Memo – NZTA

To: Vineway Limited

From: Jordan Chiswell
Cc: James Kitchen,
Date: 27/06/2025

Subject:– Delmore Stage 1 and 2- Response to Regional NZTA Memo (Annexure 31 to Council family comments)

Stormwater comments: Peter Mitchell

1. Erosion protection

NZ TRANSPORT AGENCY WAKA KOTAHI

Planning Referral Assessment 25_102_P

Assets Affected	Asset Manager & SME Response / Comments
Stormwater	10/06/2025 – Peter Mitchell
T1 - Surface water collection, conveyance, & disposal	No comments regarding NZTA surface drainage (collection, conveyance, and disposal) - No NZTA Stormwater assets impacted.
T2 – Stormwater Culvert Systems (Culverts <3.4m2)	**HIGH RISK** – Due to limitations in the performance and condition of the culvert system passing through the NZTA system I have significant concerns about the additional demand and risk that the measurably (more than minor) increased flows will present to the flood resilience at the highway system. There is a 2100mm diameter 'major' culvert system that passes through the NZTA highway. 

This culvert system was designed and built as part of the 'Transit' ALPURT B1 Project in the mid to late 1990's. The culvert inlet has a simple standard headwall, and there is fish passage through the culvert (simple wooden baffle blocks that were designed and installed prior to the release of any NZ guidance documents on fish passage design). A copy of the relevant engineering layout plan can be seen here: 03328.TIF

At the time the ALPURT B1 was only designed for maximum probable discharges that would arise from the contributing catchment under allowances of the previous Auckland Regional Council (ARC) Air Land Water Plan (ALWP). The Auckland Unitary Plan (AUP) and this current plan proposal will result in measurably increased rates and volumes of runoff, due to the increased impermeable surface area. This presents a flood resilience risk at the state highway network where flood depths and velocities against the motorway embankment present a measurably increased risk of erosion, scour, and increased risk of failure at the already aged and limited performance major culvert system.

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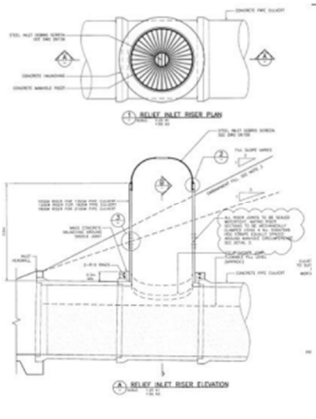
It is anticipated that as a minimum this inlet will need a culvert relief inlet riser as well as erosion and scour protection/resilience measures at the highway embankment at the culvert inlet (to a height above the 1% AEP flood level - including climate change 3.8 percent)



Response –

The headwater depth at the culvert inlet increases marginally under the 1 % AEP (+3.8 % climate change) design flow. The headwater depth at the inlet is approximately 10m, so a small increase of approximately 140mm is an increase in headwater depth of less than 1.5%. The culvert attenuates peak flows and is an important part of this catchment, protecting downstream properties and assets. This is due to the capacity of the culvert being less than the peak of the incoming flow. If the culvert were much larger, then this peak may pass through and effect downstream properties. The minor increase in depth at the inlet, does not fundamentally change the culvert scenario.

Our hydraulic modelling confirms that, despite the higher water level, flow velocities of less than 0.2m/s immediately upstream of—and around—the inlet remain well below the critical velocities of 1 to 2m/s for erosion and scour, as demonstrated in the paragraph below.

Below is a plot of the 2 year and 10 year events, from the 2D flood model including climate change. This shows the predicted velocities around the culvert inlet. In both scenarios, the flow velocities are very low, and below the velocities that cause erosion in different unlined channel materials, outlined in Auckland Councils Hydraulic Energy Management: Inlet and Outlet Design for Treatment Devices - TR2013/018. This includes the channel material relevant to the culvert NZTA is concerned about, which is highlighted yellow is the snip of Table 1 from TR2013/018 in Figure 3 below, or if the grass cover is considered, then the values in green are of relevance.

