Report on issues with bryophytes that arise from the construction of dams and associated intake structures on the Stockton Plateau by Hydro Developments Limited.

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There are three main sites that need to be considered:

1. Collection point at junction of A.J. Stream and Mangatini Stream

1.1. Potential damage to streamside vegetation during installation. This should be limited in extent and the impact is of limited duration.

1.2. Damage to aquatic and bank species close to the watercourse from loss of water flow downstream of collection point to the next stream entry into the watercourse some 1.8km downstream. Flow in the Ngakawau River is unlikely to be significantly affected. The Mangatini Stream is fairly heavily polluted at this point and aquatic species growth is limited. Bank species relying on flood events will be affected but some flow can be expected in periods of high rainfall and natural seepage down the steep banks along the stream can be assumed to reduce adverse impacts.

1.3. Damage to stream bank bryophytes from ponding at the collection site following blockage of the exit tunnel is likely to be infrequent and of relatively short duration.

2. Mt William Reservoir

2.1. Damage to bryophytes in the flooded footprint of the reservoir. This is probably not an issue because of the already damaged nature of the site.

2.2. Effects from the capture of streams:

2.2.1. T31 Stream. Little impact as the intake is near the natural discharge into Plover Stream/St Patricks Stream.

2.2.2. Fly Creek. Little or no impact on stream side vegetation as the capture point is downstream of its junction with Plover Stream.

2.2.3. Plover Stream. Little or no impact on stream side vegetation as the intake point is well below the more interesting (bryologically) areas that have been located.

2.2.4. St Patrick Stream. Some loss of habitat for aquatic plants and those on banks near the stream edge can be expected as the intake point seems to be near the head of the stream and the main flow will be lost. Natural seepage from the steep sides of the gully the stream flows in should continue to provide water flow for much of the stream side habitat and some natural flow will be provided by the T35 Stream that enters the watercourse about half a kilometre downstream.

2.2.5. Darcy Stream tributaries. The water flows will be lost. As with other streams discussed the steep valley sides should provide adequate seepage to maintain much of the valley side habitat. The stream flows would seem to be adequately restored by un-named tributaries entering the watercourse at about 1km below the intake points.

3. Weka Reservoir

3.1. Damage to bryophytes in the flooded footprint of the Reservoir. At this site not an issue because of the currently modified nature of the site.

3.2. Effects from the capture of streams:

3.2.1. Weka Creek. The parts of the stream upstream of the dam will be relatively unaffected. The downstream section will be affected but as with other streams discussed, the steep valley sides should provide adequate seepage to maintain much of the valley side habitat. The main flow should be partly restored by some small valleys that appear to feed into the stream about 1 km downstream of the dam.

3.2.2. Sandy Creek. Here also the creek is largely upstream of the Dam and will be unaffected, apart from a small section within the reservoir footprint.

3.2.3. Upper Mine Creek. The tributary that is diverted into Sandy Creek will lose water flow for nearly 1 km below the intake The amount of potential loss will depend on the quality of the plant cover in and near the stream channel. It is probably similar to other streams in the immediate area and heavily modified by mining debris. As with other streams discussed, the steep valley sides should provide adequate seepage to maintain much of the valley side habitat.

3.2.4. Mangatini Stream. This larger stream could be affected by water loss for some 1.5 km downstream of the extraction point at AJ Stream. Though polluted by coal fines etc the stream has been reported as a habitat for a number of bryophyte species on the Department of Conservation rare and endangered bryophyte lists. Though survival of

some of these may be dependent on fluctuating stream flow, others will be more dependent on seepage runoff from the surrounding land rather than the stream itself.

3.2.5. A.J. Stream. The extraction point is at the natural end of this stream and no adverse affects are expected from the work proposed.

4. Assessment of potentially rare or endangered bryophytes in the area that may be affected by the development.

4.1. The following are sites that might need to be checked. All of the other sites seem to be subject to little or no disturbance as the intakes are downstream of any areas known to have bryophytes of National interest.

Only those streams where water flow loss is predicted below intakes may need to be checked.

These would be:

4.1.1. Mangatini Stream below the intake.

4.1.2. Upper Mine Creek below the intake.

4.1.3. Weka Creek below the proposed dam.

4.1.4. Darcy Stream tributaries below the intakes.

4.1.5. St Patrick Stream below the proposed dam.

4.1.6. Any such assessment deemed necessary could initially take place at the time the dams are commissioned or shortly afterwards.

5. Other issues.

5.1. Sandy Creek is mentioned in the draft conditions for bryophyte monitoring, but as it will only have added flow the effects on bryophytes are expected to be minimal.

5.2. Transects for assessing bryophyte health within the footprint were suggested in the draft conditions.

I am not entirely sure how valuable 3 transects across each stream within the project footprint will be. Bryophytes are very small, are usually microhabitat specific and are often so similar to each other that differentiation in the field can be a problem. It is

already recognised that there is high bryophyte diversity in the Stockton Plateau area, particularly of liverworts, and this diversity implies problems in recognising species in the field. In addition, downstream effects may be more important than those within the development footprint, unless that can be taken as including areas affected downstream of intakes as well as directly by the dams. Some assessment of the health of bryophytes in the affected stream valleys should be made following commissioning of the project. This could be compared with data from some of the other survey work that has been done in the plateau area.

5.3. The species mentioned in the Councils' request for additional information document - *Hennediella sp*, *Allisoniella scottii* and *Blindia lewinskyae.*

The *Allisoniella* is not *A. scottii* which is an alpine species but rather it is *Allisoniella nigra* subspecies *novaezelandiae* forma *novaezelandiae,* otherwise known only from Waipoua. The *Hennediella* sp appears to be something else much more ordinary and not a species in this genus. *Blindia lewinskyae* has now been located in a number of sites in the general area and the development proposed by HDL is unlikely to seriously adversely affect this species. Indeed the improvement in water quality downstream of the project may improve habitat for this species. So in terms of considering relocation, only the *Allisoniella nigra* subspecies *novaezelandiae* forma *novaezelandiae* would seem worth the effort of relocation. However, as the only currently recognised location is in an unnamed tributary of the Mangatini Stream in an area unaffected by this project there is currently no need for such action as we have no evidence of its existence in any of the affected water courses.

The potential of relocation success is unknown as few bryophytes have been studied in this way and most relocation experiments have used relatively common species. Despite this it is probable that if the sites selected are sufficiently similar to the original collection sites it would be reasonable to assume that plants relocated could survive.

5.4. Other species.

Other species of bryophytes listed by DOC as having special conservation value that are found in the Stockton Plateau area are:

Acromastigum marginatum

Acromastigum verticale

Archeophylla schusteri

Isotachis westlandica

Riccardia furtiva

Telaranea inequalis

Zoopsis bicruris

None of these are strictly aquatic but occur on stream side banks or in seepage areas above the streams. Most seem fairly widespread in stream valleys on the Stockton Plateau and some are fairly widespread elsewhere. The only potential problem species is *Isotachis westlandica,* which seems to prefer low pH stream sides and some habitat may be lost with the installation of dams and the general improvement of water quality. In this case there seems to be nothing useful that could be done at this time to encourage growth of this species.