/>

Angling

There should be consideration of angling, as a recreation interest, and the potential impact that the proposed development may have on it, such implications should be outlined in the socio-economic section of the EIAR.

Adherence to current best available techniques is expected throughout all stages of the development. Site specific mitigation measures and/or enhancement programmes to protect freshwater habitats should always be included. In all cases the developer should draw up site specific mitigation plans to minimise any impact to fish and their inhabiting waters.

4. Consideration of potential cumulative effects with adjacent and other developments

The combined effect on water quality and fish populations/fisheries from all existing and proposed construction developments in the river catchment(s) within and downstream of the proposed development site should be addressed in the EIAR.

5. Proposals for monitoring before, during construction, post construction and decommissioning

The EIAR should consider and propose what monitoring of water chemistry (including turbidity and flow data), fish and macroinvertebrate populations should be carried out before construction, during construction, post-construction and decommissioning to identify any major potential impacts and allow remediation at the earliest opportunity, and provide data for wider analysis. The design of the monitoring programme should focus on the risks presented by the development and be clearly laid out to cover the sampling strategy, sampling site selection (including appropriate control sites), sampling methodology, sampling frequency, list of parameters to be measured and data analysis-including identification of threshold levels. Reporting mechanisms and links to site management should be clearly identified and an action plan describing what action will be taken should threshold levels be exceeded.

Site characterisation data can be used to supplement baseline preconstruction data; the latter should be undertaken at least one year prior to construction commencing and include a measurement of selected water quality parameters at monthly intervals over a full range of flows, at sites likely to be impacted and at control sites. Fully quantitative electrofishing surveys should take place in late summer/autumn and macroinvertebrate sampling (kick and Surber/Hess) sampling should be carried out in spring. Similar water quality and aquatic ecology sampling, using as far as possible identical methodology and the same sites, should continue during construction and for at least one year after construction- the

duration of the sampling after construction is dependent on monitoring results during the construction period.

Findings from the site characterisation surveys, an action plan outlining what remedial action will take place if threshold levels (determined from pre-construction monitoring) or Water Framework Directive standards (<http://www.scotland.gov.uk/Resource/0045/00457867.pdf>) are exceeded together with all monitoring proposals during and after construction should be outlined in the EIAR.

If the developer considers that there will be no significant impact from the development and as such no monitoring during the construction or post-construction phases will be required, justification for this should be clearly presented in the EIAR with supporting data and information.

Further survey work may be required in the year or more prior to decommissioning to fully assess the likely impacts on water quality, macroinvertebrates and fish populations.

Other consultees and sources of further information

District Salmon Fishery Boards (DSFBs) have a statutory responsibility to protect salmon and sea trout populations. If a DSFB is in place, it should be consulted. In addition to DSFBs, local Fisheries Trusts have information regarding local fish populations. The following web site has a list which includes most DSFBs and Fisheries Trusts in Scotland:

<http://fms.scot/>.

SNH should also be consulted when nature conservation sites or species of conservation interest are involved.

<http://www.snh.gov.uk/about-scotlands-nature/species/fish/freshwater-fish/>

<http://www.snh.gov.uk/planning-and-development/renewable-energy/onshore-wind/>

SEPA is Scotland's principal environmental regulator, protecting and improving Scotland's environment and should therefore be consulted. The Water Framework Directive aims to ensure that watercourses achieve "good ecological status" and that there is no deterioration in status. SEPA achieves this status through The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR Regulations) and the implementation of the River Basin Management Plans.

http://www.sepa.org.uk/water/water_regulation.aspx

<http://www.sepa.org.uk/environment/energy/renewable/>



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