

Summary of Investigations – 2024 Maribyrnong River Flood Model and the VRC Flood Wall

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Melbourne Water has commissioned Jacobs to undertake investigations to provide information to assist the Maribyrnong River Flood Event Independent Review Panel in completing their assessment against these aspects of the terms of reference:

- 6. Examine whether the Flemington Racecourse flood protection wall contributed to the extent and duration of the Flood Event.
- 7. Review the efficacy of Melbourne Water's proposed conditions of approval and mitigation measures relating to the wall and their implementation.

This document details a summary of the investigations that have been completed using the 2024 Maribyrnong River Flood Model developed by Jacobs for Melbourne Water.

In summary, the findings of the modelling work are:

- The modelled impact was that average flood depths increased by 17 mm in Maribyrnong Township within residential land uses and 51 mm within industrial/commercial land uses in the Kensington area. Extents increased by around 1% across the model. Of the 1% calculated increase, approximately 4% of the flood extent increase is in residential land use areas.
- The modelling has demonstrated that the mitigation measures were partially effective. These measures did not fully offset impacts but did reduce these impacts. The measures reduce flood level impacts by around 10mm in the vicinity of Footscray Road Bridge and by 1 mm in proximity to Maribyrnong Township, but did not reduce the flood extents.

When considering the modelling results, it is important to recognise that there are limitations in these types of flood models. The national guidelines state that results are not reported to the nearest millimetre, and impacts less than 10 mm are not reported, as they are considered to be within the precision of the numerical model and data.

VRC flood wall and associated mitigation measures

Base Case

The Base Case model represents the catchment conditions as of 2023. It includes the Victorian Racing Club (VRC) flood wall and the associated mitigation measures.

VRC flood wall

The VRC flood wall was erected around the Flemington Racecourse in 2007.

Mitigation Measures

The mitigation measures constructed as part of the VRC flood wall project include:

- Footscray Rail Culverts (Northern Railway Culverts) – Approximately 70 m of earth roadway embankment removed downstream of the rail culverts lowering levels from 0.8 m AHD to 0.5 m AHD.
- Footscray Road Bridge – Removal of a bluestone abutment located on the eastern edge of the channel.
- Footscray Road Bridge – Flow training wall constructed on the eastern embankment upstream and downstream of the bridge. Fargue spiral design to minimise the energy losses through the bridge.

Summary of investigation of the VRC Flood Wall and Mitigation Measures

To understand the impact of the VRC flood wall and associated mitigation measures, two scenarios were modelled as reported in IA5000NN_003_REP_002. These two scenarios were:

- Base Case – as defined above.
- Scenario 1 – represents the Lower Maribyrnong catchment response to the October 2022 flood event without the VRC flood wall and without the associated mitigation measures.

This investigation was completed to assess the impact of the VRC flood wall with mitigation measures in place on the Lower Maribyrnong floodplain during the October 2022 event.

- Extent - There was approximately a 1% increase in the flood extent when the Base Case was compared to Scenario 1. Of the 1% calculated increase, it was calculated that 4% of the flood extent increase is in residential land use areas.
- Duration - There was negligible change to the flood duration within the model reporting tolerance of 5 minutes when the VRC flood wall and mitigation measures were removed.
- Depth – there was an increase in flood depth when the Base Case was compared to Scenario 1, calculated as follows:
 - An average water depth increase of approximately 17 mm within residential land uses in the Maribyrnong Township. The water depth increase varies across land uses from 7 mm to 30 mm within this locality. Note: the average flood depth, in the Base Case, in this area was approximately 800 mm.
 - An average water depth increase of approximately 51 mm within industrial/commercial properties in Kensington. Excluding localised effects, the water depth increase varies from 30 mm to 70 mm within this locality. Note: the average flood depth, in the Base Case, in this area was approximately 450 mm.

Summary of investigation of the VRC Flood Wall Mitigation Measures

To understand the efficacy of the mitigation measures associated with the VRC flood wall an additional scenario was modelled to consider the wall without the mitigation. This scenario was:

- Scenario 2 – represents the Lower Maribyrnong catchment response to the October 2022 flood event with the VRC flood wall but without the associated mitigation measures.

This investigation was completed to assess the impact mitigation measures in place on the Lower Maribyrnong floodplain during the October 2022 event.

- Extent - There was negligible change to the flood extent when the Base Case was compared to Scenario 2.
- Duration - There was negligible change to the flood duration within the model reporting tolerance of 5 minutes when the mitigation measures were removed.
- Depth - Removing the mitigation works was found to increase peak water levels by up to 10 mm in the vicinity of Footscray Road bridge, to less than 1 mm at Maribyrnong Township, in the Maribyrnong River.

The comparison of Scenario 2 and Base Case demonstrated that mitigation measures did reduce the flood depth increase due to the VRC flood wall but the mitigation measures did not completely offset the impacts from the VRC flood wall. It should be noted that the training wall at the Footscray Road Bridge is not in the same condition as it was designed. This will have reduced the effectiveness of the training wall, increasing flood depths and extents due to the VRC flood wall; however, it has not been feasible to quantify this impact.

Notes on Limitations

There are limitations which relate to flood modelling, which have been documented in the full report, the key ones are:

- The modelling methodology and software which has assessed the mitigations works differs to the methodology adopted at the time of the 2003 assessment.
- The representation of the mitigation works within the current modelling software differs to the representation in the assessment completed at the time that it was approved in 2003.
- There have been changes to the floodplain in the last 20 years which have not been explicitly assessed, such as: the construction of Regional Rail Link, Ascot Chase Development, changes to Smithfield Road Bridge (Lynch's Bridge), changes to landscaping and works on the banks of the Maribyrnong River.
- The 2022 flood event is not the same event simulated for the VRC flood wall assessment completed at the time. As such the outcomes of this assessment do not preclude the ability for the mitigation works to have a different influence on another flood event. This has not been investigated as part of this engagement.
- Based on site observations, the training wall is assumed as not functioning as designed.
- This report should be read in full, in conjunction with the final reporting noted above and no excerpts are to be taken as representative of the final findings. Jacobs accepts no responsibility for using any part of this technical memorandum in any other context.