

In the matter of the Resource Management Act 1991

**Proposed
Plan Change 37 of the
Taupō District Plan**

Infrastructure evidence relating to:

**Drinking water
Wastewater
Stormwater**

Prepared by

Thomas Swindells

Michael Cordell

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Scope of this evidence

1. This evidence relates to infrastructure issues including the three waters provision to Taupō District Council Plan Change 37 - Nukuhau ('Project').
2. Drinking water evidence is provided by Thomas Swindells, Taupō District Council Asset Manager – Water.
3. Wastewater evidence is provided by Michael Cordell, Taupō District Council Asset Manager – Wastewater.
4. Stormwater evidence is provided by Colin Meadowcroft, Taupō District Council Consultant Civil Engineer – Stormwater.

Background

5. Plan Change 37 was notified on 3 February 2021. The plan change request seeks to change the zoning of 77.78 hectares of Rural Environment zoned land to a mix of General Residential and Medium Density Residential. It also seeks to provide a Neighbourhood Shopping Centre (Shops) overlay over an area in the proposed General Residential Zone and areas of stormwater and recreation reserves. These proposed zone changes will enable the future development of approximately 780 dwellings in an area identified in the Taupō District 2050 - Growth Management Strategy (TD2050) as a northern growth area.

Existing Nukuhau Drinking Water Context

6. The existing Nukuhau residential area is serviced by the drinking-water supply for Taupō. This consists of an intake from Lake Taupō, a treatment plant located on Lake Terrace, and a significant distribution network including pipelines, pump stations and reservoirs. Water supply to the existing Nukuhau residential area is fed by gravity from the Tamatea Reservoir which is located East of the Waikato River. Two network pump stations (Woodward and Nukuhau) lift water to the higher areas of the Nukuhau network.

Existing Nukuhau Wastewater Context

7. Wastewater from the existing Nukuhau residential area (Northern side of the Waikato River) is serviced by a predominantly gravity reticulation system and is conveyed over the Waikato River via two pipes attached to the Control Gates bridge. The wastewater flow is then combined with Taupō towns wastewater and is treated at the Taupō Wastewater Treatment Plant before disposal of treated wastewater to land irrigation.

Existing Nukuhau Stormwater Context

8. Taupō District Council provides stormwater services as part of the roading network or off road via gullies and overland flow paths in the urban areas within the district. The stormwater network in Nukuhau is consistent with this. Nukuhau's stormwater falls under a comprehensive discharge consent which covers all of Taupō town including Nukuhau (Resource Consent 105048).

Development Standards

9. For a base infrastructure standard Taupō District Council utilises the Code of Practice for the Development of Land (September 2009), which uses NZS4404:2004 as it's basis. This provides a basic standard primarily focused on the construction of infrastructure, but variations to this are commonly approved during the resource consenting process or during the detailed design phase to respond to the particular context and merits of a development. The Code of Practice is typically referenced as part of the normal consent conditions.

Drinking Water

Introduction

10. My full name is Thomas Arthur Swindells. I am currently employed by the Taupō District Council as Asset Manager Water.
11. I have been working in the water and wastewater field for over 15 years including as a design and commissioning engineer, contract manager, operations manager, and more recently in the asset management field. I have a Bachelor of Technology (Chemistry) degree with Honours from Massey University.

Executive summary

12. My evidence is specific to the matters of Water Engineering based on over 15 years' experience in the field and Bachelor of Technology (Chemistry) degree with Honours qualification.
13. My evidence is based on a review of:
 - a) Nukuhau Plan Change Request
 - b) Water and wastewater study (WSP)
14. In addition, I am familiar with the site and surrounds.
15. In summary I recommend, in terms of Drinking Water:
 - a) That the Taupō water supply scheme can be upgraded to provide sufficient capacity to support the proposed Plan Change.
 - b) I support the plan change based on the comments above.

Code of conduct

16. Although this matter is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with the Code of Conduct in the preparation of this evidence and will follow the Code when presenting evidence to the Commissioner. My qualifications as an expert are set out below. I confirm that the matters addressed in this statement of evidence are within my area of expertise, except where I rely on the opinion or evidence

of other witnesses, as stated. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Water Demand

17. The application presents a figure for the expected water demand for future residential development of the land. The water demand is calculated using the method defined in Councils Code of Practice for the Development of Land. This is an appropriate approach to determining water demand for the development.
18. The calculation requires input of a fire flow figure taken from SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice. A fire flow of 12.5l/s was used which is the flow required from a single hydrant in areas of water supply classification FW2, which is the standard for residential areas. The network design for the structure plan area will need to consider the following additional requirements:
 - a) To achieve the FW2 classification, an additional flow of 12.5l/s from a second hydrant within 135m of the first. Note that this would be picked up through the normal development process.
 - b) For Structure Plan area that is non-residential, such as the shopping center, the network should be designed to achieve an FW3 supply classification. Note that this would be picked up through the normal development process.

