



SSE
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Attn: [REDACTED] Consents Manager

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FILE NOTE:

Cloiche Wind Farm: existing data on fish populations and stream hydrochemistry

1 Background

Waterside Ecology has been asked to provide advice in relation to fish and fisheries monitoring at the proposed Cloiche Wind farm, near Fort Augustus. The proposed site is drained by seven named watercourses and many smaller unnamed streams.

Marine Scotland Science (MSS) is the main government advisor and consultee in relation to fish. Generic guidance from MSS in relation to fish data in Environmental Statements for wind developments (Marine Scotland Science 2015) states that:

In order that MSS- FL can assess the potential impact of developments the developer should provide information on all species and abundance of fish within the development area and on fisheries which depend on these. MSS- FL may not have local knowledge of the site and consequently the onus is on the developer to provide adequate information on which to base an assessment of risk.

The above principle underpins current guidance (Marine Scotland Science 2018).

In relation to proposed Cloiche Wind Farm, the scoping response from Marine Scotland (letter from Dr Emily Bridcut, 4th October 2018) requested that data on fish and hydrochemistry be included in Environmental Impact Assessment report (EiAR). The purpose of collecting these data would be to characterise the site in order to underpin the design of any required mitigation or monitoring. SSE have advised they would like to better understand the rationale for this request and asked Waterside Ecology to review existing data and to advise on fish data needs in relation to the Environmental Impact Assessment Report and any future monitoring.

Some past survey data are available for streams surrounding the site. The purpose of this file note is to summarise existing fish population and hydrochemical data and to consider whether these might be sufficient for the purposes of the EiAR for Cloiche Wind Farm.

2 Existing fish data

Three published data sets have been identified that are of direct relevance to fish populations potentially impacted Cloiche Wind Farm. These are:

- Monitoring data collected by West Galloway Fisheries Trust and latterly by Ness and Beaully Fisheries Trust in relation to the Glendoe hydroelectric scheme. The data cover a period from 2002 to 2009. All data are summarised in Ness & Beaully Fisheries Trust (2009).

- Results of a netting survey of Loch Killin by Lyle & Maitland (2004). This was conducted in relation to the Glendoe hydroelectric scheme. The study identified the continuing presence of Arctic charr in the loch as well as populations of brown trout.
- Fish surveys carried out in support of the EIAR for Stronelairg Wind Farm (Waterside Ecology 2011). This study included electric fishing on a number of streams draining the proposed Cloiche Wind Farm. However, most of the survey sites were downstream of Cloiche redline boundary. The data were collected in 2011.

The existing fish population data are summarised in Table 1 below. Further details are including survey results are collated in Appendix 7.1.

Table 1. Existing fish population data

Catchment and sub-catchment	Potentially impacted named stream(s) within redline boundary	Past survey data for named watercourse?	Fish species present	Comment
Fechlin, Killin (Crom Allt)	Allt Mor	Yes (2011)	Trout	Trout are present in tributary streams (Waterside Ecology 2011) so their presence in Allt Mor is certain.
Fechlin, Killin (Crom Allt)	Caochan Uchdach	*Yes (2011)	Trout	Trout present at low density in lower reaches. No data within redline boundary.
Fechlin, Killin (Crom Allt)	Loch na Lairige outflow	*Yes (2011)	Trout	Large, loch-fed watercourse likely to be suitable for trout. Trout present at low density in lower reaches. No data within redline boundary.
Fechlin, Killin (Allt Odhar)	Allt Creag Chomaich and tributaries	*Yes (2011)	Trout	Loch-fed watercourse likely to be suitable for trout. No data within redline boundary. Trout present at low density in lower reaches.
Fechlin, Breineag	Allt na Feith Gobhlaich	No	Unknown	3 km of low gradient stream. Potentially suitable for trout.
Tarff	River Tarff (upstream of reservoir)	No	Unknown	No survey data upstream of reservoir within redline boundary. Nearest survey data are from 8 km downstream of redline boundary (trout only).
Tarff	Caochan Uilleam	Yes (2011)	Trout	One site (site 14) within redline boundary. Trout fry and parr present.

* Fish data available from downstream of Cloiche WF redline boundary only

It is clear from Table 1 and Appendix 7.1 that there are few data from streams within the redline boundary but that data are available from several potentially impacted sub-catchments of both the River Tarff and River Fechlin. These data suggest that a) brown trout are likely to be the only species present within the Cloiche Wind Farm site, and b) trout density in streams draining the site is likely to be low.

