Donich Water Hydro Scheme

Waterfall Impact Assessment

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1 Introduction

The purpose of this document is to assess the effect of the Donich Water Hydro Scheme on the visual and aesthetic quality of the Donich Water waterfall.

1.1 Donich Water Waterfall

The waterfall in question is located below a footbridge over the Donich Water, but above the confluence with the Allt Airigh na Creige, at approximately NN 2133 0183.

The footpath provides a crossing point for the route of a core path that runs from the Cowal Way (long distance recreational route) to the core path network on the right bank of the Donich Water (facing downstream).

Other than the National Park designation, there are no landscape designations associated with the site and no signs or viewpoints specifically to indicate the presence of the waterfall. The waterfall is also not recognised on either a 1:10,000, 25,000 or 50,000 OS map. Hence, there is only a local appreciation of the visual quality of the waterfall from users of the core path or possibly the Cowal Way recreational route.

2 Reduction in Flow over the Waterfall

2.1 Impact of the Donich Water Hydro Scheme

The proposed scheme would involve the construction of a low profile concrete weir across the Donich Water above the waterfall at approximately NN 2225 0233. The abstracted water would be transferred via a buried pipeline to a powerhouse located on the right bank of the Donich Water (facing downstream) at approximately NN 2039 0215.

The waterfall would be subjected to depleted flows whilst the scheme is in operation although a Hands-Off flow equivalent to Q90 or 40 litres per second (0.040m^3/s) will be passed through the intake at all times so that the river will never run dry as a result of the hydro scheme. The hydro scheme will not operate unless this compensation flow can be maintained. As the scheme will only abstract the design flow required for the turbine, it also protects high flows as these will continue to spill over the weir and down the watercourse during periods of high rainfall.

Moreover, the scheme will protect the natural variation in flows by delivering a residual flow of Q80 or 63 litres per second (0.063m^3/s) when the flow upstream of the intake is equivalent to Q30 or 462 litres per second (0.462m3/s) via a notch in the intake weir.

Overall, with these mitigation measures, the scheme could potentially result in a slight change in the character of the waterfall during the periods of medium river flow.

2.1.1 Time Lapse Camera

To assess the impact of the hydro scheme on the waterfall, a time lapse camera was installed just below the waterfall. The camera was programmed to capture photos of the waterfall on an hourly basis during daylight hours. The objective was to visually capture a range of flows over the waterfall so these could be used to analyse the impact of the abstraction.

The results from the Time Lapse Camera analysis are presented in Section 3 overleaf.

2.1.2 Hydrological Analysis

A water level sensor with data logger, recording water levels at 15-minute intervals, was installed on the Allt Coire Odhair (the main tributary of the Donich Water) in 2012, above the proposed intake position, at approximately NN 2302 0291. The data logger has been downloaded at regular intervals and manual current meter gauging has been carried out at the same location in order to produce a stage – discharge relationship and hence a 15 minute flow record for the gauging station.

A 'long term' flow duration curve (FDC) was extrapolated for the site by comparing the 15-minute flow record to two long-standing analogue SEPA flow measurement stations, Glen Strae and Glen Falloch. The FDC was then scaled to the waterfall location so that the photos taken by the time lapse camera could be compared to the river flow (as a percentile) on a particular day.

Table 1 Categorisation of flows (at the intake)

High Flow	Typically Q10 and above (>1.240m^3/s)
Low Flow	Typically Q50 and below (<0.205m^3/s)
Design Flow	0.79m^3/s (79 litres per second)
Hands-Off Flow	Q90 (0.040m^3/s)
Residual Flow	Q80 (0.063m^3/s)

3 Analysis of Flows over the Waterfall

3.1 SEPA Analysis

As part of the CAR licence application for the scheme, the waterfall has been assessed by SEPA and the following conclusions were drawn from the report:

- The significance of the impact on the waterfall is determined through combining its importance in a social context with the magnitude of the impact the hydropower scheme would have on it.
- **Importance –** Following discussion with the Loch Lomond and Trossachs National Park Authority, the waterfall was not considered to be 'amongst the most visited locally'. The waterfall was therefore assessed as being of low importance as per Table 17 of the SEPA guidance document *WAT-SG-67: Assessing the Significance of Impacts - Social, Economic, Environmental*.
- **Magnitude –** Table 14 of SG67 was used to assess the magnitude of impact. Following a site visit, it was clear that the views of the Donich Water are limited from the footpath, and there is a natural narrowing of the river as it passes over the waterfall. This natural narrowing means that the reduced flows would have a far less noticeable impact in comparison to a river of uniform width.
- Considering the above, plus the mitigation measures which would limit the abstraction and maintain a level of variability in the flow regime, this would mean that the overall magnitude of the impact would be 'very small'.
- Combining this very small magnitude with the low importance would result in a very low significance impact.

The full results of this analysis are available through the CAR application.

3.2 Time Lapse Camera Results

As mentioned in Section 2.1.1 above, a time lapse camera was set up at the Donich Water waterfall in order to assess the visual effect of the proposed abstraction on the waterfall.

The results are presented below in Figures 1 to 14. The odd figures (in the left hand column) represent the flows without the hydro scheme and the even figures (in the right hand column) represent those same flows with the hydro scheme in operation.

Figure 1 – 121 litres per second (0.121m3/s)

Figure 2 – 121 litres per second (0.121m3/s)

Figure 3 – 211 litres per second (0.211m3/s)

Figure 4 – 77 litres per second (0.077m3/s)

Figure 5 – 344 litres per second (0.344m3/s)

Figure 6 – 101 litres per second (0.101m3/s)

Figure 7 – 609 litres per second (0.609m3/s)

Figure 8 – 144 litres per second (0.144m3/s)

Figure 9 – 946 litres per second (0.946m3/s)

Figure 10 – 201 litres per second (0.201m3/s)

Figure 11 – 1428 litres per second (1.428m3/s)

Figure 12 – 645 litres per second (0.645m3/s)

Figure 13 – 3592 litres per second (3.592m3/s)

Figure 14 – 2816 litres per second (2.816m3/s)

The results show that the effect of the hydro scheme abstraction is only really noticeable in the medium flows. The low and high flows (when the waterfall is arguably at its most attractive) are not significantly affected.

4 Landscape and Visual Enhancement

The proposed scheme will involve upgrading one arm of the Donich Circular Walk. Part of this upgrade could include a sign to the waterfall and possibly a formalisation of the access to the best view of the fall, if deemed appropriate. An interpretation board could also be arranged.

5 Conclusion

The Donich Water waterfall is an attractive local feature but not widely visited in the local area. The proposed hydro scheme would reduce flows over the waterfall but only during periods of medium flow. During low flows the flows would be unaffected (as the scheme would not be operating) and during high flows the abstraction would be barely perceptible.

Given the above, the overall effect of the scheme on the waterfall is considered to be non-significant.