Water Supply System Upgrades

19. The application identifies upgrades required to enable servicing of the proposed Plan Change area. I have reviewed the upgrades proposed and am comfortable with the concepts presented.
20. The application mentions a future water reservoir that is required near Poihipi Road to service the growth of Taupō and for the resilience of Council's water supply. The timing of delivery of this reservoir project has been adjusted in the 2021-31 LTP to the years 2031 to 2034.
21. The application is silent on a second future water reservoir that is required near Penny Grove and is planned for construction in years 2033 to 2035. This reservoir will also

be provided to service the growth of Taupō and for the resilience of Council's water supply.

22. Development of the Structure Plan area will be subject to a fair contribution by the Developer to these and other existing and future water supply projects. Dependent on timing, the contributions may be made via the standard development contribution process, or via a deed of arrangement entered into between Council and the future developer.

Issues raised in submissions

23. The following table summarises the submissions raised in relation to water supply, including my recommendation on whether to accept or reject the submission.

Sub No.	Name	Pt no.	Provision number/Issue	Decision sought by submitter	Summary of submission	Accept/reject recommendation
10	James Bowater	10.2	Drinking Water	Seek Amendment	All buildings (whether houses, shops, etc) that are connected to the Taupo Water System, should have water meters installed at the cost of the Developers.	Reject - The TDC Water Supply Bylaw defines those properties that are to be metered.
34	Peter Marshall on behalf of Tukairangi Trust	34.3	Infrastructure	Seek Amendment	Rainwater harvesting for domestic use should be required.	Reject – Not currently a TDC requirement. Will be considered as part of upcoming the District Plan review process.
37	Robert McKenzie on behalf of Family	37.9	Drinking Water	Oppose	Refuse the request in its entirety. Water pressure is already questionable at certain times in this area.	Reject – Network extension will be designed within TDC requirements as detailed within the Water and wastewater study provided as part of the Structure Plan Change documents.
55	Garry McCarthy	55.4	Infrastructure	Not Stated	The submitter seeks clarity that the fresh water supply system can be adequately managed.	Accept – This is detailed within the Water and wastewater study provided as part of the Structure Plan Change documents.
11	Jennifer Stillman	11.2	Appendix D - Water and Wastewater Study	Seek Amendment	Infrastructure capacity, including water, wastewater and traffic (esp Control Gates Bridge) should be resolved prior to growth occurring.	Accept – Capacity upgrades have been detailed within the Water and wastewater study provided as part of the Structure Plan Change documents.
18	Thomas Hendricks	18.11	Appendix D - Water and Wastewater Study	Seek Amendment	Direct Council Water to investigate and utilize an appropriate version of available hydropower-in-pipe systems for	Reject – Not a TDC requirement, nor is it something TDC is considering.

					all new piping, in conjunction with the local power utility.	
34	Peter Marshall on behalf of Tukairangi Trust	34.1	Infrastructure	Seek Amendment	The Proposed Plan Change should not cost current ratepayers for upgrading sewage and potable water infrastructure in Taupo which is inadequate to cope with the extra load established through the proposed residential development.	Reject – TDC water infrastructure is capable of servicing the Structure Plan area with upgrades funded by the Developers as defined within the Water and wastewater study provided as part of the Structure Plan Change documents.
46	John and Ali Wilks	46.2	Infrastructure	Oppose	Reject the proposal as Taupo's infrastructure cannot sustain another large housing development.	Reject – TDC water infrastructure is capable of servicing the Structure Plan area with upgrades funded by the Developers as defined within the Water and wastewater study provided as part of the Structure Plan Change documents.

Conclusion

24. Based on the information provided I can conclude:

- c) That the Taupō water supply scheme can be upgraded to provide sufficient capacity to support the proposed Plan Change.

Thomas Swindells
Taupō District Council Asset Manager Water

Wastewater

Introduction

25. My full name is Michael John Cordell. I am currently employed by the Taupō District Council as Asset Manager Wastewater.

