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Preliminary walkover bryophyte & lichen survey of proposed pumped storage scheme at Loch Kemp

A report for ASH

by

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Introduction

Loch Kemp, on the south-east side of Loch Ness, is the proposed location for a pumped storage scheme (Figs. 1, 2). This will involve an increase in the water level of Loch Kemp, the construction of a powerhouse and associated access tracks and other infrastructure. The scheme lies in an area that is potentially rich in bryophytes (mosses and liverworts) and lichens, and includes part of Ness Woods SSSI/SAC, so a preliminary walkover survey was commissioned in order to assess whether a full survey might be necessary. The areas targeted for this preliminary survey were the shore of Loch Ness at the proposed powerhouse location, riparian areas and the inundation zone around Loch Kemp.

Sites chosen for hydro schemes are often potentially rich bryophyte and lichen sites. The western Scottish Highlands are of global importance for bryophytes, and the Kemp scheme is just beyond the edge of this area. The temperate, wet climate is ideal for many oceanic species that are globally very rare and restricted climatically to areas with a high rainfall and only moderate temperature fluctuations. Their importance was first recognised by Ratcliffe (1968), who coined the term 'Atlantic bryophytes'. The document *Guidance for applicants on supporting information requirements for hydropower applications* (SEPA 2009) recognises the necessity for a full bryophyte survey of potentially rich hydro sites so that green energy production can go ahead without damaging Scotland's natural heritage. The potential impacts of small hydroelectric schemes on bryophytes and lichens were considered by Demars & Britton (2011).

Averis *et al.* (2012) have produced a scheme for assessing the bryological importance or potential importance of ravines for bryophytes, and making recommendations in relation to small hydroelectric schemes. This uses 29 species of nationally uncommon humidity-demanding bryophytes to classify sites to one of five levels of bryological importance. Unsurveyed or partly surveyed sites are also assessed using maps and aerial photographs. This work assessed 5629 water courses in western Scotland for their bryological interest. The majority of these have not yet been surveyed, but many have potential for high bryophyte interest. At least 136 sites have so far been identified that are of such bryological significance that hydroelectric development could have an impact of national importance.

There is no evidence of this site having been visited previously by other bryologists. According to the NBN Atlas (https://nbnatlas.org), only the common aquatic moss *Fontinalis antipyretica* and '*Sphagnum*' have been recorded here. However, the same source reveals that a few notable lichens have been recorded, principally on trees, including relatively scarce species such as *Microcalicium ahlneri*, *Lobaria scrobiculata* and *Ochrolechia microstictoides*.

Figure 1. 1:50,000 map showing location of Loch Kemp scheme.

