MEMORANDUM

To	Northern Grampians Shire Council
From	Ben Hughes	Water Technology
Date	20 July 2023
Subject	**Glenorchy – Flood Mitigation Modelling**

This Memorandum details the investigation and hydraulic modelling of a range of conceptual mitigation options in Glenorchy as requested by Northern Grampians Shire Council, following a community consultation session reflecting on the October 2022 flooding.

1 BACKGROUND AND PURPOSE

Post flooding through Glenorchy in October 2022, Northern Grampians Shire Council held a community meeting to discuss the impact of the floods on the Glenorchy community. The meeting was intended to ensure the Glenorchy community had an avenue to discuss their concerns and suggest any areas where specific improvements could be made to reduce flood risk and improve the emergency management response. A range of flood mitigation scenarios were suggested and some of these options were then modelled to confirm their viability and overall reduction in flood risk. This memo documents the modelling undertaken and the impact of each potential mitigation option.

Hydraulic modelling was completed using the hydraulic model of Glenorchy developed as part of the Dunmunkle Creek Flood Investigation (Water Technology, 2018). The model was calibrated to the January 2011 and September 2016 flood events as part of the 2018 flood study and then used to assess design conditions (i.e. 1% AEP).

2 MODELLING AND RESULTS

Hydraulic modelling was undertaken for four mitigation scenarios with the results summarised below. The mapping has been provided as separate attachment to this Memo:

- Option 1 – Raising Bunbury Street above the 1% AEP flood level from Marl Street to the Stawell - Warracknabeal Road (1% AEP flood event).

    - Raising Bunbury Street caused undesirable increases to the south with limited decreases to the north, resulting in the option not being considered feasible.

- Option 2 – Removing and clearing the topography in proximity to Glenorchy Weir (1% and 10% AEP flood events).

    - Removing the Glenorchy Weir and associated constructions causes upstream reductions in flood level; however, these are limited to downstream of Warracknabeal Road. There is one dwelling in the area of 'flood level decease'. This option is unlikely to be feasible due to the required extent of works and recreational impact on the Glenorchy community through removal of the weir.

- Option 3 – Opening of Arapiles Street, Forest Street and the Stawell - Warracknabeal Road with complete removal of the road as shown in the maps (around 50-60m sections of road) (modelled for the 1% and 10% AEP flood events).

- Opening the roadway constrictions does not cause significant reductions in the upstream flood level, largely due to the very large flow rates already overtopping each road crossing (even in a 10% AEP event). The additional capacity when the constrictions are opened isn't sufficient to prevent the roads from overtopping and therefore there is only limited change to upstream water levels. It is likely the roads cause more of a local drainage/stormwater issue compared to a riverine flooding issue. Improved benefits to the drainage in Glenorchy should be investigated as a standalone study.

3 SUMMARY AND RECOMMENDATIONS

The modelling undertaken has demonstrated the tested mitigation options are unlikely to achieve a meaningful reduction in flood damage/flood risk for Glenorchy. This is in line with previous mitigation investigations in Glenorchy (Glenorchy Flood Study, 2006), which determined floor level raising was the most appropriate mitigation option. However, given there are clear drainage issues (opposed to flooding from the Wimmera River), it is recommended a local flood investigation be undertaken to better understand flooding risk from local catchments and prioritise structure upgrades. This would involve detailed survey of the current drainage system and a combined 1D/2D hydraulic model to assess the potential works. The flood investigation should be undertaken according to Australian Rainfall and Runoff 2019 (ARR2019) guidelines.