

## Memorandum

<b>Date:</b>	19/12/2025
<b>To:</b>	Vineway Ltd
<b>From:</b>	[REDACTED]
<b>CC:</b>	[REDACTED]
<b>Project Number:</b>	P05513
<b>Reviewed by:</b>	[REDACTED]
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### Subject: Delmore Development - Geomorphic Response Memo

Vineway Ltd are applying for consent under a fast-track application for a proposed development within the Ōrewa River West catchment.

Following recent correspondence from Council, including feedback from Freshwater Ecology (Antoinette Bootsma), and the outcomes of the Culverts and Stormwater workshop meetings, this memo sets out Morphum's response to the matters raised.

#### Background and purpose

Morphum prepared and issued a Geomorphic Assessment Memo<sup>1</sup> in support of the consent application. Following that deliverable, Council's Freshwater Ecology team raised specific queries relating to culvert locations near wetlands, potential changes in flow velocities, and the relationship between culvert design and the geomorphic risk assessment.

The purpose of this memo is to address the freshwater ecology feedback raised by Council, particularly in relation to the identified culverts, and to reflect this within the geomorphic documentation supporting the consent application. This includes:

- Discussion of culvert locations in proximity to wetlands and relevant geomorphic reaches.
- Consideration of pre- and post-development velocity information in the context of erosion and scour risk.
- Confirmation of consistency between the geomorphic assessment and the current culvert design information, including the most up-to-date culvert drawings prepared by McKenzie & Co.<sup>2</sup> and relied upon in the assessment.

This memo complements the existing Geomorphic Risk Assessment and should be read in conjunction with it.

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<sup>1</sup> Delmore Development Geomorphic Assessment (Morphum, 20 November 2025)

<sup>2</sup> Stormwater Culvert Layout Drawings 3725-1-4800 to 3725-1-4812, Rev. G (McKenzie & Co., 3 December 2025)

## Geomorphic Context and Assessment Approach

The geomorphic assessment identifies that wetlands and some reaches within the study area are sensitive to geomorphic adjustment, particularly if there are changes in channel grade and flow energy. Across all reaches, the key geomorphic recommendations to be applied are:

- Maintaining existing channel grade, particularly where wetlands are sustained by current hydraulic controls.
- Minimising changes to flow velocity and energy through culvert embedment and alignment.
- Avoiding conditions that may trigger incision, channelisation, or upstream propagation of geomorphic adjustment.

The following sections respond to the freshwater ecology comments raised by Council, which are based on the findings of the Geomorphic Risk Assessment and the proposed culvert layouts. Accordingly, the assessment focuses on whether the proposed culverts are consistent with the geomorphic recommendations.

Figure 1 provides an overview of the stream network and culvert locations relevant to this assessment. The figure is based on the stormwater culvert layout prepared by McKenzie & Co and the geomorphic assessment prepared by Morphum.