3 Existing hydrochemical data

Hydrochemical data were collected in relation to the recently completed Stronelairg Wind Farm. These data cover headwater streams in the Tarff and Fechlin catchments, including several of the streams listed in Table 1. They also include sites well downstream of the Cloiche Wind Farm site including the lower reaches of Allt Odhar/River Killin. A list of monitored sites is included as Appendix 7.2. The data include monthly field and laboratory measurements of the determinands listed in Appendix 7.3. Sampling was carried out during the baseline year, throughout the construction period and during the post-construction year. The hydrochemical data cover the period 2014 to 2019.

4 Adequacy of exiting data for EIA

4.1. Fish

Two issues need to be considered if existing data are used for the purposes of the EIAR. Firstly, the data are all at least 8 years old. Recent guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2019) is that data more than three years old are unlikely to remain valid. Typically, the position adopted by SNH is similar and species data are viewed as 'out of date' at eighteen months, although it is explicit in guidance that this may vary depending on data type and proposed application.

The second issue is spatial coverage. Few of the past survey sites fall within the redline boundary for the proposed Cloiche Wind Farm. However, fish data are available from several of the streams draining the site as well as from nearby streams in the same sub-catchments. These data consistently show trout to be the only species present and, furthermore, that trout densities are low.

All watercourses within the proposed Cloiche Wind Farm site are upstream of known impassable barriers. On the Fechlin/Killin catchment Waterside Ecology (2011) identified impassable barriers on Allt Creag Chomaich at NH 5153 0415 (a 5 m high waterfall) and on Crom Allt NH 5448 0588 (a 6 m high waterfall). Impassable waterfalls are present on the River Tarff at NH 384 054, over 10 km downstream of the Glen Doe reservoir¹. The dam at the reservoir is also impassable. Together these obstacles render the entire site of the proposed Cloiche Wind Farm inaccessible to all migratory fish species with the possible exception of European eels. This is consistent with the fish population data presented in Appendix 1.

Overall, it seems clear that trout are likely to be present in most of the watercourses draining the site due to linkage with streams where trout have already been shown to be present. Due to the presence of impassable barriers, the fish fauna cannot have changed since previous surveys and trout are likely to remain the only species present. While eels have not been identified as being present, their occurrence cannot be entirely discounted due to their ability to move overland. This is true of most survey data suggesting an absence of eels upstream of barriers. Existing fish data have been discussed with those responsible for writing the EIAR, who consider the data adequate for the purpose of impact assessment and mitigation design.

4.2. Hydrochemistry

Stream hydrochemistry is determined largely by geology and soil type. These variables are not subject to short-term change. The existing monitoring data cover most streams draining the proposed Cloiche Wind Farm site and are therefore likely to be adequate to provide the physico-chemical characterisation of streams requested by MSS within the EIAR.

¹ <https://map.environment.gov.scot/sewebmap/>

5 Conclusions

- Existing data on fish species present seem adequate for the purpose of EIAR and for the design of appropriate mitigation. If existing data are used for impact assessment, it should be assumed that trout are present in all streams draining the site and that European eels may be present at low density.
- Given the potential for impacts on water quality and fish populations, some electric fishing data should be collected before construction commences. The baseline survey should determine the distribution and relative abundance of trout in streams within the site. This will be necessary in order to determine the impact (or lack thereof) on fish of any pollution incident or change to water quality during the construction or post construction periods. This would help ensure appropriate biological protection or remedial action if required. From a biological perspective, collection of such data during the pre-construction year would be satisfactory.
- Hydrochemical monitoring data collected at Stronelairg Wind should be assessed and used, in conjunction with geological data, to provide the stream characterisations requested by MSS. The hydrochemical data should be reviewed and used to identify an appropriate suite of determinands for baseline water quality monitoring.

6 References

- CIEEM. 2019. Advice note on the lifespan of ecological surveys and reports. <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>
- Lyle, A. & Maitland, P.S. 2004. An assessment of the status of Arctic charr in Loch Killin. Commissioned report to SSE, September 2004.
- Ness & Beaully Fisheries Trust. 2009. Glendoe Electric Fishing Report.
- Waterside Ecology. 2011. Stronelairg Wind Farm: assessment of fish populations. Commissioned Report to SSE Renewables, December 2011.

