

Response to Panel Request – FTAA-2603-1181 - Mt Welcome, Pukerua Bay, Porirua

Document

Title	FTAA-2603-1181 - Mt Welcome, Pukerua Bay, Porirua – Response re Applicants Additional Stormwater Modelling
Location	• Pukerua Bay, Porirua
Authors	Zeean Brydon, Consultant Peer Reviewer, Land Development Consenting
Status	Final
Version	1.0

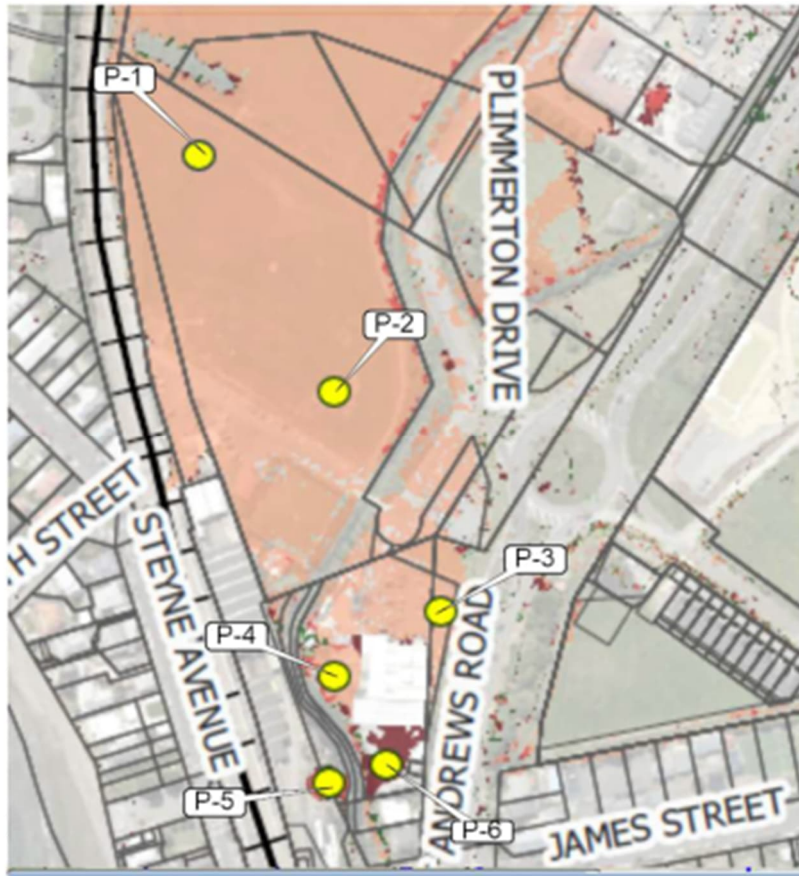
Item [13] – Extended Flood Modelling

1. Additional Stormwater Flood Modelling was provided by the applicant on the 12 September 2026 in response to Minute 18, Item [13], being:
 - Memo: Response to Expert Panel Minute 18 [P13], authored by Kyle Dirse, dated 07 September 2026, Ref 1753-02
 - Memo: Extended Flood Modelling – Taupo Swamp, authored by Kyle Dirse, dated 08 September 2026, Ref 1753-02
 - Appendix 4 – 1753-02 Mt Welcome Flood Maps Full Model 72 hrs.
 - Appendix 5 – 1753-02 Mt Welcome Flood Swamp Long Profile 72 hrs.
2. The panel confirmed that Tiaki Wai could liaise directly with the applicant regarding the additional modelling and the following queries were provided to the applicant on the 10.09.26, being:
 - a) The Tiaki Wai modelling team were concerned that the way the Mt Welcome development has been included into the broader model would result in different flow values at the top end, consequently the applicant was asked to provide:
 - i) a direct comparison between flows from the validation Lines in Figure 2 in the *Extended Flood Modelling – Taupo Swamp* doc and the Cut-off Lines in the original *Flood Risk Assessment* doc – Figure 5.
 - ii) pre-development and post-development flows (clearly labelled as such) for the full model and for the cut-off model.
 - iii) more detail around the model results from the river reach adjacent to the Palmers Garden Centre (Figure 6 in the new report). While the flows through the upstream bridge and downstream culvert do suggest there is a roughly equivalent amount of water going through the area, it

would be useful to see what the modelled water level is in the cross sections of the river reach.