26. I have been working in the water and wastewater field for over seventeen years including as a construction supervisor, as a design and commissioning engineer, and more recently in the asset management field. I have a Bachelor of Technology (Chemistry) degree from Massey University, and I am a Chartered Professional Engineer.

Executive summary

27. My evidence is specific to the matters of Wastewater Engineering based on over 15 years' experience in the field and a Bachelor of Technology (Chemistry) qualification.

28. My evidence is based on a review of:
 - a) Nukuhau Plan Change Request
 - b) Water and Wastewater Study (WSP)

29. In addition, I am familiar with the site and surrounds.

30. In summary, in terms of wastewater:
 - a) The Plan Change Documentation provided, identifies the current limitations of the wastewater network, which is largely the Control Gates Bridge pipework capacity, and there is acknowledgement that a wastewater solution is required before development can occur.
 - b) I agree with the above assessment and this can be managed through inclusion of a rule restricting development until a solution is available. I understand that such is an orthodox approach to integrating large scale development with infrastructure provision and assists the Council in terms of the efficient provision of such infrastructure.

- c) TDC has a project underway to investigate how to provide wastewater services to the Northern side of the Waikato river.

Code of conduct

31. Although this matter is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with the Code of Conduct in the preparation of this evidence and will follow the Code when presenting evidence to the Commissioner. My qualifications as an expert are set out below. I confirm that the matters addressed in this statement of evidence are within my area of expertise, except where I rely on the opinion or evidence of other witnesses, as stated. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Wastewater Supply System Upgrades

32. The critical issue related to wastewater is the lack of capacity over the Control Gates Bridge to convey wastewater, from additional growth areas, over the Waikato River to the Taupō wastewater network. Taupō District Council has a project underway to investigate and provide a wastewater solution to enable further growth on the North side of the of the Waikato River. There are several technically viable ways that this could be achieved. TDC will continue to work with key stakeholders to advance this project. The project has funding in the LTP (2021 – 2023) for this project. This funding need and timing may change depending on the chosen solution.
33. The proposed Nukuhau Private Plan Change includes a trigger rule (4a.7.1) which sets out that a solution for the anticipated wastewater flows must occur prior to the development. This is clearly spelt out in the application, *“Therefore, before any development can occur the wastewater infrastructure will need to be expanded and provided for as outlined in the WSP water and wastewater study or if Council is satisfied there is a solution to suitably dispose of the wastewater. Should this plan change request be approved by Council, a rule in the District Plan would be required restricting development of the land until the wastewater upgrade is completed or an alternative solution is available.”*

34. In addition to the limitations over the Control Gate Bridge, there are some less significant pipe upgrades required in the areas immediately adjacent to the proposed development. These upgrades are relatively simple and can be detailed when required. These are an orthodox component of greenfield development and will be implemented through the subsequent subdivision process.

Issues raised in submissions

35. The following table summarises the submissions raised in relation to water supply, including my recommendation on whether to accept or reject the submission.

Sub No.	Name	Pt no.	Provision number/Issue	Decision sought by submitter	Summary of submission	Accept/reject recommendation
34	Peter Marshall on behalf of Tukairangi Trust	34.1	Infrastructure	Seek Amendment	The Proposed Plan Change should not cost current ratepayers for upgrading sewage and potable water infrastructure in Taupō which is inadequate to cope with the extra load established through the proposed residential development.	The cost of infrastructure and related directly to the project will be funded by the developer. Financial contributions will be required from developers to contribute to other
11	Jennifer Stillman	11.2	Appendix D - Water and Wastewater Study	Seek Amendment	Infrastructure capacity, including water, wastewater and traffic (esp Control Gates Bridge) should be resolved prior to growth occurring.	Regarding wastewater, I agree that infrastructure capacity is required prior to growth occurring.
18	Thomas Hendricks	18.11	Appendix D - Water and Wastewater Study	Seek Amendment	Direct Council Water to investigate and utilize an appropriate version of available hydropower-in-pipe systems for all new piping, in conjunction with the local power utility.	Reject. Not practical to generate electricity from piped wastewater flows in this instance.
46	John and Ali Wilks	46.2	Infrastructure	Oppose	Reject the proposal as Taupo's infrastructure cannot sustain another large housing development.	Reject. Wastewater infrastructure is upgraded to allow for growth. In this case specific upgrades will be required before development can occur.
53	Jane Penton (LWAG)	53.5	Appendix D - Water and Wastewater Study	Support	LWAG agrees with the authors that 'TDC will need take in account' (WSP 2020b, Section 6.2) the wastewater needs of the Nukuhau development when designing the planned upgrade of the wastewater pipeline	Accept. TDC is allowing for this development in infrastructure plans.