7 Appendices

7.1. Existing fish population data from watercourses draining the proposed Cloiche Wind Farm Site

Source	Year	Catchment	Watercourse	Site code	East	West	Survey type	Salmon density (fish per 100 m ²)		Trout density (fish per 100 m ²)		Other fish species
								0+	1++	Fry	Parr	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2002	Tarff	R. Tarff	1 (upper)	239542	801999	Fully quantitative	0.0	0.0	0.0	1.0	None
	2004							0.0	0.0	1.0	2.0	
	2005							0.0	0.0	0.7	0.7	
	2007							0.0	0.0	1.6	0.7	
	2008							0.0	0.0	1.6	4.0	
	2009							0.0	0.0	4.2	2.1	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2002	Tarff	R. Tarff	2 (Culachy)	237882	806086	Fully quantitative	Absent	Present	Absent	Present	Eels
	2004							0.0	3.0	0.0	0.0	
	2005							0.0	1.6	0.0	0.0	
	2007							0.0	10.5	1.6	1.6	
	2008							0.0	5.7	0.0	0.0	
	2009							3.4	6.3	0.8	1.6	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2005	Tarff	R. Tarff	3 (Ardachy)	237942	807481	Fully quantitative	3.9	13.3	0.0	0.7	None
	2007							0.0	17.8	2.3	0.0	
	2008							15.4	3.2	16.0	0.5	
	2009							63.4	5.7	2.9	0.6	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2002	Tarff	R. Tarff	5 (Fort Augustus)	237843	808155	Fully quantitative	17.0	51.0	5.0	1.0	Minnows
	2004							8.0	13.0	2.0	1.0	
	2005							2.3	5.8	1.0	1.6	
	2007							0.0	10.6	1.3	1.7	
	2008							6.9	1.3	0.0	0.0	
	2009							0.6	5.6	6.0	0.6	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2002	Tarff	R. Tarff	7 (Lower)	237950	808750	Fully quantitative	20.0	11.0	12.0	0.0	Eels
	2004							12.0	5.0	9.0	1.0	
	2007							6.9	4.0	19.9	0.0	
	2008							15.0	0.5	8.1	1.2	
	2009							12.2	4.4	29.9	1.9	
Ness & Beaully FT. 2009. Glen Doe Electrofishing report.	2002	Doe	Allt Doe	8 (Upper)	241392	807279	Fully quantitative	0.0	0.0	0.0	0.0	None
	2004							0.0	0.0	0.0	1.0	
	2005							0.0	0.0	0.0	0.7	
	2007							0.0	0.0	1.7	0.8	
	2008							0.0	0.0	0.0	0.6	
	2009							0.0	0.0	11.4	0.0	

