

South Esk – Great Lake Water Management Review

Scientific Report on Downstream of Poatina Power Station

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DOWNSTREAM OF POATINA POWER STATION

1. ASSESSMENT OF ISSUES AND STATUS

Introduction and Basslink Investigations

During the Community Consultation phase of the Water Management Review, the region downstream of the Poatina Power Station (Brumbys Creek, lower Macquarie River and lower South Esk River) was an area to which a large number of concerns related. The main stakeholder groups who raised concerns were landowners and anglers, however others affected by these issues include numerous recreational users (water-skiers, swimmers), townspeople and several industries including an aquaculture operation.

The issues that were raised included environmental water requirements, riverbank stability, water quality, fishing impacts, flood risks, irrigation/township/industry water supply and salinity related issues.

Following identification of these issues, Hydro Tasmania embarked on investigations related to the likely effects of the Basslink undersea cable on the downstream Poatina environment. Installation of the Basslink cable, linking the Tasmanian power grid to that of Victoria, was thought to cause a significant change to the pattern of operation of the Poatina power station. Studies were therefore undertaken to investigate the potential impact of these operational changes on the downstream environment. This superseded the process commenced under the water management review, however as part of the investigations for the Basslink Aquatic Environmental Impact Assessment, issues identified for the river below Poatina during the South Esk – Great Lake WMR were dealt with in some detail. As a result, the management options that were derived from this study were incorporated back into the WMR program.

The results from these studies are presented in detail in the section of the Basslink Integrated Impact Assessment Statement, titled 'Potential Effects of Changes to Hydro Power Generation studies of downstream Poatina' (see Appendices 15 - 21) and are available through the Hydro Tasmania website (www.hydro.com.au/basslink/iias.html). The following information has been taken from those reports and summarised for the purposes of the South Esk – Great Lake Water Management Review.

Riverbank Stability

Riverbank stability was investigated as part of the 'Downstream Poatina Geomorphology Assessment' for the Basslink Integrated Impact Assessment Statement (Abernathy & Bresnehan, 2001). Bank erosion was raised as a major concern by landowners downstream of Poatina Power Station. It is perceived that the current bank erosion is related directly to the frequency of water level fluctuations and dewatering of the banks, and that the current problem would be exacerbated by the Basslink development. Damage to the banks of the river and to riparian vegetation as a result of stock access is seen by landowners as a secondary contributor. The Basslink study assessed the fluvial geomorphology downstream

of the Poatina Power Station under its present system of operations. It also assessed this in terms of the predicted changes in discharge patterns that might occur as a result of Basslink. The study found that the channels downstream of the Poatina Power Station are highly modified by the high flows discharged from the power station under the current operating regime. However, channel modifications have also resulted from other processes including riparian vegetation clearing and stock access. It was concluded that while the operation of the Poatina Power Station influences bank stability on Brumbys Creek and to a lesser extent on the lower Macquarie River, the same conclusion could not be drawn for further down the South Esk River. The study determined that under Basslink, the existing channel degradation processes in Brumbys Creek will switch from seepage-induced draw-down failures to slumping resulting from scour of the toe of banks and the bed of the river. The geomorphological effects of Basslink will not be so apparent on the Macquarie and South Esk Rivers, where current erosion processes will continue to dominate. The studies suggested that there may be an increase in the effects of wetting and drying cycles in clay soils in the upper Macquarie River, and potential for increased scour, undercutting and small-scale failures in the sandy soils of the lower Macquarie and South Esk Rivers.