Overall, this analysis shows in the Post Development risk of erosion around the inlet is very low, so provision of rip-rap protection (i.e. erosion and scour protection) is not considered to have any benefit.

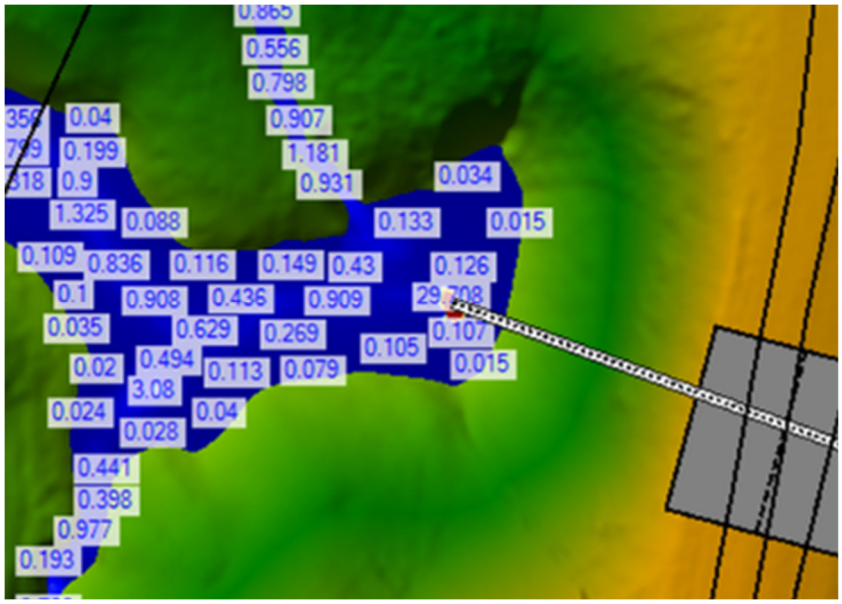


Figure 1- Velocities around culvert inlet in 2 year peak (including Climate Change)

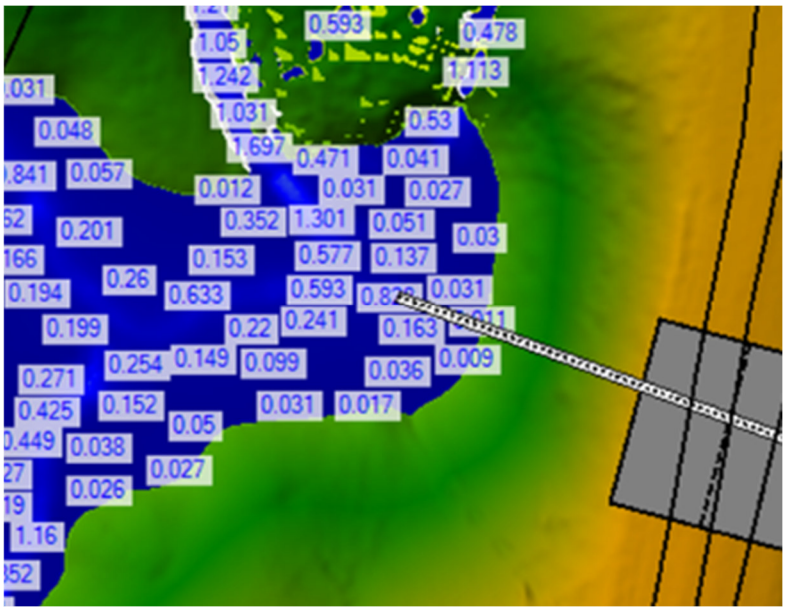


Figure 2 - Velocities around culvert inlet in 10 year peak (including Climate Change)

