Resource Consent Applications for subdivision and land use for a rural lifestyle development at Horahora Road, Lake Karapiro

K & L Tylee

Applicant

South Waikato District Council

Consent Authority

STATEMENT OF EVIDENCE OF

Arthur John Rowland Male

STORMWATER

Dated: 7.10.2026

Counsel Acting:
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1. Witness introduction, qualifications and experience

1.1 My full name is Arthur John Rowland Male. I am a Principal Water Resources Engineer at Te Miro Water Consultants Limited (TMW) and a Director at Aquaviser Ltd.

1.2 I have the following qualifications and experience relevant to the subject matter of this evidence:

(a) I have a Master of Science (Hons) degree in physical geography, with research in hydrology and water resources from the University of Auckland and I have 50 years' experience in water resources research and consulting.

(b) I am a member of Water New Zealand and the Rivers Group of Engineering NZ.

(c) I have appeared as an Expert Witness in numerous Council and Environment Court hearings, as well as a Board of Inquiry.

(d) I have been involved with flood estimation throughout my whole career. Land development stormwater matters and flood modelling became a large part of my career from 1987 onwards with consulting roles in Australia and New Zealand for large consultancies and my own practice. In the last twenty years I have held water resources leadership roles at GHD and Aurecon, was the Auckland water sector leader at URS and from 2016 to 2022 the NZ water leader at AECOM. Since that time, I have been a sole practitioner and from 2025 an employee at Te Miro Water.

(e) I have undertaken numerous projects for land development and preparing stormwater management plans. This work was either as the flood modeller, project manager, project director or peer reviewer. This work was undertaken in Australia and throughout New Zealand from the upper parts of Northland down to Central Otago.

1.3 TMW was engaged by K & L Tylee (the Applicant) to prepare the stormwater assessment and management approach for the proposed development, and later by the Applicant's surveyor, Cogswell Surveys Ltd, to prepare an Addendum memo to reflect the changes in earthworks surface. I have been involved in this project since 2026.

2. Code of Conduct for expert witnesses

2.1 I have read the Code of Conduct for expert witnesses in the Environment Court Practice Note 2023. In preparation of this evidence, I have complied with, and during these court proceedings I will comply with, that Code of Conduct. My evidence is within my area of expertise except where I am relying on the evidence of another witness, as stated in my evidence. I have not omitted to consider any material fact known to me that might alter or detract from any opinion expressed.

3. Scope of evidence

3.1 My evidence addresses the following matters:

(a) A summary of the stormwater solution TMW has prepared for this application;

(b) Amendments to the Applicant's proposal since those reports were prepared;

(c) The assessment of the current proposal;

(d) Responses to submission points relevant to stormwater;

(e) Responses to s42A report issues relevant to stormwater; and

(f) My conclusions.

4. Reports I have prepared or reviewed

4.1 TMW has prepared the following reports for this application:

(a) Stormwater Management Plan, Horahora Road (R001, version 1.3, 22 August 2025; file reference V5) (SMP). The SMP was first issued on 10 December 2023 in support of the land use consent application to South Waikato District Council. It was updated on 28 May 2025, and again on 22 August 2025 in response to Waikato Regional Council's section 92 request on the discharge consent application (APP147638), covering wetlands and outlet structures.

(b) Horahora Road Discharge Consent Application APP147638 Section 92 (Riprap Sizing) memo (22 August 2025) (Riprap Memo), prepared by Arun Gopi of TMW, and appended to the SMP.

(c) Horahora Road Stormwater Design, Revised Earthworks Addendum Memo (19 June 2026) (Addendum), prepared by Arun Gopi of TMW and reviewed by Mike Chapman.

4.2 **Site.** The site is approximately 46 ha of farmland in the Rural Residential Zone on the eastern bank of the Waikato River, between the Arapuni and Karāpiro dams. Ground levels fall from about 75 m RL to 55 m RL, with the river at about 50 m RL. The site is crossed by ancestral drainage channels which now form overland flow paths.

4.3 **Soils.** The soils are pumice sands, silts and gravels of the Taupo Pumice Formation. Soakage is generally good for stormwater disposal. Testing shows infiltration rates of between 68 to 792 mm/hr, averaging about 500 mm/hr. No groundwater was encountered in boreholes. These soil loss rates make soakage the natural primary disposal method.

4.4 **Stormwater Summary.** The SMP manages stormwater as follows:

(a) Each private large lot will have non-contaminating roof materials with rainwater harvesting tanks. Rain tank overflow and runoff from other hard surfaces on private property will discharge to on-lot soakage trenches. Runoff from private driveways may also be via sheet flows into adjacent permeable grassland. No direct outlets are proposed from private roof or driveway areas to the roadside swale network.