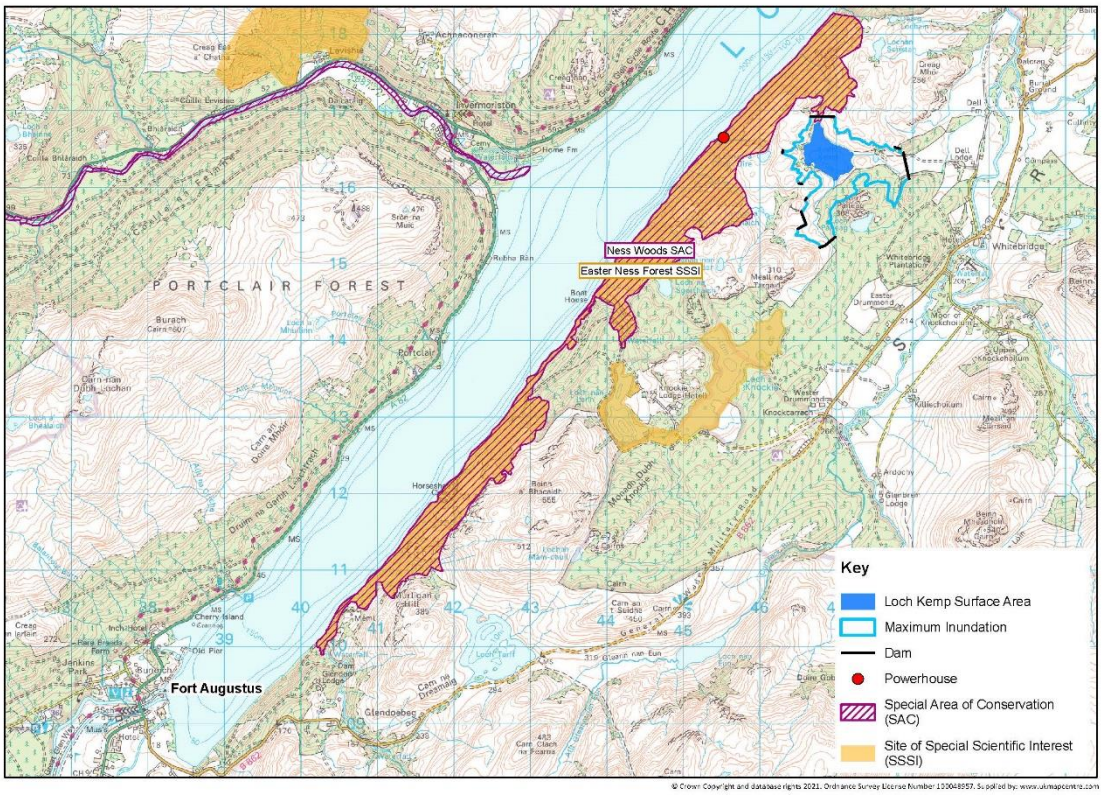
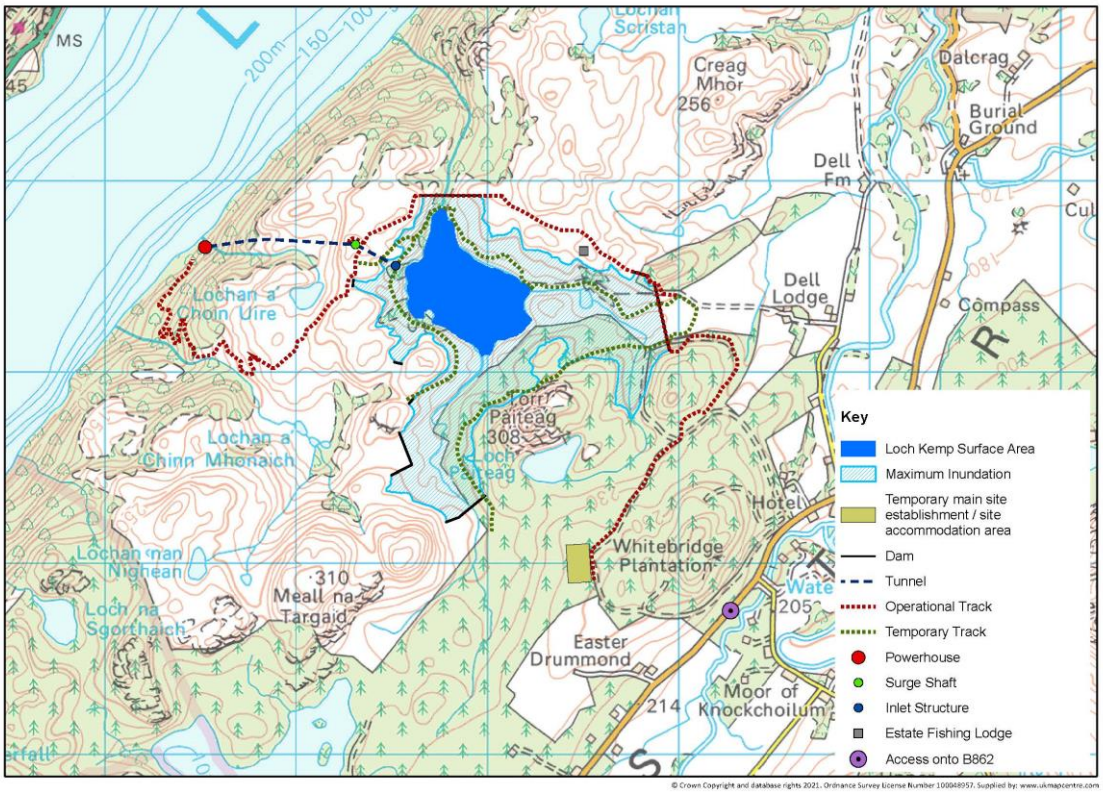


Figure 2. Loch Kemp scheme plan (supplied by employer).



Methods

Fieldwork was carried out on 21 September 2021. Starting at the proposed powerhouse site on the shore of Loch Ness, the site was walked uphill to the cabin on the shore of Loch Kemp, concentrating on the proposed powerhouse site, woodland within the SSSI/SAC, and the inundation area around Loch Kemp. No list was made, as this was a preliminary walkover survey, but notes were made on features of potential interest, and some photographs taken. A few specimens were collected where necessary for later microscopic examination. Bryophyte nomenclature follows the British and Irish bryophyte checklist (Hill *et al.* 2008). Lichen nomenclature follows the taxon dictionary on the British Lichen Society website (https://britishlichensociety.org.uk).

Results

The area of the proposed powerhouse on the shore of Loch Ness (Figs. 3-5) is dominated by birch and rowan, with some alder and ash, largely on dry ground with bracken, but a small unnamed burn (dry at the time of survey) runs to the north of the site. Lochside rocks have a variety of common and widespread species, including an abundance of the mosses *Fontinalis antipyretica, Hygrohypnum* spp., *Racomitrium* spp. and *Thamnobryum alopecurum*. *Pterogonium gracile* was found on one lochside boulder, and the tiny liverwort *Lejeunea cavifolia* is also present. The trees have abundant common epiphytes, including the bryophytes *Frullania* spp., *Hypnum andoi* and *Ulota crispa* s.l., and the lichens *Parmelia* spp. (in the broad sense), *Platismatia glauca*, *Ramalina* spp., *Usnea* sp. and numerous crusts. Rocks and boulders also have common and widespread species such as the bryophytes *Dicranum scoparium, Frullania tamarisci* and *Isothecium myosuroides*. The oceanic liverwort *Plagiochila spinulosa* is also present, and a more detailed survey might reveal more. There are some shaded outcrops that appear to support only common species, but there are some mildly base-rich outcrops with mosses such as *Amphidium mougeotii, Anoectangium aestivum* and *Rhytidiadelphus triquetrus*.