Water Quality

Water quality was examined as part of the 'Downstream Poatina Water Quality Assessment' for the Basslink Integrated Impact Assessment Statement (Koehnken, 2001). The current status of water quality downstream of Poatina Power Station was assessed and the implications of Basslink on water quality were investigated. The study found that there are reduced summer temperatures when the power station is operating, and increased temperatures along with reduced dissolved oxygen in the weir ponds on Brumbys Creek during summer and autumn shutdowns. When the power station is operating, it dilutes any poor quality water present below the tailrace, however the water quality returns to background levels when the power station is shut down. Turbidity (the main concern with regard to water quality identified by stakeholders during community consultations for the Water Management Review) tends to be low when the power station is on, due to dilution by the discharge of water originating from Great Lake. Large spikes in turbidity coincide with storm events rather than power station operations. These spikes occur with local rain events regardless whether the power station is operating, and are presumably created by turbid run-off entering Brumbys Creek from the catchment upstream from the power station tailrace. Turbidity spikes also occur during extended power station shut downs due to algal growth in the waterway.

Dry land salinity salt scald has also been observed on the banks of Brumbys Creek, but is not reflected in the salinity data for the creek, probably in part due to dilution by Poatina Tailrace water. However, dryland salinity has been shown in other places to increase the dispersibility of soils and further contribute to erosion and turbidity. The dilution effects of the power station operation are very noticeable in the lower Macquarie River below the Brumbys Creek confluence.

The Basslink development is anticipated to impact on existing water quality through greater short-term variation in dilution downstream of Poatina than occurs at present, although the range of water quality conditions present in the downstream catchments will be similar. This would impact most on the stretch

between the tailrace and the first weir pond; each successive weir pond will dampen the fluctuations and create more uniform water quality. There will be improved flow-through in the weir ponds, with Poatina off for shorter durations. There is unlikely to be any change in peak turbidity values with Basslink, as they reflect storm events more than power station operations. Basslink will result in more through flow in the weir ponds, which will result in shorter retention times and less potential for algal blooms and deoxygenation. Hence there will be potentially better water quality in the weir ponds. As this is a significant recreational fishery, this should also be a benefit.

Fishing

Fishing was addressed in both the 'Downstream Poatina Instream Biota Assessment' (Davies & Cook, 2001) and the Basslink Integrated Impact Assessment Statement 'Summary Report' (Locher, 2001). The original concerns raised through the Water Management Review were how the fishery is currently affected by the fluctuations in flow, and how the health of the fishery might be affected (in terms of the availability of trout food) following implementation of Basslink operations. The studies concluded that currently, Brumbys Creek supports an abundant and diverse aquatic biota, particularly in the weir ponds and this in turn supports a productive trout fishery. It was recognised that this is a very popular, nationally recognised recreational fishery, predominantly sustained by the weir pond and associated macrophyte habitats. However, upstream degradation of the channel may eventually result in negative impacts on macrophytes and invertebrates by gradual siltation of the weir ponds (the timeframe and extent could not be defined). It was also concluded that while the lower Macquarie and South Esk Rivers have experienced a loss of fringing macrophytes, these rivers still currently support viable and significant trout fisheries.

The predicted increases in flow fluctuation under Basslink are likely to increase stress on macrophytes and instream biota in the weir ponds (particularly in Weir Pond #1) and the river downstream. This has the potential to negatively impact upon the recreational fishery. Discussions with Inland Fisheries Service indicate that there is little in the way of trout spawning reeds in Brumbys Creek below the tailrace, and significant spawning only occurs in the headwaters and headwater tributaries, which are not affected by Poatina. No significant gains or losses are anticipated for the instream biota in the lower Macquarie and South Esk Rivers. Management options to address this are discussed in Section 2 of this document.

Flood Risks

Flood risks were addressed during the 'Downstream Poatina Landowner Issues Assessment' (Thompson & Chilvers, 2001). It is recognised that flooding is a significant issue for the stakeholders downstream of Poatina. Large floods are common downstream of Poatina, with floods in excess of 1000 cumecs being regularly experienced in the South Esk River. While Poatina Power Station introduces additional water into the South Esk catchment due to diversion of water from the Great Lake catchment, the exacerbation of floods downstream of the power station is constrained due to operating rules restricting power station operation during high natural flows in the Macquarie catchment. Landowners are concerned that these flood rules do not consider local floods in Palmers Rivulet

and Brumbys Creek sufficiently, nor do they consider floods in the South Esk River, which significantly affect landowners downstream of Longford.