					including the Waikato River crossing.	
53	Jane Penton (LWAG)	53.6	Appendix D - Water and Wastewater Study	Support	LWAG submits the upgrade presents TDC with a golden opportunity to deal with foreseeable wastewater loadings in one infrastructure upgrade. In addition, it makes sense for TDC to consider, in the upgrade, future urban development in the west beyond foreseeable wastewater loadings. LWAG also support the inclusion of the needs of the Nukuhau development in this upgrade.	Accept. TDC is allowing for this development and future developments in infrastructure plans.
53	Jane Penton (LWAG)	53.7	Appendix D - Water and Wastewater Study	Support	LWAG whole-heartedly supports the planned upgrade to remove Acacia Bay wastewater to the Taupo treatment plant.	Accept. Decision on the future of the Acacia Bay WWTP to Taupō WWTP is yet to be confirmed, however this is certainly being considered in infrastructure planning.
55	Garry McCarthy	55.2	Infrastructure	Not Stated	The submitter seeks clarity that the extra load on wastewater infrastructure can be adequately managed.	Accept. Upgrades are made to wastewater infrastructure to meet additional wastewater due to growth. In this case, there is not currently sufficient capacity in pipework over the Control Gates Bridge to accept additional wastewater from this development and a solution will be required before development can occur.

Conclusion

36. Based on the information provided I can conclude:

- a) The Plan Change Documentation provided, identifies the current limitations of the wastewater network, which is largely the Control Gates Bridge pipework capacity, and there is acknowledgement that a solution is required before development can occur.

Michael Cordell
Taupō District Council Asset Manager Wastewater

Stormwater

Introduction

37. My name is Colin Meadowcroft. I am a Consultant Civil Engineer contracting to Taupō District Council (TDC) since 2013.
38. I have approximately 24 years' experience working in the stormwater, water, wastewater and land development practice areas. I have practiced as a contractor, consultant, project manager and worked in a senior Regional Council role. My professional qualifications are Masters in Civil Engineering (Upper 2nd Class Hons) from the University of Exeter, UK 1997. I achieved Chartered status with the UK Institution of Civil Engineers (MICE) in 2004.
39. I assist TDC Development Engineers with assessing engineering and roading aspects of Project Information (PIM)'s as part of Council's building consent process.

Executive summary

40. My evidence is specific to the matters of stormwater based on my 24-years experience in the field following completion of a Masters degree in Civil Engineering.
41. My evidence is based on a review of:
 - a) Nukuhau Plan Change Request
 - b) Stormwater Management Report (WSP)
 - c) Geotechnical Report (WSP)
42. In addition, I am familiar with the site and surrounds and have undertaken all of Taupō District Council's stormwater hydraulic modelling since 2017.
43. In summary I recommend, in terms of stormwater:
 - b) That the proposed stormwater management regime is accepted in principle, being based on typical land development practices used throughout the Taupō district.
 - c) That this be approval is based on the understanding that the geotechnical engineer peer reviewer (Geoffrey Burnett Farquhar, Technical Director – Dams and Geotechnical at GHD Ltd) also being satisfied with the methodology proposed, with special consideration given for the susceptibility of this area to tomos.

- d) I support the plan change based on the comments above, and with the appropriate stormwater mitigation proposed to attenuate/slow the main gully flows to pre-development levels for up to a 1% AEP (100-year) rainfall event.

Code of conduct

- 44. Although this matter is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with the Code of Conduct in the preparation of this evidence and will follow the Code when presenting evidence to the Commissioner. My qualifications and experience as an expert are set out above. I confirm that the matters addressed in this statement of evidence are within my area of expertise, except where I rely on the opinion or evidence of other witnesses, as stated. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Stormwater provision

- 45. I have been asked to comment on the stormwater aspects of the proposed development area. My comments will be specific to the stormwater design approach and its similarity to other Taupō developments. The geotechnical aspects of the underlying ground and its suitability for the proposed stormwater disposal methods will be left to the geotechnical engineers to confirm.
- 46. It's not my intention to examine the technical details of the proposed solutions in detail in this evidence. The Council has control during the subdivision resource consent process of the specific design of the infrastructure, and this application does not extend into the engineering detail, as would be expected.
- 47. The stormwater concepts of dispersed ground soakage and vegetated swales treatment is consistent with other recent developments around Lake Taupō and with WRC stormwater Guidelines.
- 48. Private residential dwellings, along with their associated patios and driveways will be required to collect and dispose of stormwater via onsite soakage systems, as is normal practice elsewhere in Taupō District on elevated pumice sites. This would be

to a 10% (10-Year) AEP 1-hour rainfall event as per TDC Engineering Code of Practice.