(b) Internal road runoff drains via flush kerb to adjacent grassed treatment swales. The roadside swales are sized and designed to treat the water quality flows as well as provide initial abstraction and extended detention by soaking the 10-year ARI rain event to ground.

(c) Soakage is achieved via underdrains and a rock drainage layer. Effectively runoff from the road impervious area drains to the adjacent swale resulting in no increase in volume to the Waikato River replicating the existing natural condition.

(d) Upstream catchment flows are carried safely through the site via the swale network with appropriate easements and consent notices in place. The roadside swales are designed to convey high flows up to the 100-year + climate change (RCP 6.0). They discharge to the existing receiving environments, the Waikato River and an unnamed tributary, mimicking natural runoff patterns. The 100-year conveyance is shown in the flood modelling maps in the addendum memo based on the final design surface.

(e) Appropriate rock riprap sizes and apron are provided for each outlet, with spreader bars where flows are dispersed. No impact on the

riverbank and no piped outlets and headwalls to the river are proposed.

(f) The natural wetland is retained within Lot 37. The SMP shows the hydrological catchment is maintained with no change in base flow given the scheme plan and earthworks surface maintain the current catchment area.

4.5 **Addendum.** The TMW Addendum memo reviewed the revised scheme plan (26 May 2026) and earthworks design (received 11 June 2026) to check whether they require changes to the SMP approach. Overall retaining more of the existing landform as per the addendum supports best practice stormwater approach. The key changes were:

(a) The existing gully is retained as a planted reserve and secondary flow path, and Road 1 now discharges into the gully rather than through Reserve Lot 37.

(b) A new 750 mm culvert under Road 1 connects the reserve areas BB and BC. TMW hydraulic analysis shows the culvert has capacity to convey 100-year storm flow, without overtopping Road 1.

(c) Swale 13 is realigned through Lot 27 to a terrace in Lot 29, diverting road overland flows away from Lots 25 and 26. Final rock rip rap outlet protection will be finalised at detailed design.

(d) The updated 100-year ARI flood model shows reduced ponding within the development. Some shallow localised ponding remains within lots, so building platforms are to be located outside the 100-year ARI ponding areas, with floor levels set at building consent stage from topographic survey (not LiDAR) and freeboard meeting both the Building Code (E1/VM1) and NZS 4404.

4.6 The Addendum concluded that the changes are refinements to the engineering layout and earthworks, and that the fundamental stormwater management approach remains consistent with the SMP.

5. Stormwater Specific Controls

5.1 **Runoff volume.** Road and lot runoff is designed to be detained and soaked to ground up to the 10-year ARI event. In my opinion there is therefore no increase in runoff volume to the Waikato River for those events. Larger events up to the 100-year event including upstream flows are conveyed by swales to the existing receiving environments as per the existing condition.

5.2 **Water quality.** Road runoff is treated in grassed swales before soakage, and roof-derived contaminants are avoided at source through non-contaminating roof materials.

5.3 **Erosion and the river.** Most of the storm events discharge to ground, so outlet erosion protection is only engaged in larger events. All outlets are within the site with riprap aprons and spreader bars, and no pipes or headwalls in the riverbank are proposed. In my opinion, consistent with the SMP, the effects of stormwater discharges on the riverbed and river morphology are minor to not measurable. Riverbank slope stability is a geotechnical matter outside my evidence.

5.4 **Flooding.** Upstream flows are conveyed through the site, and the Addendum modelling shows reduced ponding. Locating building platforms outside the 100-year ARI ponding areas, with floor levels set from survey and freeboard at building consent stage, manages residual flood risk to dwellings. Further landscape contouring could be considered to further reduce ponding at detailed design stage.

5.5 **Maintain Wetland Hydrology.** The SMP showed the post-development catchment to the Lot 37 wetland increasing from 1.65 ha to 2.99 ha because of the swale and road layout. The wetland is likely also fed by seepage from the upper terrace, to which soakage will contribute.

5.6 **Te Ture Whaimana.** As the SMP concludes, returning rainfall to ground, filtering road runoff, and avoiding piped outlets to the river aligns the stormwater design with Te Ture Whaimana o Te Awa o Waikato.

5.7 The remaining matters for detailed design are final swale geometry, grades, inlets and outlet protection (including the realigned Swale 13), the road crossing arrangement for secondary flows, and an operation and maintenance plan. Building platform locations and floor levels are to be set from topographic survey at building consent stage.