There was also a high level of concern that flooding would be exacerbated by the Basslink development. The current flood rules for Poatina Power Station date back to the 1960s and there is no indication that these have been updated to reflect changing river conditions (eg. roadworks, developments near the floodplain and construction of levees). The study concluded that the present flood rules should be reviewed to determine if they are still valid.

In conclusion, the study stated that it is unlikely that Basslink will change the frequency or magnitude of floods in Brumbys Creek, or in the lower Macquarie and South Esk rivers.

Industrial Water Supply

Industrial water supply was examined and discussed in the Basslink Integrated Impact Assessment Statement 'Summary Report' (Locher, 2001). The issues raised in the Water Management Review essentially related to the Sevrup aquaculture operation, which expressed concerns regarding changes to the operation of Poatina Power Station. The current operation suits the aquaculture business, which relies on the cooler, more constant flows during the warmer months. However shutdowns of more than 12 hours in the summer months (particularly November/December) create critical water quality declines. Other issues with the current operation are the presence of algae in Brumbys Creek when Poatina is not operating. Sevrup would also like more information on changes to flow within the flow ranges currently supplied to them as these result in damage to screens. Changes to the operation of Poatina Power Station as a result of Basslink are likely to provide net benefits to the aquaculture business, in terms of more predictable power station discharges occurring at times that suit their flow requirements. However, it was noted that improved communication regarding power station operations are critical.

Irrigation Supply

The issue of irrigation supply was briefly reviewed and discussed in the Basslink Integrated Impact Assessment Statement 'Summary Report' (Locher, 2001). The Cressy-Longford Irrigation Scheme takes water from the Poatina tailrace, and many of the properties further downstream are farms that own land to the centre line of the river and access the river for irrigation water. There were concerns regarding the security of water supply as a result of changes to the operation of Poatina Power Station. Hydro Tasmania has clearly stated that it will adhere to all existing water management commitments.

Environmental Flows

Environmental water requirements, although flagged as an issue during the Water Management Review, were not addressed directly through the Poatina Basslink studies. Instead, the Basslink studies undertook investigations to develop habitat-flow relationships for instream biota and aquatic plants. This was aimed specifically at platypus, brown trout and the freshwater mussel (*Velesunio moretonicus*), as well as more generic habitat preference information for major aquatic plants (*Eleocharis*, *Myriophyllum*, *Isolepis*, *Potamogeton/Chara-Nitella*). This was

used to examine how fluctuations in discharge from Poatina power station affect habitat availability in Brumbys Creek and the Macquarie River downstream. The results showed that the current pattern and magnitude of flow fluctuations cause little change in habitat suitability or availability for submerged aquatic plants in Brumbys Creek when flows are above 5 cumecs, and that overall the relative constancy of large portions of habitat area for submerged aquatic plants probably accounts for their high biodiversity and apparent productivity, which is reflected in the productivity and popularity of the trout fishery.

These relationships for the lower Macquarie River are quite different, with significantly more area being provided for channel-margin aquatic plants only at higher flows (30 - 60 cumecs). Flow fluctuations below this range are likely to impact on habitat suitability and availability for these plants.

The mitigation option proposed for Basslink (construction of a re-regulation pond below the Poatina power station) would increase the amount of control Hydro Tasmania has over flows lower down the river, however it would still be limited. Given that the power station diverts significant volumes of water into Brumbys Creek from outside its natural catchment, there is no possibility of approximating 'environmental flows' within the creek. The aquatic environment will be considered during the development of operational rules for discharge from the re-regulation pond.