- b) The Tiaki Wai modelling team noted that there is a significant amount of water in the 2D domain that is bypassing the bridge and culverts, consequently the applicant was asked to provide:
 - i) timeseries results for depth at a set of points one the domain and near the Palmers Garden Centre (see below for suggest locations) – pre and post development.
 - c) Tiaki Wai modelers were also interested to know if the applicant has re-run the post-development simulation to see if the instability is repeatable, in which case, it may not be an instability.
3. In response to this enquiry an additional memo; Response to Tiaki Wai Flood Modelling Queries, authored by Kyle Dirse, dated 10 September 2026, Ref 1753-02 was provided and further additional information was provided by email (Attachment A).
4. The results indicate flood-level increases of 4–84 m m within Plim merton (table below), however Tiaki Wai note that the recorded difference for Pt 6 is different from the mapped difference (36 m m report vs 200 m m mapped),
5. The applicant concludes that the increases are localized, do not materially increase the downstream flood risk within Taupō Swamp or Plim merton and that no additional properties are flooded.

	Provided Model	Provided Model + Mt Welcome	Difference	Difference
Location	Max (m)	Max (m)	(m)	(mm)
P-1	1.347	1.351	0.004	4
P-2	1.303	1.316	0.013	13
P-3	0.446	0.479	0.033	33
P-4	0.228	0.312	0.084	84
P-5	0.000	0.061	0.061	61
P-6	0.563	0.599	0.036	36



6. The differences between the reported and mapped results were discussed with Mr. Dirse via email. the current approach of combining ecological mitigation with stormwater management through proposed retention wetlands. Key concerns include the absence of a clear options and safety-in-design assessment, staging risks, maintenance access, pre-treatment requirements, co-location of Rain Garden 01 within a flood management area, and the proposed retention wetland D arrangement. If consent were granted on the current design, Tiaki Wai would not support vesting of these assets or transfer of associated operational stormwater responsibilities unless the identified matters were resolved to its satisfaction.. Dirse remains of the opinion that the differences are a result of instability in the 2D model.
7. With respect to the model, Tiaki Wai's position is that:
 - The statement that the difference between the reported and mapped results is a result of an instability in the model is not fully substantiated. It is possible that this represents a 'real' increase.
 - The statement regarding the model instability could be resolved through additional modelling using a shorter save step or revising the geometry of the 2D network. Tiaki Wai modellers are happy to meet with the applicant to review the modelling requirements.
 - With regards the on-site flood modelling Tiaki Wai's original comments (Clauses 83, 84, 89 and 90) have not been satisfactorily addressed.
 - No allowance has been made within the modelling for planting within the proposed 'retention wetlands.'
8. With respect to the conclusions made by the applicant, Tiaki Wai's position is that:

- The conclusion that the increase can be accepted is inconsistent with the outcomes outlined in the Northern Growth Area structure plan and as accepted as appropriate by the EPA Expert Consenting Panel for Plim merton Farm Stage 1 where betterment was conditioned. It is considered therefore that the minimum standard for stormwater management should be no increase in flooding within Plim merton.
- However, the modelling is accepted as being sufficient to demonstrate the principles of the proposed on-site stormwater management.
- Tiaki Wai note that further modelling may be required because of the conclusion of the current stormwater management review (Minute 19).
- If the panel is minded to grant the consent based on the information provided then it is recommended that the required outcome secured through a condition requiring flood modelling to be presented to support an application for Engineering Approval.

9. The wording below is offered as an example of the wording used for the Plim merton Farms consent. A place holder has been left (yellow highlight) within the condition to set the requirements for the Kakaho East catchment based on an assessment of the sensitivity of the receiving environment to effects associated with increases in peak flow, velocity and channel forming flows which remains outstanding.

Proposed Condition:

Engineering Approval – Stormwater Detention - Flood Modelling Report and Design Outcome.

The consent holder must ensure the following design criteria are achieved in the final Flood Modelling Report (FMR) and design:

- a) *The post-development flood models must demonstrate that in the 10-year event and 100-year event the proposed stormwater detention system achieves:*
 - i. *no increase in off-site flooding within the Plim merton (within the Taupō Swamp catchment).*
 - ii. *no increase in peak off-site flood flows within the Kakaho Catchment,*
 - iii. *no increase in flood depth, velocity or peak flow at the development boundary.*
- b) *Any proposed increase in Kakaho East Catchment must be demonstrated to have a less than minor effect on the receiving environment with respect to scour, erosion and channel forming flow such as may increase sediment load within the receiving environment.*

Advice Note a) to c): The modelled events that confirm the outcomes in the table above must be the 12-hour rainfall event with allowance for climate change, coincident tidal and rainfall peaks and no model 'warm up' period. The rainfall and climate change allowance must be in accordance with Wellington Water Limited's Reference Guide for Design Storm Hydrology: Standardised Parameters for Hydrological Modelling (2019).

