Comments on a Substantive Application under section 53 of the Fast-track Approvals Act 2024: Hydrology

Fast-track project name	**Waikanae North Development**
Fast-track application number	FTAA-2603-1194
GW file number	FTA106

Technical area	**Hydrology and Wetland Hydrology**
Date	21 July 2026
Author	James Blyth Director and Water Scientist Collaborations
Statement of expertise	I am a Director and Water Scientist at Collaborations Limited ('Collaborations'). I hold a Master of Science (MSc) Degree with first class honours from the University of Waikato, with a thesis completed on wetland eco-hydrology. I am also a Certified Environmental Practitioner (CEnvP) under the Environmental Institute of Australia and New Zealand (EIANZ). I have ~16 years of work experience, and have worked internationally in over six countries. This experience covers a range of water sciences, including water quality, water resources, hydrology, hydraulics and wetlands. I have provided evidence for hearings, Environment Court and High Court processes.
Code of conduct	I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. This technical memorandum has been prepared in accordance with that Code. Unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express.
Documents considered	• Building Block Planning Ltd. 2026. Substantive Application: Fast-track Approvals Act – Waikanae North Developments Limited Application for Resource Consent and Wildlife Approval (169–171 Peka Peka Road, Waikanae). Prepared for

	Waikanae North Developments Limited, 30 March 2026 "the application" • Appendix 23: RMA Ecology Ltd. 30 March 2026. Waikanae North Development: Fast Track Application: Assessment of ecological effects. Report prepared for Waikanae North Developments Ltd. 159 pages + appendices. "the Ecological Assessment" • Appendix 26: RMA Ecology Ltd. 30 March 2026. Waikanae North Development Fast Track Application: Ecological Restoration Management Plan. Report prepared for Waikanae North Developments Ltd. 91 pp. + Appendices. "the ERMP" • Appendix 33: Proposed draft conditions of consent. "proposed conditions" • Appendix 17: O'Callaghan Design Ltd. March 2026. Waikanae North Development Fast Track Application: Hydrological Report. Report prepared for Waikanae North Developments Ltd. 42 pages including appendices "hydrology report" • Supplementary Information: O'Callaghan Design Ltd. June 2026. Memo to GWRC – Peat-to-Sand Replacement Groundwater Sensitivity - 30 June 2026 signed Final. "groundwater sensitivity memo" • Supplementary Information from Consultation: Waikanae North Developments Limited. GWRC Conferencing 4/5th June 2026. Hydrology and Ecology Meetings – Summary, Agreement Points and Actions Arising. • Supplementary Information from Consultation: Local Landscape Architecture Limited. 15 July 2026. Waikanae North Wetlands and Stream Plan (A3). 2109-1238. "wetland and stream map" • M Dixon (21/07/2026). Waikanae North Development – Ecological Review Comments on Section 53 Substantive Application. FTAA-2603-1194 • G Taylor (21/07/2026). Waikanae North Development, – Stream Ecology Comments on Section 53 Substantive Application. FTAA-2603-1194

Summary

The applicant has engaged with Greater Wellington Regional Council (GWRC), with an initial site visit in June 2025 and pre-application discussions through 2026 with GWRC appointed technical reviewers, to help narrow down potential concerns and issues with the proposal. This included two consultation meetings in June 2026, with the minutes of that meeting being incorporated into my final position reflected in this document.

My formal comments relate to hydrology of the site, with a particular focus on wetland hydrology. Assessment of flooding risk and stormwater (i.e. water sensitive urban design) on behalf of the regional council is being considered by other council experts.

Generally, I consider the hydrology assessment provides useful contextual information for the site including ~10 months of groundwater monitoring data and some hydrogeological cross sections. However, I would consider the report a basic assessment for the size of the proposed development and the plan to remove 475,000m^3 of peat to replace with compacted fill (sand/silt). No transient (i.e. daily or 7-day timestep) hydrological or hydrogeological models were developed to support the application, which is typical in most projects of this size. In addition, no Ngārara Stream level monitoring was undertaken to correlate with rainfall events and inundation frequency (seasonally). While further groundwater level sensitivity analysis was provided (relating to peat replacement), I consider there is some remaining uncertainty in the potential effects on ground water levels and wetland hydrology.