Table 1: Maximum Velocities for Erosion Control

Material	Maximum velocities for erosion control in unlined channels[a] ($m\ s^{-1}$)
Fine sand, colloidal	0.5
Sandy loam, noncolloidal	0.5
Silt loam and Alluvial silt, noncolloidal	0.6
Ordinary firm loam	0.8
Volcanic ash	0.8
Stiff clay and Alluvial silt, colloidal	1.1
Shales and hardpans	1.8
Fine gravel	0.8
Graded loam to cobbles, noncolloidal	1.1
Graded silt to cobbles, colloidal	1.2
Coarse gravel	1.2
Cobbles and Shingles	1.5
Tussock type grasses[b]	0.5–1.3
Couch, carpet and sward –forming grasses[b]	1.4–2.0
Kikuyu grass[b]	1.9–2.5

Figure 3 - Table 1 from Hydraulic Energy Management:TR2013/018

Therefore, we do not believe that rip rap around the inlet is necessary and we consider that it will not provide the anticipated benefit in the request.

NZTA has also stated that it anticipates that a culvert relief inlet riser will also be needed. We do not agree with this recommendation. Introducing a secondary inlet riser could significantly alter headwater control and flow distribution—potentially compromising the culvert's designed performance. We recommend retaining the existing single-inlet arrangement . We also note in our response to concern number 2 (see below), that the risk of blockage due to debris from this specific catchment, is very low due to the total removal of existing pine plantation prior to the earthworks being undertaken, and the

monitoring by the proposed Resident's Society.

For these reasons, we do not recommend adding a secondary inlet.

2. Slash and debris

Response –

All existing pine stands within the development boundary will be felled in their entirety, with both timber and slash (branches and roots) removed from site prior to any earthworks. Removal of slash and debris is required to enable cut and fill works to commence, and are a geotechnical requirement. This proactive removal of potential debris will significantly reduce the risk of slash blocking culverts or entering the downstream network.

Once the subdivision is complete, all streams within existing and proposed covenanted bush areas, will be maintained by the residents' society rather than by individual lot owners. The society will engage a contractor on call to clear any blockages in the streams within the development.

Therefore we do not consider it necessary to construct a secondary inlet into the NZTA culvert system referred to in the NZTA comments.

Structures comments: Peter Withers

3. Bridges & Culverts

Structures	9/06/2025 – David Withers
Bridges & Culverts (>3.4m2)	MAJOR CONCERN IS RAISED about the runoff from the new development entering the watercourse that leads to Orewa Deep River Culvert BSN 3900 which is believed to be inadequate for the water flows expected with the project attenuation being designed to only meet 10% AEP for hydrologic neutrality. A full assessment of the adequacy of the culvert in the flow path to accommodate the 1% rain event flows is required, and upgrade of the asset or redesign of the attenuation for the project to be suitable. The new connection into Grand Drive has been reviewed at length and I still have not seen final approval for structural widening of bridge planned. Do we know when this is going ahead?

Response -

It's not clear exactly which "structural" concern is raised, so we have addressed the hydraulic capacity aspect only.

The culvert (BSN 3900) currently operates under elevated headwater conditions—which in practice attenuates peak flows to the downstream network. This is documented in many flood reports, and is shown on Auckland Councils GIS system.

We have completed a detailed 2D hydraulic model showing that, although upstream water levels rise slightly as a result of the development (by 140mm), there is no increased flood risk to existing properties or to the network. This assessment is addressed in the Delmore Flood Assessment Report

We cannot comment on the structural widening of the bridge. This is covered in other responding memos.

4. Summary

- Due to the very low velocities, we do not believe additional riprap at the NZTA culvert system identified in NZTA's comments will provide the anticipated benefits. We therefore do not think this is required.
- The removal of slash generating vegetation, and of debris left from the removal process, will significantly decrease the risk of debris buildup, the residents society being responsible for the riparian planted margin maintenance, and the absence of a debris screen make the risk of blockage low.
- Therefore a secondary inlet to be constructed in case of primary inlet blockage, is not considered to be necessary.