- c) *The post-development flood models must include the following assumptions:*
 - i. *All roads and commercial areas are 100% impervious surfaces.*
 - ii. *Residential developable areas are 70% impervious surfaces.*

Advice Note: These assumptions must be used in the sizing and capacity of hydraulic neutrality systems to ensure they manage stormwater flows effectively for the entire consented development. These impervious values are nominated to ensure a conservative flood model and do not represent impervious targets for water sensitive design.

- d) *Design Assumptions for the 'retention' Wetlands: The updated modelling must consider the wetland plant species, plant density and final revised ground level within the 'retention' Wetland.*

Advice Note: For (c) above, the updated modelling shall apply a reduction factor of 0.75 (or a 25% reduction) to account for the expected wetland plant species.

Item [13] – Potential Loss of On-Site Storage Due to Sediment Accumulation

10. The applicant's response discusses loss of volume within both the Taupō swamp and the proposed Mt Welcome Retention wetlands.
11. Tiaki Wai consider that it is important that any increase sedimentation risk is managed on site without being allowed to impact on the Taupō Swamp and consequently an assessment of the impact of sediment loss on Taupō Swamp is not necessary. We note however that a direct comparison of the 2013 and 2023 Lidar Data to conclude that the storage available in the swamp is greater than the model allows has not been verified through modelling, acknowledging that modifications were made to the swamp during the modelling process to verify the model.
12. In terms of the applicant's response regarding potential storage loss within the proposed retention wetlands, the applicant has provided the following assessment:

Pond	Permanent pool (m³)	Storage used to 1% AEP (m³)	1% AEP to spillway (m³)	Available sediment storage, prior to spill way (m³)
Retention A	770	2,910	2,020	2,790
Retention B	480	4,500	5,720	6,200
Retention C	720	3,330	2,900	3,620
Retention D	50	130	81	131
Retention E	1,090	7,060	3,500	4,590

Figure 1 shows Retention Wetland B as an example. The dark blue bands are the permanent pool storage below the outlet and the storage above the 1% AEP level up to the spillway; the purple band is the stormwater detention storage used to size the device. For Wetland B, 480m³ is provided below the outlet, 4,500m³ is used for stormwater detention, and a further 5,720m³ is available above the 1% AEP level before the spillway is engaged, consistent with the table above.

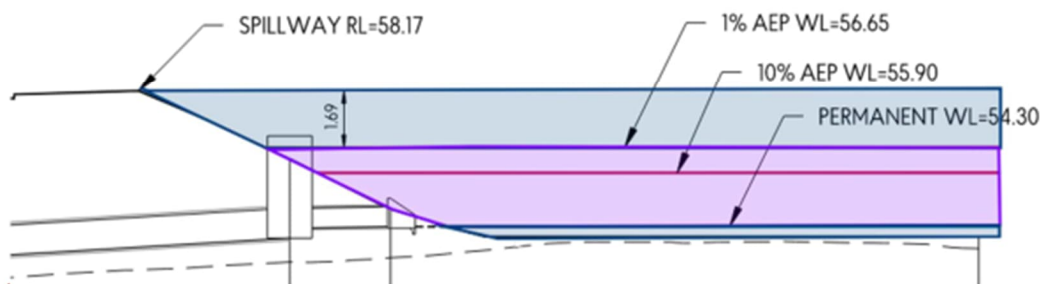


Figure 1

With the following conclusion:

- Sediment inflow is expected to be low once the development is established,

- Capacity is provided within the design for sediment accumulation within the permanent pool (below the PWL) with additional capacity by utilising the capacity between the 1% AEP water level and the spillway.