49. The code considers that the 1% & 10% (100 & 10-Year) AEP post development flow-rate must not exceed the 1% & 10% (100 & 10-Year) AEP pre-development flow-rate to ensure existing flood and erosion risk is not exacerbated downstream.
50. As an interim measure until the dwellings are built, it is normally a consent requirement at the completion of each subdivision stage that cut-off drains will be installed by the developer around each section to capture runoff from the site and contain it in an open soakage trench or pit. This prevents silt-laden runoff during the initial grass-establishment phase and limits the volume of water running off it, potentially overloading the roading network system. This is typically worked through in the subsequent subdivision process.
51. For disposal of road stormwater runoff into the environment the methods will need to comply with the Waikato Regional Council (WRC) guidelines. The application advises this is the case and that will be verified in detail at the time of subdivision resource consent and again during the construction phase. If the permitted activity rules and guidelines of WRC are not fully satisfied, they will be the subject of a resource consent application to WRC.
52. I note that the Waikato Regional Council Policy Statement does not support the realignment of natural gully systems. I support WRC's submission and application of their Policy Statement to protect natural gully systems and good management of stormwater.
53. I support the opportunity to reduce flow velocity by the use of detention within the gully system, which would reduce flood and erosion issues in the lower catchment.

Issues raised in submissions

54. The following table summarises the submissions raised in relation to stormwater, including my recommendation on whether to accept or reject the submission.

Sub No.	Name	Organisation	Pt no.	Provision number/Issue	Decision sought by submitter	Summary of submission	Accept/reject recommendation
18	Thomas Hendricks		18.13	Appendix F - Stormwater Management Report	Seek Amendment	Grey water systems must be mandatory for all residences, to lower the impact during heavy rains on the immediate ground flow, and to aid in drought-resistance.	Reject – the proposed stormwater treatment is consistent with WRC Guidelines
33	Gary & Rebecca Brandon on behalf of Ripeka Ma Trust		33.3	Stormwater	Seek Amendment	The layout of the gullies should be marked as preliminary for applicable stormwater design at a later stage.	Reject – TDC notes the WRC Policy Statement on gully alignment. This can be dealt with by separate Resource Consent application.
34	Peter Marshall on behalf of Tukairangi Trust		34.2	Stormwater	Seek Amendment	Large planted soil conservation areas should be set aside using existing gullies and overland water flow patterns to cope with increased run off from hard surfaces and stormwater.	Accept – TDC supports planting of gully systems to reduce erosion and flood risk.
43	Hannah Craven	Waikato Regional Council	43.1	Stormwater	Support	The Waikato Regional Council supports a comprehensive approach to stormwater management as detailed in the Plan Change documents.	Accept – TDC also supports a comprehensive approach to stormwater management as detailed in the Plan Change documents and within the required Stormwater Catchment Management Plan.
49	Brett Farquhar on behalf of Rangatira E Trust	C/- Stratum Consultants Ltd	49.8	Stormwater	Oppose	The submitter opposes the plan change due to lack of analysis on discharge of contaminants to the lake.	Reject – WRC Guidelines provide for appropriate contaminant reduction.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.5	Appendix F - Stormwater Management Report	Not Stated	Submitter seeks clarification of the design flood event and what flows are likely to be discharged to the gully from the Plan change areas.	TDC supports detailed analysis for maximum certainty on catchment flows
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.1	Stormwater	Seek Amendment	The Stormwater Management Report should be extended to include the catchment and its characteristics.	Accept – this will assist in confirming post development flows do not exceed pre-development flows
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.2	Stormwater	Seek Amendment	There should be further certainty around the recommended stormwater management strategy within the Stormwater Management Report.	Reject – WRC Stormwater Guidelines have been adopted as the strategy to manage stormwater.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.3	Stormwater	Not Stated	The flood analysis within the Stormwater Management Report incorrectly shows NRL (Nukuhau Resorts Ltd) as being floodable.	Accept - Note that current TDC flood modelling does not show the Nukuhau Resorts Ltd as flooding.