Source	Year	Catchment	Watercourse	Site code	East	West	Survey type	Salmon density (fish per 100 m ²)		Trout density (fish per 100 m ²)		Other fish species
								0+	1++	Fry	Parr	
Ness & Bealy FT. 2009. Glen Doe Electrofishing report.	2002	Doe	Allt Doe	9 (Lower)	240876	808762	Fully quantitative	0.0	0.0	2.0	17.0	None
	2004							0.0	0.0	2.0	18.0	
	2005							0.0	0.0	1.5	10.8	
	2007							0.0	0.0	0.0	20.1	
	2008							0.0	0.0	6.8	6.7	
	2009							0.0	0.0	3.2	10.4	
Ness & Bealy FT. 2009. Glen Doe Electrofishing report.	2002	Fechlin	Glen Brein	10 (Upper)	247521	812014	Fully quantitative	0.0	0.0	6.0	6.0	None
	2004							0.0	0.0	12.0	5.0	
	2005							0.0	0.0	2.3	6.7	
	2007							0.0	0.0	0.0	2.9	
	2008							0.0	0.0	1.8	0.6	
	2009							0.0	0.0	8.8	2.5	
Ness & Bealy FT. 2009. Glen Doe Electrofishing report.	2002	Fechlin	Glen Brein	11 (Lower)	247244	812567	Fully quantitative	0.0	0.0	0.0	1.0	None
	2004							0.0	0.0	2.0	3.0	
	2005							0.0	0.0	1.0	2.4	
	2007							0.0	0.0	1.1	3.5	
	2008							0.0	0.0	0.0	2.6	
	2009							0.0	0.0	4.9	1.9	
Ness & Bealy FT. 2009. Glen Doe Electrofishing report.	2002	Fechlin	R. Killin	16 (Lodge bridge)	252969	809206	Fully quantitative	0.0	0.0	14.0	9.0	None
	2004							0.0	0.0	24.0	1.0	
	2005							0.0	0.0	1.4	1.9	
	2007							0.0	0.0	5.5	9.8	
	2008							0.0	0.0	7.0	0.6	
	2009							0.0	0.0	0.8	1.7	
Lyle & Maitland. 2004. An Assessment of the Status of Arctic Charr in Loch Killin.	2004	Fechlin	Loch Killin		252800	810400	Netting	na	na		Present	Arctic charr
												Ferox and brown trout
Waterside Ecology. 2011. Stronelairg Wind Farm: assessment of fish populations	2011	Killin	East Allt Mor	1	255970	803110	Semi- quantitative and qualitative	0.0	0.0	0.0	2.3	None
	2011	Killin	Caochan Uchdach	2	255970	803110		0.0	0.0	2.8	2.8	None
	2011	Killin	Loch na Lairge out flow	3	255910	803070		0.0	0.0	0.8	0.0	None
	2011	Killin	Loch na Lairge out flow	4	255990	802940		0.0	0.0	2.1	1.1	None
	2011	Killin	Dearg lochan outflow	5	255030	803340		0.0	0.0	0.0	3.3	None
	2011	Killin	Allt Ruighe an t Sidhein	6	253900	803230		0.0	0.0	0.8	4.8	None
	2011	Killin	Allt Creag Chomaich	7	251250	803100		0.0	0.0	0.3	0.3	None

Source	Year	Catchment	Watercourse	Site code	East	West	Survey type	Salmon density (fish per 100 m ²)		Trout density (fish per 100 m ²)		Other fish species
								0+	1++	Fry	Parr	
	2011	Killin	Allt Creag Chomaich	8	251000	802800		0.0	0.0	0.0	1.7	None
	2011	Killin	West Allt Mor	9	250370	803320		0.0	0.0	0.0	0.0	None
	2011	Killin	Allt na Craidhleig	10	250110	804100		0.0	0.0	0.9	3.6	None
	2011	Killin	Allt Cam Ban	11	256130	806580		0.0	0.0	0.0	0.0	None
	2011	Killin	Allt Cam Ban	12	256350	806490		0.0	0.0	0.0	0.0	None
	2011	Killin	Cam Ban tributary	13	256910	806480		0.0	0.0	0.0	0.0	None
	2011	Tarff	Caochan Uilleim	14	247820	803210		0.0	0.0	0.7	0.7	None

7.2. *Stronelaig Wind Farm, hydrochemistry monitoring sites 2014 - 2019*

Site code	Stream	East	North	Receive runoff from proposed Cloiche WF?
1	Allt na Craidleig	250500	803990	No
2	Allt Mor	250540	803950	No
3	Allt na Craidleig	251383	804315	No
4	Allt Creag Chomaich	250970	802820	Yes
5	Allt Tarsuinn	251400	803150	No
6	Allt Creag Chomaich	251430	804270	Yes
7	Red Burn	252856	804915	No
8	Allt Odhar	253267	806127	Yes
9	Allt Ruighe an t-Sidhein	254730	804550	No
10	Crom Allt (Allt Mhor confluence)	255850	803210	Yes
11	Crom Allt	255250	803540	Yes
12	Crom Allt	254810	804590	Yes
13	Crom Allt (Coire an Eich)	253610	806350	Yes
14	Allt Odhar	253610	806920	Yes
15	Caochan Uilleam	247450	803650	Yes
16	Glenmarkie Burn	253800	807000	No

7.3. *Determinands monitored at Stronelaig Wind Farm, 2014 – 2019*

Suite	Determinands
Field	pH, temperature, electrical conductivity, dissolved oxygen, turbidity
Laboratory	pH, temperature, electrical conductivity, alkalinity, turbidity, suspended solids, BOD, COD, dissolved oxygen, calcium, iron, magnesium, potassium, sodium, ammoniacal nitrogen, chloride, nitrate, total reactive phosphate, sulphate, hydrocarbons (various)