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Our Ref: 4957d

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Sonya Nicol
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Dear Sonya

REVIEW OF EFFECTS OF THE FIORDLAND TRAIL ON WETLAND VALUES

Environment Southland have received a retrospective resource consent application (APP-20191150 W4931) from the Fiordland Trails Trust to modify a wetland due to construction of a multi-use trail on the eastern margin of Lake Manapouri. The trail crosses the wetland approximately two kilometres northeast of Manapouri township. Environment Southland required an independent assessment of the likely effects of trail construction on the wetland, which was provided by Wildland Consultants early in 2019 and in response to subsequent developments (Wildland Consultants 2019a; 2019b; 2019c).

More recently, the applicant has applied for a new consent to divert surface water, divert ground water, and modify the wetland. This is required to implement the suggestion from a hydrological expert to install an additional culvert beneath the trail, believed necessary to fully address the hydrological effects of track construction (Geosolve 2019).

All of the previous opinions provided by Wildland Consultants was done so on a desktop basis, without having visited the site, which limited the accuracy of these opinions. A site visit was therefore undertaken on 4 November 2019 to assess the wetland in the field and to assess the effects of the proposed third culvert.

VEGETATION

The site visit was helpful in clarifying the location of wetland and other vegetation at the site.

Upstream of the cycle trail, wetland vegetation occupies the floor of a shallow, 30-40 metre wide gully, with wetland sedges dominant on stream sides (Plate 1) but also dispersed through the manuka *(Leptospermum scoparium*) shrubland that occupies much of the gully floor (Plate 2). Mingimingi (*Coprosma propinqua*), weeping mapou (*Myrsine divaricata*), and *Coprosma dumosa* are common shrubs in the mānuka shrubland, with occasional Scotch broom (*Cytisus scoparius*) and blackberry (*Rubus fruticosus*). Rautahi (*Carex geminata*) is the dominant sedge, with pukio (*Carex secta*) on some stream margins. Shield fern (*Polystichum vestitum*) is common

in the ground layer, with occasional swamp kiokio (*Blechnum minus*) and lotus (*Lotus pedunculata*). Sharp spike sedge (*Eleocharis acuta*) and Edgar's rush (*Juncus edgariae*) are present in open areas. Areas with slightly better drainage have seedlings of kapuka/broadleaf (*Griselinia littoralis*), kōhūhū (*Pittosporum tenuifolium*), and horoeka/lancewood (*Pseudopanax crassifolius*) beneath the mānuka canopy, or support patches of bracken (*Pteridium esculentum*) fernland.

Below the cycle trail, wetland vegetation is largely confined to the margins of the two streams that pass through culverts in the trail. Pukio is the dominant sedge (Plate 3), and water cress (*Nasturtium microphyllum*) is present in the open stream bed.

Scrub dominated by Scotch broom occurs between the two streams. Shrubs of cotoneaster (*Cotoneaster simsonii*), mingimingi, rowan (*Sorbus aucuparia*), and Darwin's barberry (*Berberis darwinii*) are also present, and lianes of pohuehue (*Muehlenbeckia australis*) and lawyer (*Rubus schmidelioides*) occupy the scrub canopy. Sweet vernal (*Anthoxanthum odoratum*) and bracken are present in the ground layer.

During construction of the trail, excavated substrate has been dumped on either side of the cycle trail, mostly on the downstream side, but in one location on the upstream side (Plate 4). These now form spoil mounds covered by exotic grasses and indigenous fireweed (*Senecio minimus* and *S. glomeratus*).

EFFECTS OF CYCLE TRAIL CONSTRUCTION

The main effects of cycle trail construction are through loss of indigenous vegetation, including wetland vegetation, beneath the footprint of the trail and associated spoil dumps, and modification to wetland hydrology caused by excavation of a ditch on the upstream side of the trail.

The applicant has agreed that the ditch excavated on the upstream side of the formed trail (Plate 5) should be filled in, monitoring of the infilled area should be undertaken to check for settling of the substrate (with re-filling if required), and monitoring of subsequent colonisation by rautahi should be undertaken. The ditch should be filled in to a level consistent with the level of the adjacent upstream wetland surface (Plate 5). This may require raising the height of the cycle trail to prevent water flowing over it.

The applicant has agreed to undertake these works and monitoring. If the infilling work is carried out successfully, this should remedy the adverse hydrological effects on the wetland to the point that they are less than minor (Wildland Consultants 2019c).

