TA6.8 Hydrological Assessment to Inform River Spey SAC Habitats Regulations Appraisal

Glenshero

Hydrological Assessment to Inform River Spey SAC Habitats Regulations Appraisal

Technical Appendix 6.8

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1 INTRODUCTION

MacArthur Green was commissioned by RES Ltd on behalf of Simec Wind One Ltd to provide an assessment of the hydrological connectivity of the site to the downstream River Spey Special Area of Conservation (SAC), and associated impacts of the proposed development on water quality and quantity.

This report has been produced by MacArthur Green and in accordance with Scottish Environment Protection Agency (SEPA) guidelines. All staff contributing to this technical appendix have undergraduate and/or postgraduate degrees in relevant subjects, have deep professional ecological or hydrology impact assessment and ecology or hydrology survey experience, and hold professional membership of the Chartered Institute of Ecology and Environmental Management (CIEEM) or Chartered Institution of Water and Environmental Management (CIWEM). The report has been reviewed and approved by David MacArthur of MacArthur Green and a copy of his CV is included in EIAR Volume 4: Technical Appendix 1.2.

2 HYDROGEOLOGY AND HYDROLOGICAL CATCHMENTS

2.1 Hydrogeology

The aquifer underlying the site is stated to be of low productivity with only small amounts of groundwater, generally found in the near surface weathered zone and in secondary fractures[1] (evident as rare springs as noted in the NVC survey results in EIAR Volume 4: Technical Appendix 6.1). It is therefore considered unlikely that there are notable areas of groundwater in this hydrogeological setting. There are areas of standing water on the plateau, at the watershed. Due to the hydrological setting and the type of vegetation communities, this environment is thought to be influenced predominantly by high levels of rainfall, late lying snow, low infiltration rates and low rates of evaporation.

Superficial deposits across the site appear to have the ability to retain water during the winter, which once saturated, would become reactive to rainfall events and result in downstream watercourses being flashy in nature and conveying surface runoff. This would be most likely to occur in areas of deep peat.

2.2 River Spey Catchment

The majority of the infrastructure for the proposed development is located across the catchments of Feith Talagain, Allt Coire Iain Oig and Allt Feith A'Mhoraire as shown in EIAR Volume 3: Figure 6.13. All three watercourses flow into the River Spey, upstream of the Spey Dam. A number of smaller watercourses flow through the site to these tributaries, the most significant of which is Black Corrie Burn, which flows into Fèith Talagain.

Following two site visits on 25th to 27th June 2018, and, 1st and 2nd July 2018 it was noted that a number of smaller watercourses were dry. The timing of the site visit coincided with a prolonged period of low rainfall though it was evident from the channels, peat hagging and potential peat pipes observed, that site conditions are variable throughout the year with the potential for saturated ground and conveyance of surface runoff.

[1] British Geological Survey, Onshore GeoIndex (http://mapapps2.bgs.ac.uk/geoindex/home.html), accessed November 2017.

2.3 Loch Ness Catchment

Access to the site is via the existing access track to Stronelairg Wind Farm. The access track runs from the site entrance southwest of Allt Doe watercourse, through the Allt Doe and River Tarff catchment (EIAR Volume 3: Figure 6.13). The access track would not require upgrading, as such there would be no new infrastructure in the catchment.

Access to the proposed development would be via an additional length of track from Stronelairg Wind Farm sub-station (EIAR Volume 3: Figure 2.1) to the north of the Glenshero Estate. This track will require some upgrading works. A temporary mineral workings search area has been identified adjacent to the sub-station, though it is noted that this overlaps with an existing area of rock extraction. Both areas of infrastructure are located in the catchment of Allt Odhar; due to the existing infrastructure there would be a reduced level of activity associated with the proposed development within this catchment.

Allt Odhar, Allt Doe and the River Tarff catchment all flow to Loch Ness, to the north west of the site. However, they have been scoped out of this assessment as there is no development proposed in this catchment.

