

3. Future evolution of the Tongariro River

The river channel position has undergone many changes in the past and this can be expected to continue into the future. The timing of these changes will depend on the occurrence of future floods and eruptions.

Upstream of Turangi the bed level appears to be entering a falling phase and, as a mildly degrading river is relatively stable, no severe changes are foreseen in this section of the river unless a major eruption occurs. The position of the main channel will continue to change, as it has done in the past, and variations in bed level can be expected, especially where the river is adjusting to new channel locations such as have occurred with the split in the island downstream of Puketarata and the cutoff of Breakaway Pool.

Downstream of Turangi the situation is more serious and major changes in the river's position on the delta are likely to occur in the future.

Overflow channels across Grace Road to Stump Bay and across Awamate Rd towards Deep Stream have become more established following the February 2004 flood and it is only a matter of time before the river will break out of its present course and take a new route to Lake Taupo. Possible breakout routes are shown in Figure 18.

An inspection of the situation in November 2004 showed that the water level in Deep Stream is over a metre lower than the water level in the nearest part of the Tongariro River and Deep Stream is "head-cutting" towards the river as shown in Figure 19.

The large amount of floodwater that is escaping from the main Tongariro channel into Deep Stream is evidenced by erosion of its left bank (which adjoins the Tokaanu tailrace) as shown in Figure 20. The small catchment of Deep Stream could not produce sufficient flows to cause such erosion. The erosion of the western bank of Deep Stream is caused by floodwaters from the Tongariro River.

At the exit of Deep Stream there is a large quantity of flood debris deposited into Lake Taupo (Figure 21). This debris has been moved by floodwaters that have escaped from the Tongariro into Deep Stream.

In light of this evidence, unless some form of intervention is engineered, it is considered that the Tongariro will breakout of its present channel during a future flood. The most probable location of the new Tongariro River mouth will be alongside the exit of the Tokaanu tailrace (shown as a dark blue trace on Fig. 18).