6. Responses to submission points relevant to this evidence

6.1 I have read the submissions. Three raise stormwater matters, and I respond to each below.

6.2 **P Martin (paragraph 10)** is concerned about the likelihood of sewage and stormwater or wastewater overflowing into the Waikato River, and the effect on its water quality.

6.3 **TMW Response:** No piped discharge to the river, and no pipe outlet or headwall in the riverbank, is proposed. Road runoff is treated in grassed or planted swales and soaked to ground up to the 10-year ARI event. Roof runoff goes to rainwater re-use tanks, which overflow to soakage trenches in accordance with NZBC E1. Driveway runoff sheet flows to adjacent land within the site or to soakage trenches, both of which treat the minor sediment load from driveways.

6.4 Runoff from the development leaves the site only in events greater than the 10-year ARI, via swales to the same receiving environments as the current condition, with erosion protection at each outlet. Upstream catchment flows continue to pass through the site as they do now. The sewage and wastewater aspects of this submission are outside my expertise and are addressed in reports by GWE consulting engineers. **C and J Hogg (item 1)** are concerned that the change from permeable rural land to high-density impervious surfaces will significantly increase stormwater runoff volumes and risk discharging contaminants (heavy metals, hydrocarbons and agricultural residues) into the Waikato River catchment, undermining Waikato Regional Council's water quality targets. They also raise the cumulative effect of on-site wastewater systems on groundwater.

6.5 **TMW response** (7.6-7.8)**:** The development is not high density: it is a large lot rural residential subdivision. The additional runoff from roads is held and soaked in the swales, and roof and hard surface runoff is managed on each lot through tanks and soakage. In my opinion there is therefore no increase in runoff volume to the river for events up to the 10-year ARI. Secondary flows up to the 100-year event follow overland flow paths to outlets within the site, each with riprap erosion protection.

6.6 Managing flows and water quality treatment at source within roadside swales is considered a best practice approach within the Waikato Regional Council stormwater management guideline.

6.7 On contaminants, roof-derived contaminants are avoided at source through non-contaminating roof materials, and road runoff is treated by filtration through swales before soakage. The submitter's concerns about on-site wastewater systems, and their effects on groundwater, are outside my expertise.

6.8 **Bates Family Trust (paragraph 33)** states it is not clear from the stormwater design how roadside swales will accommodate the Waikato River Trail without compromise to users.

6.9 **TMW Response:** Whether the trail is to be provided within the site is a matter for the Applicant. If it is, in my opinion the trail should be located outside the swales, parallel to them between the swale and the boundary fence. That keeps the swales free to treat, soak and convey flows, and keeps trail users out of the flow path.

7. Responses to s42A report issues relevant to this evidence

7.1 The stormwater aspects of the s42A report have been considered and generally there is support for the low impact approach to stormwater management. Further there is acceptance that the design details will be resolved at detailed design stage.

7.2 Ensuring compliance of stormwater infrastructure and performance along with ongoing maintenance is raised as a concern. It has now been resolved with Council. Assets will be owned by individual landowners who have assets on their lots. A consent notice will be registered on all affected lots which will outline the preservation of the overland flow paths without any alteration to the ground surface or without construction of any buildings. The culvert under the road in stage 3 will be Council managed and these matters can be covered with consent notices.

7.3 The proposed consent conditions requiring a stormwater management plan, design, construction and certification are accepted as an appropriate means of ensuring system performance and condition.

8. Conclusions

8.1 In my opinion:

(a) The SMP, as refined by the Addendum, treats and returns road runoff to ground for events up to the 10-year ARI. The swales also convey larger and upstream flows to the existing receiving environments as peer the current situation, with appropriate erosion protection at outlets within the site.

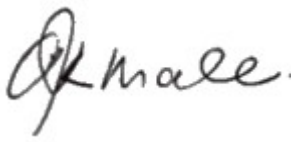
(b) The stormwater solution is relatively simple and responds appropriately to the existing landform and large lot density.

(c) Residual flood risk to dwellings is managed by locating building platforms outside the 100-year ARI ponding areas and setting floor levels from survey, with freeboard meeting the Building Code and NZS 4404.

(d) The stormwater matters raised by P Martin, C and J Hogg and the Bates Family Trust are addressed by that approach.

(e) The remaining matters can be resolved at detailed design stage, when the final ground surface is known and engineering design completed, which will inform any requirements at building consent stage.

Dated:7th October 2026



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Arthur John Rowland Male