

Email Message

From: Frank Roy

Sent: January 12, 2015 5:49 PM

To: Yee Michael; Grant Machan

Subject: Tay River Dams Recommendation



Little Tay Flows

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Gentlemen,

Thank you, Mike, for your time on the telephone Friday afternoon, and Grant this Monday afternoon, in discussion of the Tay River Dams. The following has been reviewed by the Friends of the Tay Watershed Association and constitute the Association's comment on the Tay River Dams recommendation presented to Perth Committee of the Whole on 9 December, 2014.

These comments are based on the Detailed Design - Hydraulic Analysis - Modeling Results presented in Appendix D, Attachment 2, Proposed Conditions dated March 24, 2006, of the Final Design Report, Haggart Island Dams Reconstruction, dated February 2007, prepared by the Ainley Group for the RVCA. *[Editorial comment: Although this report was published 8 years ago, the hydraulic modelling information remains valid as a basis for current discussions on the replacement of the existing dams.]*

In our opinion, the main problem to be addressed is the high water levels in the Little Tay in the reach between the natural hydraulic control by the rock formation immediately above the Cavers Bridge and the control structure associated with the culvert under Drummond Street. We will call this "Cavers Reach" hereafter. We consider this level to have reached flood stage when it reaches heights where the gabion basket retention wall protecting Code Park is overwhelmed, the waterside lawns in Stewart Park become saturated and the control weir

governing flow through the channel to Mill Street is overwhelmed. Although less apparent, with water levels at this height in Cavers Reach, the water levels upstream of the natural control have also risen to a local flood stage, inundating private property on the north side of the channel and threatening the stone retention wall on the south side.

Given the channel configurations that we have, water surface levels relative to a datum are directly related to discharge or flow rate. Flow rate in the Little Tay, in turn, is governed by the surface water level above the two Haggart Island Dams and by the conveyance of what ever structures are proposed to replace the existing dams.

The above referenced modelling results for a design with a 20/80 percent split of river flow between the Little Tay and the Tay indicate that the 20/80 percent split would be maintained for river surface level of 133.15 metres giving a flow of 1 cms (cubic metre per second) through to 133.30 metres, giving a flow of 10 cms. With this rise in river surface levels, the surface level in Cavers Reach rises 23 cm from 131.66 to 131.89 metres.

As the river surface level rises a further 36 cm to 133.66 metres, giving a flow of 50 cms, the flow split changes to 30/70 percent, i.e. a higher percentage of a larger flow now goes down the Little Tay. The water level in the Cavers Reach rises to 132.52, an increase of 63 cm. A river flow of 50 cms has a computed frequency of 7.05 years, that is a fairly common event.

A river flow of 100 cms has a computed frequency of 37.65 years. In this event, the river surface level is 133.97 cm, the level in the Cavers Reach is 133.35, or 1.46 metres above that for a 10 cms flow. With the 100 year flow of 150 cms, the river surface level is 134.22 metres and at Cavers Reach the level is 133.88, a drop of only 34 cm. At this point, the low land on Haggart Island is in complete flood.

The desired 20/80 percent flow split begins to be over run as the river surface level reaches 133.47 metres giving a river flow of 25 cms; the water surface in the Cavers Reach is then 132.24. This is 1.98 metres below the 100 year flood plane. It is also only 7 cm below that for so called existing conditions with the damaged Little Tay Dam, as modelled circa 2006.

It is our opinion that the hydraulic design should be aimed at avoiding localized flooding of the Cavers Reach as described above, rather than to achieve a split ratio of 20/80 as seems to be the focus at present. Therefore we suggest the following further study should be undertaken:

a) Establish a target water surface level to be maintained in the Cavers Reach, based on the maximum level allowable to avoid local flooding as defined above. Ideally this surface level should be controlled for a range of river surface levels from 133.15 to 133.97 metres. Above this level, the level in the Cavers Reach is no longer controllable as the Tay River over tops its banks and floods the low parts of Haggart Island.

b) Given that it is now recognized that historical flow levels may not reflect future conditions, some study be made of future expectations for Tay River flows considering climate change and extreme events already in evidence.

c) Conduct appropriate hydraulic model studies of the existing conditions with varying Rocky Ramp sill heights to establish a split ratio which will result in the desired surface water level in the Cavers Reach for river surface levels equivalent to a return period of say 50 years for flows estimated from study b). This will no doubt result in a much lower split ratio than 20/80.

d) Should this reduced split level result in water surface levels in the Cavers Reach below the design target, i.e. below the sill level of the weir controlling the flow in the channel to Mill Street, then consideration should be given to controlling for the target level by placing stop logs as already provided for in the existing culvert design at the Drummond Street end of the reach. Such action would temporarily raise water levels in the Cavers Reach for the dry period, but because of the rock formation at the Cavers Bridge would not influence water levels above Cavers Bridge. In a worst case dry season scenario, it might be necessary to completely shut off flow through the Drummond St culvert in order to maintain a high enough water level in Cavers Reach to drive flow through the Mill St channel. The logs would be pulled in the fall in anticipation of spring high water. The operation of setting and removing stop logs at the Drummond St culvert presents little or no risk to health or safety of the required workers, and as Grant noted in conversation, was a practise in the past.

We would be pleased to meet with you to discuss this matter further at your convenience. In the meantime, thank you again for your time and the opportunity to submit our comment.

Frank Roy,
On behalf of the Board,
The Friends of the Tay Watershed Association.