3 RIVER SPEY SAC

The River Spey SAC is designated for species including: Atlantic Salmon, lamprey, freshwater pearl mussel and otter. The results of an electrofishing survey (EIAR Volume 4: Technical Appendix 6.4) have identified that Atlantic Salmon are present below an impassable waterfall on the tributary of Fèith Talagain. Infrastructure is located around the headwaters of the watercourse and within the catchment of the lower Black Corrie Burn, flowing into Fèith Talagain. There is a distance of approximately 4 km between the closest infrastructure within the catchment and the impassable waterfall below which Atlantic Salmon were recorded. Further detail on the qualifying features of the SAC is provided in EIAR Volume 2: Chapter 6: Ecology.

4 DEVELOPMENT INFRASTRUCTURE

The proposed development is located across three catchments of the River Spey. In total, 23 of the 39 turbines would be located within the eastern sub-catchment of Fèith Talagain, around its headwaters and tributary of Black Corrie Burn. This catchment also contains the greatest length of proposed new access track (approximately 15 km, 55 % of the total), 7 watercourse crossings, 3 temporary mineral workings search areas and part of the footprint of the substation and a construction compound.

Infrastructure across the western side of the site is less dense with a total of 16 turbines, three temporary mineral workings search areas, approximately 9 km of track (33%) and 2 watercourse crossings across the tributaries of Allt Coire Iain Org and Allt Fèith a' Mhoraire. The remaining access track comprises the existing linking access track to Stronelairg Wind Farm, which would be upgraded as part of the proposed development.

The main access for all vehicles would be through the consented Stronelairg Wind Farm. This approach would reduce vehicle movement within the River Spey catchment and the likelihood of an associated pollution event. All proposed infrastructure would be located around the headwaters of the tributaries, at the watershed of the River Spey.

4.1.1 Site Runoff

The proposed development would introduce an impermeable footprint into the catchment. Whilst the access tracks would allow a level of infiltration, they have been considered to be impervious for the purpose of calculating a potential change in peak runoff. This applies a conservative approach to the assessment.

Calculations of change in peak runoff have been completed for Feith Talagain and Allt Feith a' Mhoraire using FEH Rainfall-Runoff unit of Flood Modeller, industry standard software. The catchment characteristics have been taken from FEH Web Service[2], industry standard software. FEH data was downloaded on 11th July 2018.

The percentage change reflects the difference between peak runoff for a 1 in 200 year flood event for baseline conditions, and, for operational conditions with the introduction of an impermeable footprint. The results are shown in Table 6.8.1.

The percentage change in impermeable area is less than 0.01% of the catchment. This results in a 2.8% change in peak runoff within the Feith Talagain catchment, where the greatest area of infrastructure would be located, and 1.2% change in peak runoff in the Allt Feith a' Mhoraire catchment.

This is based on the conservative assumption that the infrastructure is 100% impervious whilst the actual construction would allow a level of infiltration. This percentage change is not considered to be significant; however, increases in runoff would be mitigated on-site through attenuation measures detailed in a drainage design.

Table 6.8.1 Percentage Change in Peak Runoff

Catchments	Catchment Area (km^2)*	Infrastructure Area (km^2)	% of Catchment	Natural Catchment Hydrograph Peak (m^3/s)	Increased URBEXT Hydrograph Peak (m3/s)	**% Difference**
Allt Feith a' Mhoraire	9.09	0.03	0.0034	40.17	40.65	**1.2**
Feith Talagain	34.13	0.21	0.0063	97.21	99.98	**2.8**

**Catchment is defined to the confluence with the main stem of the River Spey*

The change in peak runoff is calculated at the confluence with the River Spey. Flows for a 1 in 200 year peak flow event would be calculated at the location of each watercourse crossing. The detailed design (of the watercourse crossing) would be such that it could convey this flow and prevent localised flooding of the watercourse.

5 BUILT-IN MITIGATION

The downstream water environment was identified as a key environmental sensitivity in the initial layout. Built-in mitigation (detailed below) has been incorporated into the design, which aims to prevent water quality and quantity impacts during the construction of the proposed development.

[2] Flood Estimation Handbook Webservice, https://fehweb.ceh.ac.uk/, accessed July 2018.

A 50 m buffer has also been applied to all watercourses and water bodies to mitigate the potential for connectivity between areas of construction runoff, and the tributaries of the River Spey. It is recognised in Section 2 above, that the plateau at the centre of the site has the potential to be saturated following heavy rainfall. Localised channels were observed on-site around the proposed infrastructure (though dry at the time of survey), particularly in areas of peat hagging. These areas will convey surface runoff and require management through an appropriate drainage system.