Salinity

As mentioned above in section 12.1.3, salinity was examined as part of the 'Downstream Poatina Water Quality Assessment' for the Basslink Integrated Impact Assessment Statement (Koehnken, 2001). Dry-land salinity is recognised as an emerging management issue in this region and is known to occur intermittently along the banks of other rivers and creeks in the area that are not affected by power station operations. This indicates that salinity is a regional issue independent of power station flow regulation. Although only one location along Brumbys Creek was observed to show evidence of salt scald, salinity maps of the area downstream of the tailrace indicate that while the visual evidence of salt scald may be limited, there is evidence of the impact of salinity on pasture grasses and surface waters in the catchment downstream.

The salt deposits found on Brumbys Creek appear to be caused mainly by bank infiltration and drainage associated with power station operation raising near-bank water table levels and mobilising salts. The lack of woody riparian vegetation may also be a contributing factor to the near-bank water table activity producing the salt scalds. Discharge patterns from Poatina Power Station following the Basslink development are likely to decrease salinity along Brumbys Creek if it is driven by inundation, as the shorter duration power station on events should reduce water infiltration into the banks but would increase it if driven by inundation.

Town Water

Township supply was not addressed in the Basslink studies, but given that water quality is expected to improve, and the volume of water discharged is not expected to change, it is thought that town supply will not be significantly affected by Basslink operation.

Miscellaneous Issues

A variety of other issues raised by landowners downstream of Poatina were also investigated. These issues were not addressed individually, however they make up the bulk of issues identified through the Water Management Review; they include stock access and bogging, domestic and irrigation pump intakes and fencing infrastructure. Stock access and stranding are problems for some landowners when water levels rise, a problem that could increase under Basslink. Muddy conditions on recently dewatered banks cause stock to become bogged. Fencing to low water levels would contain the stock, however frequently fluctuating water levels make fencing difficult to maintain, which is another issue for some landowners. Domestic and irrigation pump intakes are affected by fluctuating water levels and pumps often need to be repositioned to accommodate periods of lower flows, the pumps are then susceptible to being flooded when the power station turns on again. The hydrological study undertaken under the Basslink Integrated Impact Assessment Statement could not predict which pumps would be affected by Basslink, but suggested that some may need to be replaced by submersible pumps or floating off-takes (Taylor, Adams & Peterson, 2001).

Although Basslink was raised as a concern numerous times in the Water Management Review consultation, the study found that most landowners perceive that existing conditions are more of a problem than potential Basslink issues. The main concerns with Basslink operational changes were the increased variability in river level, and the risk of increased power operation during flood periods.

2. ENVIRONMENTAL MANAGEMENT OPTIONS FOR DOWNSTREAM POATINA

The downstream Poatina environmental investigations have provided considerable data documenting the modifications to the river channel due to existing power station operations and the surrounding land use practices. In the absence of mitigation measures, changes to the existing pattern of water discharge that will result from Basslink are likely to cause continued channel degradation and environmental impact, including increased stress to aquatic flora and fauna, as well as exacerbating the existing problems related to water extraction and stock stranding.

As a consequence of the better understanding of environmental processes gained by these investigations, and as a major option to allow the Basslink development to proceed, a riverine enhancement and environmental monitoring program has been proposed for Brumbys Creek below the Poatina tailrace.

The construction of a 1.5 Mm³ re-regulation storage is proposed immediately adjacent to the existing tailrace to act as a flow management pond. Water will be diverted from the tailrace into the pond, rather than being directly released into the creek. A pond of this volume will hold approximately 12 hours of Poatina discharge under Basslink operating conditions, and gates will control the release of water into Brumbys Creek. This will smooth out much of the hydro-peaking. This is currently considered to be the optimal mitigation option for Poatina under Basslink conditions. In addition to mitigating Basslink impacts, this option has the added advantage that it also addresses many of the existing environmental concerns and issues, since most of these are also linked to variability in flow. The re-regulation storage will also address the issues relating to water quality, fluvial geomorphology, impacts on instream biota and socio-economic factors by reducing the fluctuations in water level downstream of Poatina Power Station.

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