However, the approach taken by the applicants with the development somewhat mitigates this uncertainty. The natural inland wetlands proposed to lost, are intending to be offset through restoration and construction of wetlands and riparian corridors along Ngārara Stream, supported by raising of the stream *minimum* water levels by 300-400 mm through twin box culverts. This approach will likely be effective at achieving restoration outcomes, but will require further monitoring and design assessments to ensure water levels are appropriate to ecological planting plans and proposed earthworks for wetlands and riparian corridors. Subsequently, I consider robust consent conditions and an adaptive management approach are likely to be sufficient, noting this would require reworking of the applicant's proposed conditions and the possible establishment of an eco-hydrological monitoring plan.

Agreement with the applicant

1. The hydrology report provides suitable context to the site's hydrological conditions on the east and west sides of the development area.

2. The application adequately integrates in water sensitive urban design (WSUD) green infrastructure (i.e. bioretention, rainwater tanks) to pretreat and attenuate stormwater runoff before discharging to ground or swales.

3. The hydrology report provides nearly 10 months of monthly (manual) monitoring data summaries from 17 groundwater piezometers spread across the site, which is useful to characterise water level ranges and depths to groundwater. Continuous monitoring would be preferred to understand responses following rainfall and dry periods and to truly capture the natural range. Should this consent be granted I recommend continuous monitoring transducers are installed in retained wetlands and selected piezometers locations (to be defined in the groundwater monitoring plan).

4. Piezometers P05 and P011 are within the dominant wetland offset/restoration area (along Ngārara Stream corridor) and will not be modified (with peat excavation). These piezometers show water levels at a maximum depth of 0.7 – 0.83 mbgl, indicating generally favourable conditions for wetland restoration (noting the limited record length).

5. The hydrology report presents a single hydrogeological cross section (Figure 10) for clarity showing indicative water levels and peat removal extent. I agree with the approach of maintaining the peat in the restored and offset wetland areas suggested by the applicants to enhance habitat and ecosystem function.

6. A large twin barrel box culvert is proposed in the Ngārara Stream on the edge of the property (see Figure 10 in the ERMP), with an overflow Weir on top (acting as a spillway in large events). This culvert structure will raise the bed level of the stream and minimum water levels under baseflow conditions by 300-400 mm, which will reduce upstream velocities (by lowering gradients) and is in my opinion, is likely to achieve minimum water level targets for the Ngārara Stream and restored/offset wetlands (along the stream corridor). Although, technical information is lacking to fully assess the structures likely ecological outcomes (see following sections).

Matters in contention and suggested response

Reclaimed wetlands hydrology assessments

7. The hydrology report does not attempt to assess the hydrology of inland wetlands that will be reclaimed as part of the development.

8. It is likely the majority of these wetlands are rainfall and groundwater fed, and are being offset through wetlands that will be riverine systems defined by a minimum water level maintained in Ngārara Stream and flooded (potentially numerous times per year, depending on stream water levels). This means the wetland offset is not like for like as per typical biodiversity offsetting approaches.

9. Should the panel consider offsetting requires like for like replacement, then I recommend this assessment is completed and ideally utilises monitoring data (which may not exist for these wetlands, and would therefore require a period of data collection).

Hydrology report – modelling approaches

10. The hydrology report attempts to assess changes in hydrology and hydrogeology resulting from the proposed development using empirical calculations, such as an annual water balance calculation with fixed inputs and assumptions and empirical assessments of change in groundwater levels with only limited static data inputs. This is undertaken for pre and post development conditions, and I consider this is a basic assessment that results in greater amounts of uncertainty relating to potential effects of the development.

11. In relation the *hydrological* changes (pre and post development) utilised in the Assessment of Effects (Section 9 of the hydrology report), an annual water balance spreadsheet model is used to assess pre and post development hydrological changes. This approach provides limited insight into spatial and temporal hydrological responses, as the method incorporates fixed inputs such as annual rainfall and potential evapotranspiration. A modern approach would be a transient (i.e. daily) hydrological model for the site to understand changes in rainfall and runoff under a range of climatic conditions (i.e. >20 year simulation) for pre and post development catchments.

12. Large scale earthworks are proposed for the site, involving the removal of 475,000 m^3 of peat in the low lying land, which will be replaced with compacted sand/silt. Developments of this size that involve such a substantial change in geological conditions often include a transient *hydrogeological* model that would assess the changes and response of groundwater with long term historical and future climatic rainfall and evapotranspiration data. The absence of a such a model at this stage of the application would indicate it is unlikely to be developed, and if so would require a minimum of 6 months to build and calibrate before running baseline and post development groundwater scenarios.