The woodland immediately above the proposed powerhouse, along the line of the proposed access track, consists of dry, open birch woodland with bracken below, and is of little interest (Fig. 6). There is also some hazel locally. This part of the SSSI/SAC appears to be of very limited interest for bryophytes and lichens, but the unnamed burn running down from Lochan a' Choin Uire to the north of the powerhouse site has more variety, including some small liverworts.

Above the woodland, the track crosses dry open bracken and heath, clearly intensively managed for game birds, with rearing pens and mown areas (Fig. 7). The occasional rock outcrops in this zone are of very limited interest, with *Andreaea* spp., *Campylopus atrovirens, Racomitrium* spp. dominant in the mosses, and *Cladonia* spp. *Cornicularia normoerica*, *Parmelia omphalodes* and other *Parmelia* spp. (in the broad sense) and crustose species dominant in the lichens. The moss *Hedwigia stellata* is occasional. The proposed surge shaft is on a hilltop with dry heath and rock outcrops, with only the same common species present.

The proposed inundation zone around Loch Kemp is mainly rather dry and acidic, but there are some low-lying wet areas. These are also of little interest, and support mainly common calcifuge species, especially widespread species of *Sphagnum* beneath plants such as heather and bog myrtle. There is some mature birch woodland with large trees, especially on steep ground on the south and west sides of the loch (Figs. 8-10), which supports a fairly varied lichen community, including *Mycoblastus sanguinarius, Ochrolechia* spp., *Parmelia* spp. (in the broad sense), *Pertusaria* spp., *Sphaerophorus globosus* and *Usnea* spp. There is an area of conifer plantation (partly felled) on the south-east side of the loch that is of no interest for bryophytes or lichens. The outfall from Loch Kemp into the Allt an t-sluichd, near the ford, has nothing of particular significance although there are some fairly mature birch trees with lichen cover.

Figure 3. Powerhouse site, showing dry, open mixed woodland and bracken.

Figure 4. Looking up unnamed (dry) burn from shore of Loch Ness adjacent to the powerhouse site.

Figure 5. Powerhouse site, showing stony loch shore with mixed woodland.

Figure 6. Representative view of Ness Woods SSSI/SAC from access track, showing dry, open birch woodland with bracken.

Figure 7. Representative view of dry heath above SSSI/SAC from access track, showing heather and bracken.

Figure 8. Mature birch woodland on south shore of Loch Kemp, with trees supporting a significant lichen flora.

Figure 9. View of south side of Loch Kemp, showing steep birch woodland in foreground and partly felled conifer plantation in background.

Figure 10. View of Loch Kemp from cabin on east side.

Conclusions

It is considered that most of this site does not require detailed bryophyte and lichen survey, as the ground is rather uniform, consisting of acidic dry heath, dominated by bracken and heather, and intensively managed for game birds. The part of the SSSI/SAC affected by the scheme is predominantly dry, open, and dominated by bracken, and is of no particular interest. However, the powerhouse site and the unnamed burn running down from Lochan a Choin Uire might benefit from a detailed bryophyte survey. Furthermore, it is recommended that Allt an t-sluichd, entering Loch Ness at NH465177 should also receive a bryophyte survey. If it is considered likely that construction will impact on the Allt a' Chinn Mhonaich, to the south–west, then this burn should also receive a bryophyte survey.

The mature birch on the south and west side of Loch Kemp, and perhaps immediately around the ford, should be examined more closely for lichens, especially in view of the previous records from the area. The southernmost part of the inundation zone, to the west of Torr Paiteag appears to be dry and of little interest, but a more detailed look (for bryophytes) may reveal some richer flushes.

To summarise, more detailed survey is recommended for the following:

- Powerhouse site, lower works and access track to the lower works through the woodland (bryophytes)
- Lower part of unnamed burn draining from Lochan a' Choin Uire (bryophytes)
- Allt an t-sluichd (bryophytes)
- Allt a' Chinn Mhonaich (bryophytes, if it is likely to be disturbed)
- Mature birch on shore of Loch Kemp (lichens)
- Open ground west of Torr Paiteag (bryophytes, but low priority)

A few general recommendations relevant to the scheme can be made. Construction activities on the shore of Loch Ness and within the adjacent woodland should be restricted where feasible, to protect the mature trees and associated lichens and bryophytes present. Disturbance to sheltered rotten logs and rock outcrops should be avoided or minimised wherever possible. Mature trees, ash and hazel should be left standing and undisturbed wherever possible. Dry areas of heath and bracken should be disturbed in preference to wet areas.

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