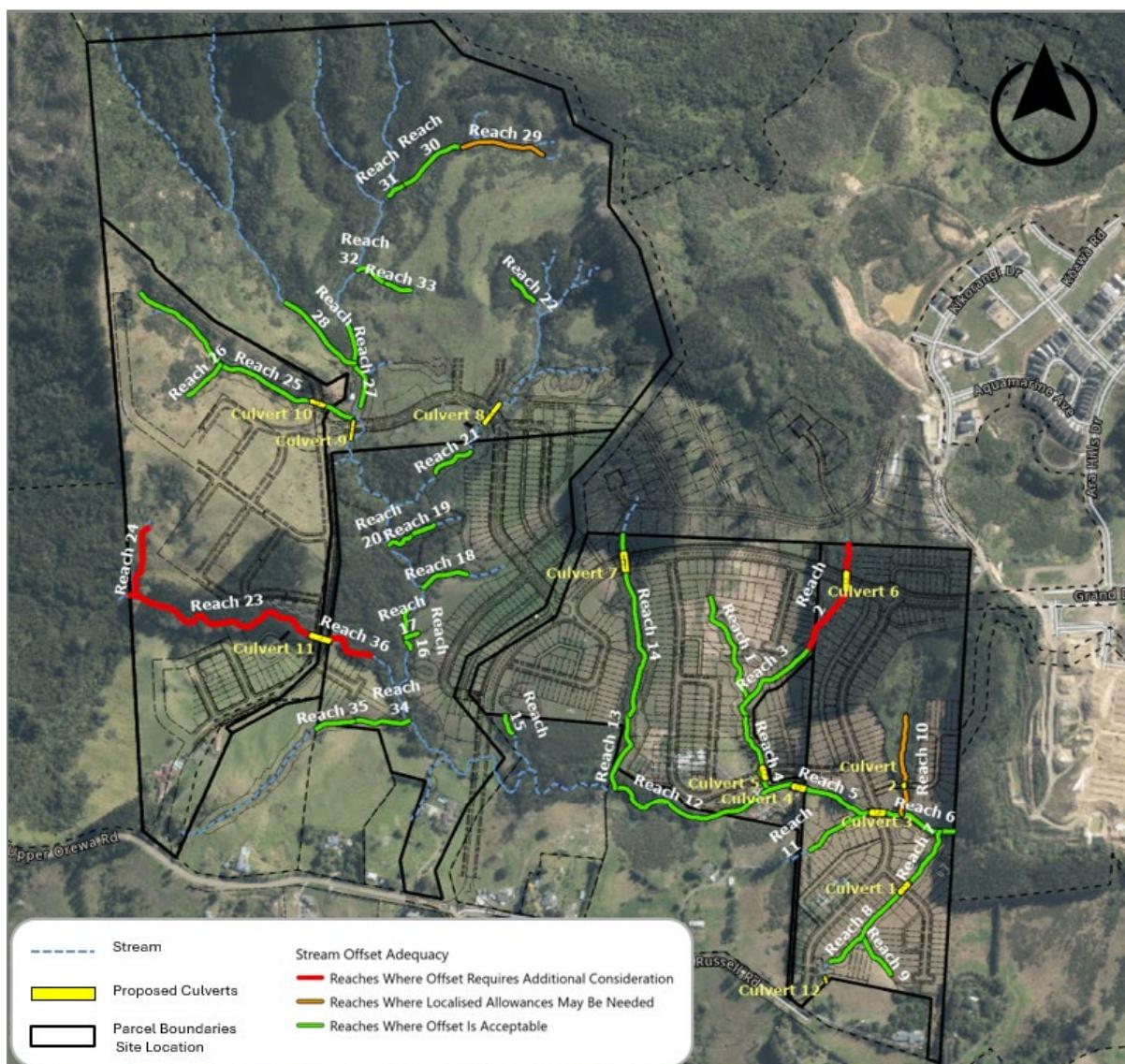


Figure 1. Stream network and culvert locations.

Source: Stream network and reaches based on the Delmore Development Geomorphic Assessment (Morphum, 20/11/2025) and culvert locations from the stormwater culvert layout (McKenzie & Co., 03/12/2025).

## Reach-Specific Geomorphic Considerations

### Reach 4 – Existing farm culvert and proposed Culvert 5

*Council comment (Freshwater Ecology – Antoinette Bootsma):*

*"Reach 4 – Geomorphic assessment identified that the upstream wetland is sustained by the existing culvert and is sensitive to changes that may create a preferential channel. This is relevant to proposed culvert 5."*

*Response:*

The Geomorphic Risk Assessment identified Reach 4 as an incised reach where the upstream wetland (Reach 3) is sustained by an existing culvert and associated bunding. The assessment noted that this wetland is sensitive to changes that may create a preferential channel, particularly if the existing culvert were removed.

The proposed Culvert 5 is located further downstream of the wetland area. Based on its location, no direct impact on the upstream wetland is anticipated.

The geomorphic sensitivity identified in the assessment primarily relates to the existing farm culvert near the Reach 3/4 boundary. If this culvert is removed or modified, it is important that the hydrological conditions created by the existing culvert and downstream bunding are maintained, including allowance for upstream ponding and protection of the stream bed currently provided by the culvert structure.

Where these conditions are maintained, based on the current design information, the risk of wetland channelisation identified in the Geomorphic Risk Assessment is expected to be low.

### Reach 7 – Culvert 1 and knickpoint considerations

*Council comment (Freshwater Ecology – [REDACTED]):*

*"Reach 7 – Geomorphic assessment identifies the risk of upstream migration and culvert undermining. This is relevant to culvert 1."*

*Response:*

Reach 7 was identified in the Geomorphic Risk Assessment as a transition from an incised to a non-incised channel. Knickpoints were identified in the approximate location of the culvert (and will effectively be removed as part of culvert construction) and downstream of the culvert. Under existing conditions, the knickpoint is expected to migrate upstream, however, the rate of upstream migration is unknown..

The proposed culvert in this reach is embedded, and post-development velocities are similar to pre-development conditions. On this basis, the culvert is not expected to exacerbate the existing knickpoint migration process.

