



25 February 2021

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Dear Adele

TAGGART EARTHMOVING LTD APPLICATIONS - CORRECTION TO FLOOD MODELLING

I refer to the various flood modelling results and assessments of flooding effects in the AEE (6 October 2020) and our response to your s 92(1) request for further information (27 January 2021).

Through our quality control work prior to the hearing of this application we have identified an error in the flood modelling. This error affects the results of the modelling and the environmental effects anticipated following the construction of the proposed acoustic bunds.

This memo sets out the error and explains briefly the implications for the application.

1.0 Modelling error and correction

Flood modelling inputs include surface 'roughness', which is one factor influencing the conveyance of water over the land in the event of a flood. Accurate representation of surface roughness in the model is critical to the accuracy of the results.

In the suite of modelling undertaken for the AEE and s92(1) response, the Mannings 'n' value which describes roughness was incorrectly identified for River Road and Priors Road between Lehman's Road and Merton Road. The model mistakenly treated these roads as rougher surfaces than they are in reality.

The high roughness on Priors Road resulted in a portion of the floodwaters being slowed and deflected onto properties to the immediate north, along Lehman's Road and onto properties on Lehman's Road and Priors Road. This effect was discussed in the AEE and illustrated in the maps of flood modelling results of that document (Appendix G). Flood effects were also discussed in the s 92(1) response along with a possible mitigation for the flooding in this area.

Remodelling of the Q100, 200 and 500 flood scenarios has now been undertaken using the correct roughness coefficient for River Road and Priors Road.

2.0 Results

The results show that flood waters will not back up in the vicinity of the bund in the manner originally thought. Rather, the flow will be concentrated along the major (existing) flow path through the holiday park and then conveyed through the proposed excavated channel at the southern end of the western bund. The excavated channel, as anticipated, will increase the capacity of the flow path and reduce flood

water levels to the west of the racecourse. The increase in flow through the channel is directed to within the racecourse property.

Maps showing the results of Q100, Q200 and Q500 modelling are attached showing the difference in flood water depths between the existing environment and the proposal (which incorporates the excavated channel and bunds without a flood water mitigation cut).

To note are that, in all scenarios, construction of bunds and the excavated channel will result in:

- ∴ a decrease in flood water depth relative to the status quo in the Lehmans Road / Priors Road area and no change to the flood depths for the properties at the northern end of Lehmans Road. This reduction in depth arises as a result of the excavated channel to the south of the bund.
- ∴ an increase in flood water depths relative to the status quo along River Road and on land to the immediate east of the eastern bund. Here, flood waters are predicted to back up on the Racecourse site and flow into River Road around the northern tip of the bund.
- ∴ no increase in the flood hazard for the Q500 event (outside of the Racecourse footprint). Previously, some increase in flood hazard was predicted for the area adjacent to Lehmans Road.

3.0 Implications

The AEE discussed flood effects and their significance in light of relevant planning instruments, but under a flooding scenario somewhat different to that identified here.

For the greater part, the environmental effects of flooding are now avoided by the proposal, as flood water depths will be reduced almost everywhere off the Racecourse site and there will be no increase in flood hazard.

This conclusion excludes 335 West Belt. The AEE's flood modelling showed that the Racecourse development would cause flood depths at 335 West Belt to increase by 0 to 50 mm during Q100 and Q200 events, but that depths would decrease during a Q500 event. The results of the flood remodelling confirm that 335 West Belt will be affected by flood waters in all scenarios. Pre-development flood water depths are modelled to occur at 110 mm (Q100), 120 mm (Q200) and 160 mm (Q500). These depths are modelled to increase by 20 to 30 mm following the development of the Racecourse site. In none of the modelled scenarios do flood waters encroach on the dwelling at 335 West Belt.

The owner/occupier of that property Richard Townshend made a submission in opposition to the proposal but did not submit on the matter of flooding. We note that flood water depths are now modelled to increase less than as described in the AEE during Q100 and Q200 events, but that the Q500 event depth will be deeper than previously anticipated.

4.0 Next steps

We anticipate this letter being taken as a correction to the application AEE and that it will be useful in preparation of the s 42A report.

We note the difference in flood water levels around Lehmans Road as being positive but also acknowledge the change in modelled circumstances at 335 West Belt. However, in the case of this property we consider the difference in flood modelling results here and in the AEE are very small. We do not anticipate that this change is significant enough to warrant any alteration to the processing of the consent application or the work program from here. We would be comfortable with Mr Townshend speaking to the matter of flooding at the hearing.