13. The applicant's approach has been to utilise empirical formulas to calculate the potential change in groundwater gradients from a few static input parameters (such as transmissivity, peat volume removal and hydraulic conductivity) along three hydrogeological cross sections. No site-specific testing of peat hydraulic conductivity (e.g. slug testing or pump tests) was undertaken to integrate into this assessment. The hydrology report concluded that minimal

change in groundwater levels will occur, with this assumption applied universally across the site.

14. Following my initial assessment and feedback to the applicants about the limitations in this approach and the lack of sensitivity assessments around input parameters, and conferencing on the matter in June 2026 (with the applicants), the applicant expanded the empirical assessment in the groundwater sensitivity memo.

15. The groundwater sensitivity memo applies a sensitivity assessment utilising degraded peat hydraulic conductivity data (from literature) that are 2 orders of magnitude lower than assumed in the original assessment, while maintaining the same input parameters for the compacted fill and aquifer profile. This shows minimal predicted change in groundwater levels (~0.1 mm) when replacing peat with compacted sand, ~4% effects on aquifer transmissivity, due to the fact regional groundwater is dominated by a deep (~20-30 m) unconfined sand aquifer beneath the peat. It is worth pointing out that peat depth and hydraulic conductivity will be variable across the site, and the replacement with compacted fill will also have variability in its hydraulic parameters.

16. While I generally agree that the unconfined sand aquifer would have a greater influence on the *regional* groundwater flow directions than the shallower peat layers (and subsequent removal of the peat), the application is still lacking a temporal assessment of the change in groundwater levels, or the changes in groundwater heads following the permanent increases to the water table proposed due to the raising of the Ngārara Stream by a minimum of 300-400 mm. This leads to some uncertainty in the potential effects.

17. In addition, the sites proximity close to the coast would result in regional groundwater gradients being governed by sea levels and likely, Te Harakeke Wetland. This is evident by the piezometric contours in Figure 7 of the hydrology report showing groundwater levels declining towards the west (the sea), from ~6.5mAMSL at Piezometer 7 (East) to 4.6 mAMSL at Piezometer 5 (Ngārara Stream) and finally 2.8mAMSL at Piezometer 15 (Te Harakeke Wetland). It is worth pointing out that this figure doesn't indicate if the groundwater levels are minimum, maximum or averages, and that this application would benefit in developing a piezometric contour map and flow directions for each of the water level ranges above.

18. Groundwater models of Kāpiti (referenced by the applicant in the hydrology report) were partially updated and utilised for a number of simulations of climate change (including Sea Level Rise (SLR) to 2130) and water allocation during the Kāpiti Whaitua Committee process[1]. I provided a summary of the modelling results to GWRC science advisors at the time[2]. This information hasn't been accounted for in the application. The modelling showed that for

[1] Tonkin and Taylor. 2022. Hydrogeological Modelling Inputs – Kapiti Whaitua. Kapiti-Whaitua-Hydrogeological-Modelling-Inputs-Report-v2.pdf
[2] Blyth, J. 2022. Summary of groundwater modelling report for Kāpiti Whaitua. Summary-of-Kapiti-Whaitua-Hydrogeological-Modelling-Inputs-Report-1.pdf

lowland surface water features, it appears that SLR of 0.45m by 2080 results in an increase in groundwater levels, and greater groundwater contributions to these streams/rivers and wetlands.

19. This is despite climate change resulting in warmer temperatures, more sporadic (and intense rainfall) and reduced streamflow (in upper catchments with shallow GW stores). Particularly, Ngārara Stream was indicating that under an RCP4.5 2080 SLR scenario, in March (the period of lowest baseflow), stream flow may increase by up to 20%, even under maximum allocation.

20. This indicates that groundwater levels are likely to increase over time in low lying areas, which is likely to benefit surface water bodies such as wetlands and streams, including Te Harakeke Wetland. Coupled with the applicant's approach to raising levels in Ngārara Stream, additional groundwater recharge to Te Harakeke Wetland is likely to benefit wetland health. However, it is worth noting this statement is made independent of any considerations of potential effects of higher groundwater levels on properties outside of the proposed development, which I have not considered, or the management of Te Harakeke Wetland water levels for stormwater conveyance by Kapiti Coast District Council.

21. The applicants simplified hydrological and hydrogeological assessment and uncertainty in potential effects are somewhat 'mitigated' by the proposal to reclaim the majority of natural inland wetlands, and offsetting/restoring the wetlands along the lowest lying land (next to Ngārara Stream). Table 3 of the hydrology report indicates that the Ngārara Stream levels are similar to nearby groundwater levels over summer (dryer) conditions.