Knickpoint migration within this reach is recognised as a natural geomorphic process. Ongoing monitoring is recommended as part of stormwater management, with remediation to be undertaken if upstream knickpoint migration is at risk of undermining the road culvert. The proposed culvert design does not introduce additional drivers that would accelerate this process beyond existing conditions.

### Reach 17

*Council comment (Freshwater Ecology – [REDACTED]):*

*"Reach 17 – Geomorphic assessment finds that this reach is incising. There is the potential for upstream incision to continue. This is relevant to wetlands associated with proposed culvert 7."*

*Response:*

The Geomorphic Risk Assessment identified Reach 17 as an incising reach, reflecting an ongoing natural geomorphic process. This condition was considered in the assessment, and the associated offset was classified as acceptable.

This reach does not include wetlands or proposed culverts. Accordingly, no specific culvert-related geomorphic concerns have been identified for this reach.

## **Culvert 7 – Reach 14 geomorphic considerations**

Culvert 7 is associated with Reach 14. The Geomorphic Risk Assessment identified this area as having moderate instability, with a valley-bottom setting that includes wetland areas and sections of defined channel. Previous geomorphic advice relating to potential stream incision was provided to the geotechnical team and has since been incorporated into the updated stability modelling for this reach.<sup>3</sup>

Based on the location of the proposed Culvert 7 in relation to Stream 14, no specific geomorphic concerns have been identified in relation to the culvert itself. The proposed culvert includes embedment and is associated with post-development outlet velocities that are lower than existing conditions. As a result, channel grade is expected to be maintained, and no increase in erosion or wetland channelisation risk is anticipated relative to the pre-development scenario.

## **Reaches 27 and 28 – Culverts 9 and 10 and wetland stability**

*Council comment (Freshwater Ecology – [REDACTED]):*

*"Reach 27 and 28 - Potential for channelisation if and loss of wetland if stormwater regime changes. This is relevant to proposed culverts 9 and 10."*

*Response:*

Reaches 27 and 28 were identified in the Geomorphic Risk Assessment as wetland systems with potential for channelisation if the stormwater regime were to change. The geomorphic recommendation for these reaches is to maintain a low-energy wetland environment.

The proposed culverts (9 and 10) are embedded and are associated with reduced post-development velocities compared to existing conditions. On this basis, no increase in geomorphic risk to the wetlands is anticipated from the proposed culverts. Maintaining the hydrological conditions created by the existing downstream culvert and bunding arrangements remains important to preserving wetland function and stability.

## **Conclusions**

This memo responds directly to Council's freshwater ecology comments by clarifying the relationship between the proposed culverts and the geomorphic risks identified in the Geomorphic Risk Assessment. In summary:

- Reach 4: The proposed Culvert 5 is located downstream of the upstream wetland and is therefore not expected to affect wetland stability. Provided the hydrological conditions currently supported by the existing farm culvert and bunding (Reach 3/4 boundary) are maintained, no increase in wetland channelisation risk is anticipated.
- Reach 7: Knickpoints within this reach are expected to migrate upstream over time under existing conditions. The embedded proposed Culvert 1 and similar pre- and post-development velocities are not expected to exacerbate knickpoint migration beyond existing conditions.
- Reach 17: This reach reflects a natural incision process previously assessed, with the associated offset classified as acceptable. No wetlands or proposed culverts are present, and no culvert-related geomorphic concerns arise.
- Stream 14: The valley-bottom setting includes wetland areas and weakly defined channel sections. Based on the proposed Culvert 7 location, embedment, and reduced post-development velocities, channel grade is expected to be maintained and no increase in erosion or wetland channelisation risk is anticipated.

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<sup>3</sup> Riley Consultants Ltd., email correspondence ([REDACTED]), 3 and 13 November 2025.

- Reaches 27–28: These low-energy wetland systems are sensitive to flow changes. The embedded proposed Culverts 9 and 10 and reduced post-development velocities are not expected to increase geomorphic risk to the wetlands.

Overall, the proposed culvert layouts are consistent with the geomorphic risk framework previously provided and do not introduce additional geomorphic risks beyond those identified in the Geomorphic Risk Assessment.

## Limitations

This assessment is based on the reach and catchment conditions at the time the work was carried out. It does not account for any further development of impervious areas in the catchment, beyond what is shown for the proposed development. The assessment was limited to streams within the subject site and does not account for threatening processes occurring up or downstream. No quantitative modelling has been undertaken and the conclusions from this assessment are based on observations only.

## Disclaimer Statement

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