5.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Taggart Earthmoving Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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SOURCE:
 1. AERIAL IMAGERY (FLOWN 2015-2016) SOURCED FROM THE LINZ DATA SERVICE
<https://data.linz.govt.nz/layer/53452-waimakariri-0075m-urban-aerial-photos-2015-2016/> AND LICENCED
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 ATTRIBUTION 4.0 INTERNATIONAL LICENCE.

WATER LEVEL DIFFERENCE MAP Q100 (POST - PRE)

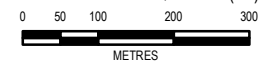
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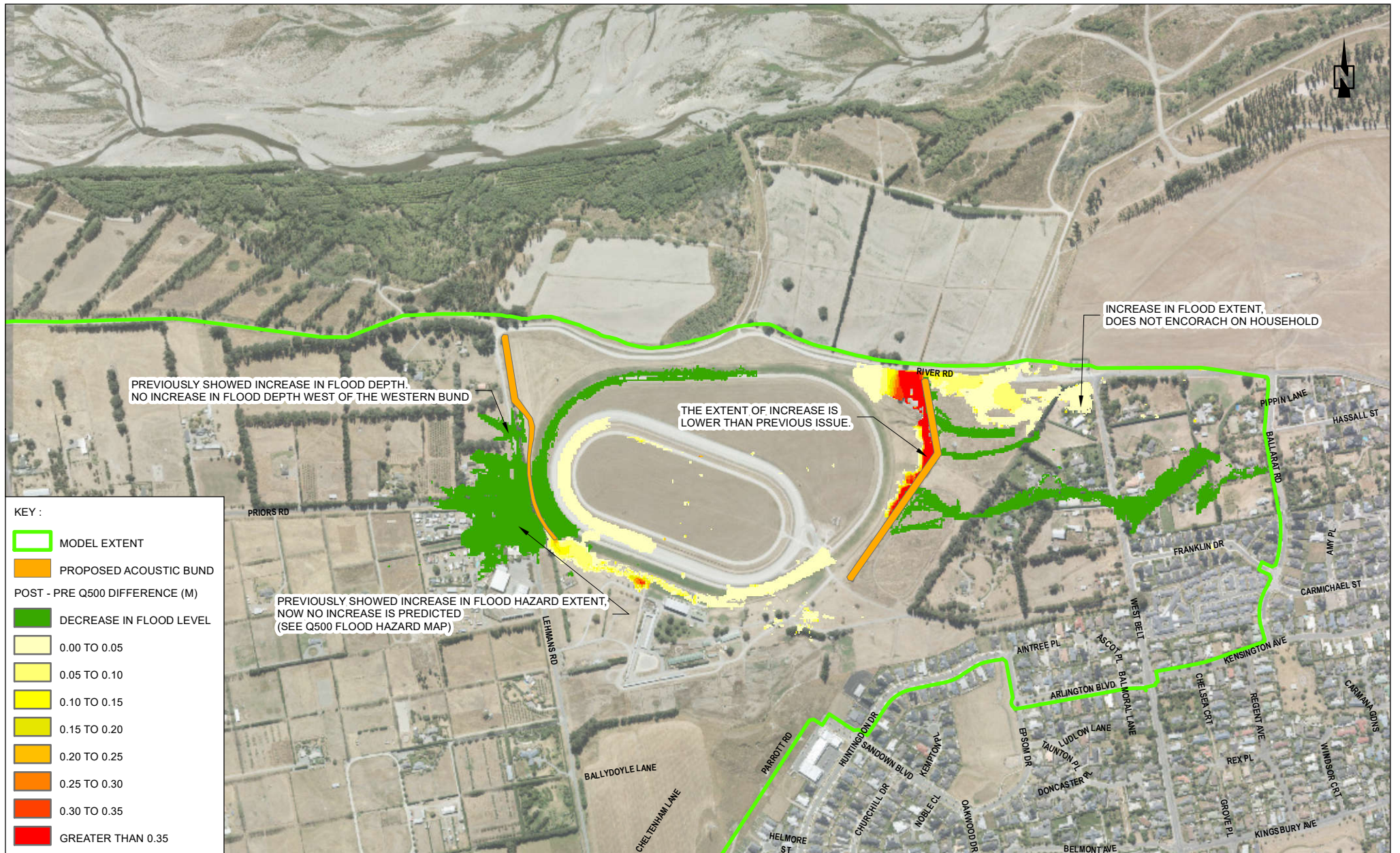


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WATER LEVEL DIFFERENCE MAP Q200 (POST - PRE)

SCALE : 1:10,000 (A4)