13. Tiaki Wai note that the:

- 1% storage volumes provided do not appear to match the volumes provided on the Wetland Construction set (1753-02 4300 R2 series), comments are therefore provided in principle only.
- the modelling is based on 95% 'porosity' – i.e. no allowance for plant growth within the wetland. By comparison modelling for Plim merton Farm included a reduction factor of 0.75 (or a 25% reduction for plant growth)¹

14. While assessment concludes that the proposed retention wetlands have Factor of Safety for storage of between 1.65 and 2.38 Tiaki Wai does not consider that this is sufficient to address the comments raised by Tiaki Wai regarding the long-term operation and maintenance of the proposed retention wetlands.

15. The assessment provided focuses on the available wetland storage volume, but does not adequately address:

- The rate at which sedimentation will occur – Whilst the assessment states that sediment inflow will be low this appears to be a comparison of pre and post sediment loading and is not considered to be substantiated. As per the Engineering Joint Witness Statement there is no agreement as to the rate at which sedimentation will occur.

The Engineering JWS agreed that sediment sources include not only roads and roofs, but also erosion from open watercourses downstream of the pipe outfalls, existing unstable slopes, ongoing farming activities and potential scour between the discharge points and wetland systems. It was also agreed that the existing modelling framework is not suitable for quantifying these short-term scour and sediment transport processes. Accordingly, there remains uncertainty regarding the actual quantity, timing and location of sediment deposition within the proposed wetland systems.

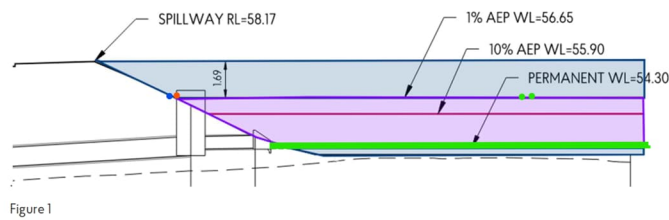
- The broader operation and maintenance of the system that is proposed to function simultaneously as a stormwater management asset and an ecological offset wetland.

While the applicant notes a considerable theoretical storage buffer, this assessment does not address broader operational and maintenance implications of sediment deposition within the system.

Sediment accumulation above the design permanent water level will impact on the outlet structure, culvert arrangement and fish passage. Using the example provided by the applicant (retention wetland B). Sedimentation above the green line (35 – 80 years as identified within the applicant's literature review) will impact on the existing outlet structure. Requiring either sediment renewal of the outlet structures and culverts, with new culverts required through the embankment, including for wetland B relaying a new culvert beneath the road and past the wastewater mitigation. Installation of

¹ CCC Wetland and Waterways Design Guide, Chapter 6 Stormwater Treatment Systems, CCC Simplistic Method for Wetland Sizing

new culverts through the embankments has the potential to compromise the embankment stability and may impact on fish passage if culverts are steepened.



16. It is Tiaki Wai's position that consideration of sediment management should therefore extend beyond a simple volumetric storage-loss assessment. The appropriate assessment should demonstrate how sediment will be intercepted, monitored and, where necessary, removed throughout both the construction build-out phase and long-term operational phase, while maintaining the functionality of outlet structures, hydraulic controls, fish passage provisions and ecological values.
17. In the absence of a dedicated maintenance facility, such as a forebay located outside the ecological offset area, Tiaki Wai remains concerned that sediment accumulation may progressively compromise the operational performance, maintainability and vesting suitability of the proposed stormwater assets.
18. This response aligns closely with the positions recorded by Tiaki Wai's and GWRC's experts in the Joint Witness Statement, particularly around:
 - erosion/scour from outfalls and gullies,
 - the importance of maintainable sediment capture infrastructure,
 - ecological wetland maintenance constraints,
 - and the need to protect stormwater asset functionality rather than simply preserve hydraulic storage volume.

Position Summary

19. Tiaki Wai does not accept that the applicant's additional modelling fully resolves the outstanding flood concerns but considers that consent could be supported if robust conditions require further flood modelling to support the developed design through Engineering Approval prior to start on site.

Tiaki Wai does not accept the applicant's position that the design presented allows for sediment accumulation within the proposed retention wetlands and our position, as outlined in our original comments, remains that we do not support the stormwater strategy as presented by the applicant with our key concerns being the absence of a clear options and safety-in-design assessment, staging risks, maintenance access, pre-treatment requirements, co-location of Rain Garden 01 within a flood management area, and the proposed retention wetland D arrangement. Our position remains therefore that if consent were granted on the current design, Tiaki Wai would not support vesting of these assets or transfer of associated operational stormwater responsibilities unless the identified matters were resolved to its satisfaction.