52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.4	Stormwater	Seek Amendment	Submitter seeks clarification on the method for mitigation of pollutants in stormwater.	Reject – WRC Stormwater Guidelines have been appropriately followed.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.6	Stormwater	Not Stated	The submitter seeks clarity on how the applicant in conjunction with council propose to manage the upper catchment above Acacia Bay to mitigate the effect of peak rainfall events.	TDC supports the use of gully systems to reduce the impacts from erosion and flooding.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.7	Stormwater	Not Stated	The submitter seeks clarity on whether the applicant is intending to work with council to create detention and infiltration systems to the gully discharges from the residential areas between Acacia Bay Rd and subject site. We believe these should be undertaken prior to considering the need for the culvert under Acacia Bay Road.	TDC promotes the use of gully systems to slow flows but notes that the applicant does not have control of the downstream gully systems.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.8	Stormwater	Not Stated	The submitter seeks clarity on what has been provided for in terms of the balance of the catchment above the applicants site contributing to the catchment.	TDC supports a full understanding of the catchment flows.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.9	Stormwater	Not Stated	The submitter seeks clarity on what provision has been made for peer reviewing the flow calculations undertaken by WSP for the applicant and what level of benchmarking has been undertaken against WSP's findings that ratifies the projected flows.	Accept– TDC supports the need for peer review of flow calculations and benchmarking
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.10	Stormwater	Not Stated	The submitter seeks clarity on what monitoring of flow has occurred in recent years, say 5-10 and 10-20 years to measure the flows against actual rainfall.	TDC supports the fact that flow monitoring would provide improved validation on theoretical flows.
52	Chris Todd on behalf of Owners of 179 Acacia Bay Road	Todd Land Development Consultancy Ltd (TLDC)	52.11	Stormwater	Seek Amendment	It is submitted that an overall Catchment Plan that considers the whole catchment and waterflows throughout, particularly looking at potential Land Use changes and the impact on the primary downstream channel should be undertaken.	Accept – TDC comprehensive stormwater consent requires WSP to provide a Catchment Management Plan for the proposed greenfield developments with reference to managing the effects of increased stormwater flows from the proposed development.

53	Jane Penton	Lakes & Waterways Action Group (LWAG)	53.1	Stormwater	Seek Amendment	LWAG commend the use of WRC's guidelines in regard to the applicant's stormwater management strategy. However submits that the developers and consultants should work towards a higher level on environmental standards. For instance, we recommend they include water retention and reuse.	Accept – TDC supports the use of WRC Stormwater Guidelines for stormwater management.
53	Jane Penton	Lakes & Waterways Action Group (LWAG)	53.2	Stormwater	Oppose	LWAG recommend that the gullies not be modified as pumice soils are prone to erosion and are valuable stormwater management assets in their natural form.	Reject – gully modification can allow reduction in flow velocity and erosion
53	Jane Penton	Lakes & Waterways Action Group (LWAG)	53.3	Stormwater	Seek Amendment	LWAG agrees with WRC's informal advice "to not modify natural gully systems'. LWAG submits that the proposed realignment and merging of channels is 'significant'.	Accept – TDC considers that gully realignment must be managed through a subsequent resource consent process
53	Jane Penton	Lakes & Waterways Action Group (LWAG)	53.4	Stormwater	Not Stated	In general, LWAG appreciate the intentions of the proposed stormwater management strategy but seek clarity on how individual lot owners would be encouraged to take this up.	Building Consent and TDC Code of Practice manage the on-site soakage requirements
55	Garry McCarthy		55.1	Stormwater	Not Stated	The submitter seeks clarity that stormwater will be adequately managed given the system seems to be approaching its maximum now.	TDC support the need for the Applicant to demonstrate its management of post development flows to pre-development levels.

Conclusions

55. Based on the assessment above I conclude:

- a) The proposed development proposes standard land development practices regarding stormwater.
- b) It is based on minimizing the concentration of collected stormwater, the improvement of runoff water quality using the recommended Waikato Regional Council guidelines for the use of swales and the disposal of stormwater by ground soakage.
- c) support for the approach in the assessment as to achieving the 1% & 10% (100 & 10-Year) AEP post development flow-rate within the 1% & 10% (100 & 10-Year) AEP pre-development flow-rate to ensure existing flood risk is not exacerbated downstream.

- d) The independent geotechnical assessment by peer reviewer (Geoffrey Burnett Farquhar, Technical Director – Dams and Geotechnical at GHD Ltd) must conclude that the proposed management of stormwater is appropriate and the injection of stormwater runoff to ground is safe and will not have adverse effects, such as tomo's.

Colin Meadowcroft
Consultant Civil Engineer