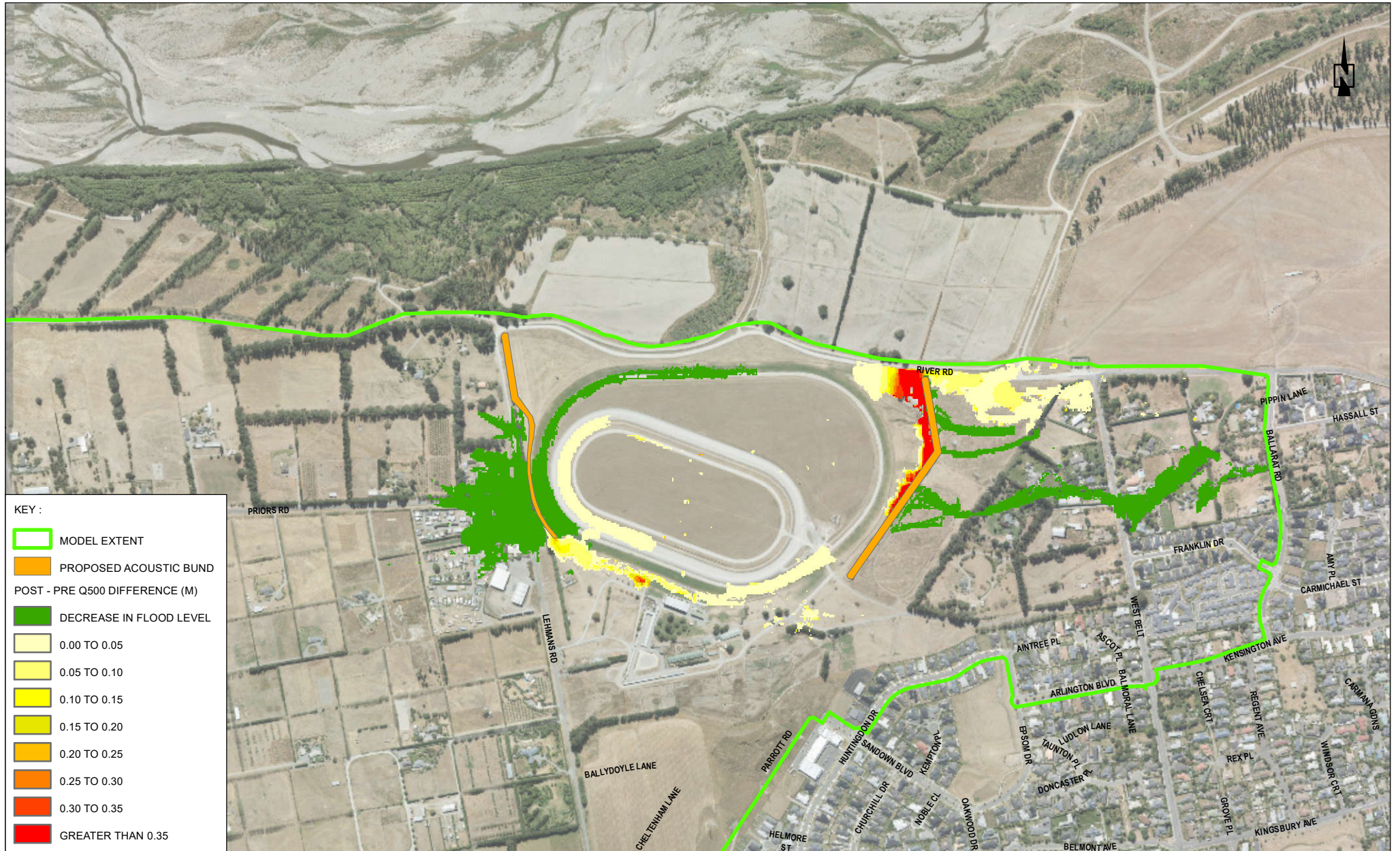




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**WATER LEVEL DIFFERENCE MAP Q500 (POST - PRE)
 COMPARISON AGAINST PREVIOUS FIGURE**

SCALE : 1:10,000 (A4)
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 METRES



SOURCE:
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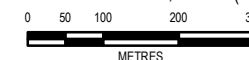
WATER LEVEL DIFFERENCE MAP Q500 (POST - PRE)

SCALE : 1:10,000 (A4)
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SOURCE:
1. AERIAL IMAGERY (FLOWN 2015-2016) SOURCED FROM THE LINZ DATA SERVICE <https://data.linz.govt.nz/layer/53452-waimakariri-0075m-urban-aerial-photos-2015-2016/> AND LICENCED BY WAIMAKARIRI DISTRICT COUNCIL FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE.

SCALE : 1:10,000 (A4)



Q500 FLOOD HAZARD DIFFERENCE