A detailed pollution prevention plan and drainage design would be completed to manage runoff around the areas of construction and incorporated into the Construction and Environmental Management Plan (CEMP) (an Outline CEMP is provided in EIAR Volume 4: Technical Appendix 2.1). The 50 m buffer provides a reasonable distance to implement a series of filtration and attenuation techniques before dispersal onto surrounding areas of vegetation. This drainage design would be submitted to SEPA as part of an application for a Complex Controlled Activity Regulation (CAR) Licence for the construction of a surface water drainage system.

The proposed layout has been designed to avoid peat over 1 m, where feasible, within the context of the other constraints of the site. This approach would minimise impacts on peatland, and, indirect impacts of water release from peat. Further information on peat excavation volumes is reported in the draft Peat Management Plan (EIAR Volume 4: Technical Appendix 2.5).

The requirement for new watercourse crossings has been kept to a minimum where feasible across the site. Access to the proposed development would be via shared access of the existing Stronelairg Wind Farm access track, thereby removing the need for construction of a new access track from the public road. The new internal track length has also been kept to a minimum, where feasible. Consideration has been given to further reducing the length of new internal access tracks and spurs, where possible; the final layout represents the option assessed as having the least environmental impact within the other site constraints (EIAR Volume 3: Figure 2.1). Further details on the design alternatives is provided in EIAR Volume 2: Chapter 3: Design Evolution and Alternatives.

As stated in Section 4 above, flows for a 1 in 200 year peak flow event would be calculated at the location of each watercourse crossing. The detailed design would be such that it could convey this flow and prevent localised flooding of the watercourse.

Implementation of appropriate pollution prevention measures and good industry practice construction environmental management would occur across the site as standard and form part of a CEMP (Outline CEMP is provided in EIAR Volume 4: Technical Appendix 2.1). This would include management of chemicals and stockpiling of material on-site, all of which would occur out-with the watercourse buffers to mitigate the risk to the water environment.

5.1 Management Measures

Whilst Water Quality Monitoring (WQM) does not prevent a pollution event occurring, it provides a management tool for ensuring that mitigation measures in place are maintained should such an event occur.

A WQM plan would be submitted to SEPA and THC for their agreement. The plan would require monitoring of the tributaries of the River Spey as they leave the site boundary. It is noted in Section 3 above, that there is a distance of approximately 4 km between the closest infrastructure within the catchment and the impassable waterfall below which Atlantic Salmon were recorded. It is

recommended that additional WQM is undertaken within the first 500 m to 1 km of the upper reaches of the watercourse as a management measure to check that the buffer and pollution prevention measures are proving to be resilient. The WQM plan would provide mitigation measures and an emergency plan, in the event that a pollution event is identified. This should include additional reactive monitoring downstream, closer to the boundary of the SAC.

Daily visual checks would be undertaken in the working area by the principal contractor, in addition to checks undertaken by the ECoW during their scheduled visit. If an adverse trend in water quality is observed, the site should be visited for remedial works and construction paused if necessary, due to the downstream sensitivity of the watercourse.

It is noted that the upper reaches of the watercourses support brown trout (EIAR Volume 4: Technical Appendix 6.4). Whilst not part of the River Spey SAC, the resilience of the pollution prevention measures should be checked visually daily. Consideration should also be given to identifying water quality sampling locations, upstream of where populations have been recorded. This would allow additional remedial actions to be implemented should they be required.

A WQM would be included within the final version of the CEMP.

6 SUMMARY

It is recognised that site-specific conditions are variable across the year and, whilst the site was dry during the field survey, its high altitude hydrological setting will result in high levels of rainfall, late lying snow, low infiltration rates and low rates of evaporation.

Recognising the site conditions and sensitive downstream River Spey SAC, built-in mitigation has been applied to the layout design. Watercourse crossings have been kept to a minimum where feasible, and a 50 m buffer around watercourses has been applied. This would reduce the connectivity between the proposed development and the River Spey SAC, and mitigate the potential for impacts on water quality and quantity, in conjunction with the design and implementation of a site-specific drainage plan and pollution prevention measures to be submitted in the CEMP.