22. Raising the Ngārara Stream minimum water level by 300-400 mm with the box culvert structure, and retaining peat in existing wetlands and along the stream corridor are also likely to help mitigate the changes to groundwater conditions over such an extensive area, particularly in the areas being restored.

23. While I consider there is residual uncertainty in wetland hydrology and groundwater levels, I believe this is likely manageable through consent conditions that would require extensive monitoring to better understand hydrological conditions at site including baseline water levels with continuous pressure transducers (rather than monthly) at selected sites before, during and after development. This monitoring data will need to be integrated into a sound adaptive management framework with hydrological triggers, to ensure any potential adverse effects are identified and appropriately mitigated, offset or compensated.

Ngārara Stream Levels

24. No flow time-series / water-level analysis has been presented for the Ngārara Stream to assess hydraulic connectivity between the stream, the existing adjacent wetlands and

riparian margins across a typical year, including the frequency and duration of wetland and stream margin inundation and potential changes as a result of climate change. It is worth noting that climate change effects have been incorporated in flooding assessments with 2130 predictions, but these results aren't relevant (or applied) to *seasonal* hydrological variations at restored wetland and stream sites.

25. Recently, the applicants provided an A3 wetland and stream map which shows the existing drains/highly modified streams, the proposed Ngārara Stream realignment and all wetlands (retained and offsets). This is useful to show the significance of this stream realignment and areas where a water level increase will seek to achieve mitigation and offset outcomes.

26. Rather than assess the stream level variation over time and connectivity to existing and proposed constructed wetlands and riparian margins, after the water level has been increased through the twin culverts, the applications assessment infers that the 0.3–0.4 m increase in water levels will achieve appropriate restoration levels and relies on flood modelling of a two-year event to demonstrate inundation.

27. This is most likely due to the lack of monitoring equipment in the stream to measure water levels and lack of a transient hydrological model (to simulate streamflow), noting the water levels of the stream were spot surveyed at three locations in summer (date unknown) and showed similar levels to nearby piezometers.

28. Ngārara Streams proposed realignment will also have a habitat corridor planted that will be regularly flooded under 'minor rainfall events', which has not been defined.

29. I consider it necessary to better understand the annual water level variation of the Ngārara Stream and its hydrograph response to different rainfall events, to feed into the design of the riparian corridors and wetland offsetting and restoration. Climate change projections (detailed in footnote 1) could then also be applied to consider the frequency of such rainfall events, or drought conditions.

30. Following conferencing in June 2026 with the applicant, it was agreed that wetland and Ngārara stream water levels are important parameters to monitor and manage, and that this can be addressed through a conditions-based management plan with trigger levels, integrated with the Groundwater Monitoring Report (GMR).

Sediment in Ngārara Stream and ongoing maintenance:

31. The hydrology report does not consider the potential for sediment deposition in the stream channel bed over time due to upstream land uses. The ecological assessment identifies a high loading of fine sediment in the Ngārara Stream (pg 70). This may affect the proposed riparian corridors and constructed/restored wetlands that will be hydrologically controlled by the stream.

32. Whilst this was not a focus of my review, I am highlighting that further detail should be provided by the applicants on;

32.1 what the proposed approach would be if stream and wetland hydrology changes over time due to the streambed level increasing from sediment deposition via the flatter gradient established from the box culvert and weir structure.

32.2 if there is a sediment maintenance/drain clearance programme being proposed,

32.3 and if so, who would be responsible for this programme (I.e. will this be vested to Kāpiti Coast District Council and likely would require separate GWRC consents).

Groundwater Level Monitoring Report (GMR) (as described set out in proposed Conditions 60–63)

33. Should the consent be granted, due to uncertainties in the hydrological report and a lack of monitoring information presented (i.e. for the Ngārara Stream water levels), I recommend new conditions should be drafted from what is proposed by the applicant.

34. As an example, the GMR should be expanded to become an *eco-hydrological monitoring and response plan* that aligns with the ecological offsetting and restoration proposed, and hydrological monitoring and design criteria (for wetlands and stream corridors).

35. Such a report would incorporate monitoring details, locations, minimum groundwater trigger level thresholds, and clearly defined response actions if adverse development effects or un-anticipated restoration outcomes are identified in stream or wetland areas. It would aim to establish 'environmental bottom lines' and outline hydrological targets (i.e. for the existing retained wetlands and offset wetlands). The plan would also detail actions and responsibilities should a trigger be breached during or post development, or offsetting targets are unable to be achieved. An integrated eco-hydrological plan that also establishes ecological condition requirements will streamline monitoring and reporting.