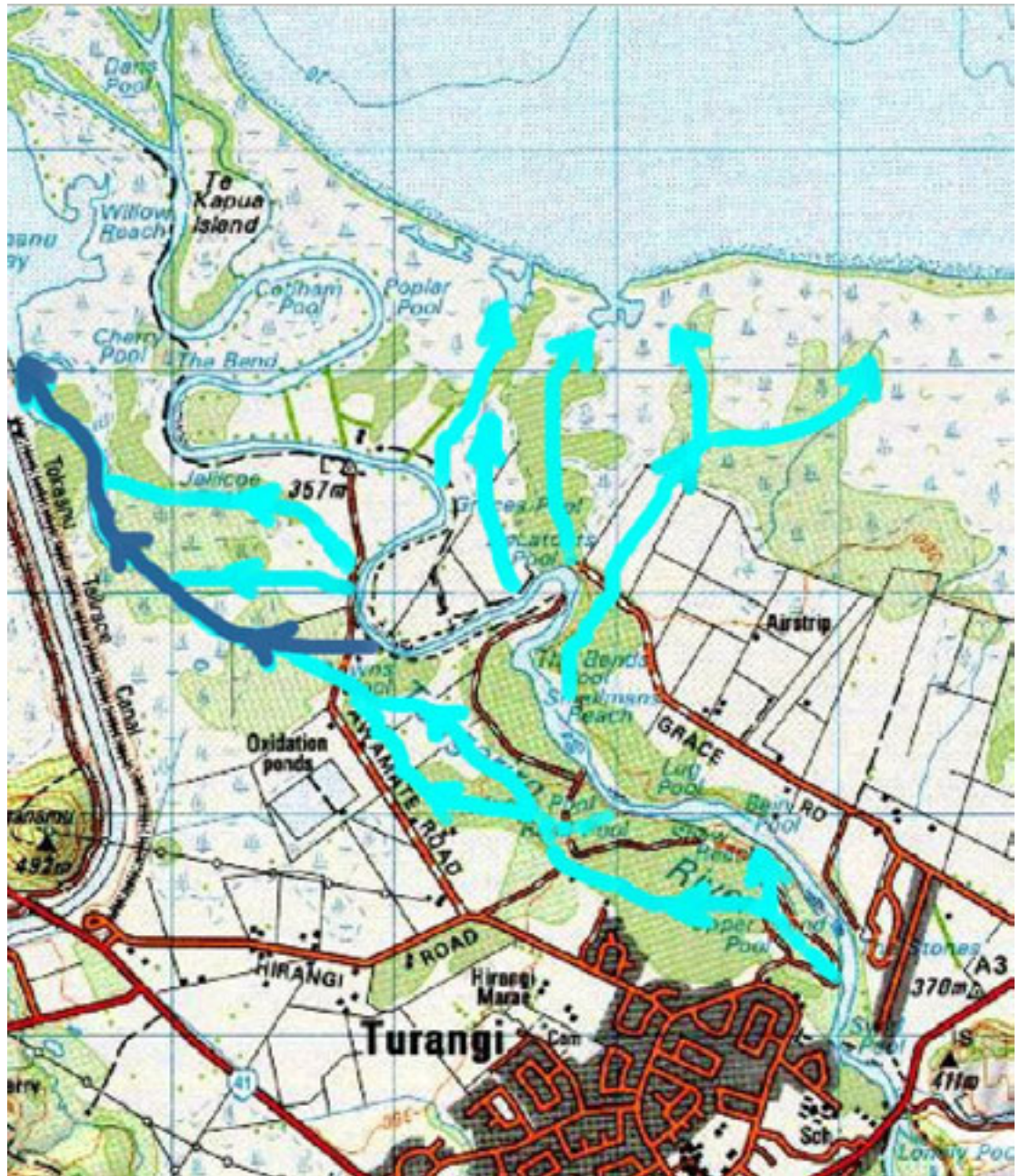


Figure 18: Possible breakout routes and locations for the future mouth of the Tongariro River.



Figure 19: Floodwater spilling into Deep Stream is causing “head-cut” erosion which brings Deep Stream closer to the Tongariro River



Figure 20: An indication of the volume of floodwaters exiting via Deep Stream is shown by the erosion caused to its left bank before it enters Lake Taupo (near the mouth of the Tokaanu tailrace).



Figure 21: Vegetation and debris entered Tokaanu Bay via Deep Stream in the Feb. 2004 flood.

4. List of management options

While it is not possible to control a river on a geologic timescale, it is possible to control relatively large floods, direct river evolution and pre-empt dramatic changes in river position as long as natural processes are guided and respected. A number of options are available for management of the Tongariro River depending on the vision that the stakeholders have for the river. Each option will have advantages and disadvantages and hence a combination of options might be appropriate within an overall management plan context. These options include:

- Implementing pre-emptive land use plans and controls so that the future evolution of the river will not adversely affect stakeholders.
- Doing nothing and managing the impacts of future changes, when they occur, through planning and control works. The impacts of future changes should not be underestimated as once the river changes position it may be extremely difficult to modify the new river course.
- Attempting to rejuvenate the current channel through dredging, vegetation control and river training works.
- Helping the river develop a new channel to Stump Bay through excavations and training works.
- Increasing the channel capacity in the vicinity of Turangi by extracting gravel from the river bed.

- Other control options such as meander cutoffs, guide walls and lake level management.

Because this river is subject to natural hazards such as volcanic eruptions, seismic activity and tectonic movements there is no guarantee that implementation of any management options will achieve a desired outcome. In formulating future management plans for the Lower Tongariro River these hazards need to be highlighted and considered.

5. Future Investigations

To guide the planning process for management of the river, a more accurate picture of flood breakout and future channel changes on the lower delta could be obtained with a numerical hydraulic model of the lower delta. It would be necessary to carry out an airborne laser altimetry (LiDAR) scan of the delta to measure the local topography in sufficient detail for high resolution hydraulic modelling.

If engineering works such as dredging, stopbanking or pre-emptive channel re-routing are to be considered, feasibility studies will be necessary to investigate the costs and benefits of such works.

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