In addition to this, we suggest that the spoil mound in the wetland upstream of the cycle trail be removed – it could potentially be used to infill the ditch. Removal of this mound would enable wetland vegetation to re-colonise the area. The mound should be carefully removed to reinstate the original ground level of the wetland, consistent with the adjacent ground surfaces. This will allow the substrate to become wetted, and colonised over time by indigenous wetland vegetation.

We **do not support** the proposed installation of a third culvert between the two existing culverts. This would only exacerbate the adverse hydrological effects on the wetland above the cycle trail, and deliver water from it to Scotch broom scrub that does not comprise wetland vegetation below the trail.

While we earlier noted that the trail would reduce water flow to the 'larger downstream part of the wetland' (Wildland Consultants 2019a) this desktop assessment was made based on the wetland area depicted in Figure 8-1 of the ecological report (Beale Consultants 2018) accompanying the application. As noted above, field assessment indicated that wetland vegetation downstream of the cycle trail is largely confined to stream margins, and much of the vegetation mapped as wetland by Beale Consultants (2018) comprises bracken fernland, mānuka scrub, and Scotch broom scrub. Therefore there is no need for any additional work to restore water flows downstream of the cycle trail; the existing culverts in the stream bases perform this adequately.

PROPOSED WEED CONTROL

The Trust has proposed to control pest plant species including gorse (*Ulex europaeus*), Scotch broom, and Darwin's barberry in an approximate 2,000 m^2 area centred on the trail where it crosses the wetland. This would improve indigenous plant dominance within the wetland and adjacent areas. The Trust would also discuss removal of the upstream willow trees with the landholder.

Having undertaken field work at the site, we suggest the focus of weed control work should be on the entire area of wetland above the cycle trail and below the deer fence that marks the boundary of the neighbouring property. The main weeds to be controlled in this area of wetland vegetation are Scotch broom and blackberry, and any invading rowan, cotoneaster, and Darwin's barberry. We also suggest removing the mature rowan tree approximately 15 metres downstream of the cycle trail, and any associated rowan regeneration.

Observation of the neighhouring upstream willow trees from the property boundary indicated the willow was not crack willow (*Salix fragilis*) and may not be a species that is notable for spread. However, as a precautionary measure there would still be merit in removing them.

EVALUATION

If weed control is focused on the entire wetland area above the cycle trail, the spoil dump is removed from this wetland, and the upstream ditch beside the trail is filled in, this would remedy some of the adverse effects on the wetland and provide positive effects that would address the residual adverse effects of wetland clearance.

The mature rowan tree below the cycle trail, and nearby regenerating rowan, could also be controlled.

Performance standards, such as post-operational inspection and reporting, should be implemented. This will ensure that spoil removal and ditch infilling have been undertaken appropriately, and that the weed control is effective and that it is not adversely affecting indigenous vegetation.

Ongoing discussion by the Trust with the upstream landholder is supported; if this also enabled the upstream willow trees to be controlled, that would be very positive.

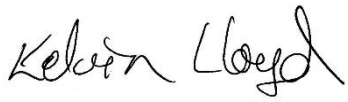
CONCLUSION

In our opinion, if the adverse effects of spoil dumping and ditch excavation on the upstream wetland are remedied, then the residual adverse effects of wetland vegetation clearance caused by track construction can be addressed by the positive effects of weed control over the entire

upstream wetland (an area of approximately 1,500 m^2), and additional control of rowan downstream of the cycle trail. Overall, the ecological effects on the wetland should be no more than minor if these actions are undertaken with sufficient care and diligence.

Please don't hesitate to contact me if you require further input or discussion.

Yours sincerely



Kelvin Lloyd
Principal Ecologist

REFERENCES

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Wildland Consultants 2019b: Review of effects of Fiordland Trail on wetland values. *Wildland Consultants Ltd Contract Report No. 4957b*. Prepared for Environment Southland.

Wildland Consultants 2019c: Review of effects of Fiordland Trail on wetland values. *Wildland Consultants Ltd Contract Report No. 4957c*. Prepared for Environment Southland.

Plate 1: Dense sedgeland beside the northern stream above the cycle trail, with watercress occupying the open stream channel. 4 November 2019.

Plate 2: Sedges dispersed through mānuka scrub above the cycle trail, indicating wetland conditions. 4 November 2019.

Plate 3: Dense pukio sedges beside the southern stream below the cycle trail. 4 November 2019.

Plate 4: Exotic grasses dominate a mound created by dumping of spoil in the wetland upstream of the cycle trail. This mound should be removed and the original wetland ground surface restored. 4 November 2019.

Plate 5: The excavated ditch on the upstream side of the cycle trail that is resulting in adverse hydrological effects on the upstream wetland. 4 November 2019.