Before the Hearings Panel
At Kapiti Coast District Council

Statement of evidence of James Robert Oakley on behalf Kāpiti Coast District Council (Stormwater and Flooding)
Date: 14th August 2026

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1 SUMMARY OF EVIDENCE

1.1 In summary, I conclude that:

a. The site is affected by a combination of local flood hazards, elevated groundwater levels and regional flood hazards associated with the Chillingworth Stopbank breach scenario.

b. Lot 1 is subject to significant flooding constraints, with the AWA Environmental Ltd Stormwater Management Report (SMP) for the Applicant SMP reporting flood depths of up to approximately 800 mm during the 1% AEP 2130 event and identifying the need for site filling and engineered stormwater solutions to facilitate development.

c. Forthcoming updates to the GWRC Waikanae River flood model include revised hydrology and changes to the river geometry, including within the Chillingworth Stopbank breach. These updates have the potential to affect the breach hydrograph used to assess flood effects on the site and therefore introduce uncertainty regarding the existing data relied on in the Applicant's assessment.

d. While the SMP identifies a number of potential stormwater management approaches for Lot 1, the suitability of these approaches remains unproven and is dependent on further investigation of groundwater conditions, soakage performance, flood conveyance requirements and compensatory flood storage requirements.

e. In my opinion, there remains insufficient information to conclude that development of Lot 1 can occur while:

i. Maintaining flood conveyance and floodplain function;

ii. Achieving hydraulic neutrality;

iii. Avoiding increases in flood hazard on surrounding land;

iv. Maintaining groundwater and wetland hydrological functions; and

v. Providing safe access and egress during flood events.

f. Additional engineering investigations, hydraulic assessment, groundwater monitoring, earthworks design and stormwater design work would be required to demonstrate that these matters can be appropriately managed whilst enabling development on Lot 1.

g. Lot 2 presents fewer stormwater and flood hazard constraints than Lot 1. Subject to further investigation confirming groundwater conditions, soakage performance and geotechnical suitability, I consider the proposed soakage-based stormwater management approach for the elevated dune areas of Lot 2 to be generally appropriate. The lower lying areas of Lot 2 are subject to the same considerations that apply to Lot 1 and which are described above.

1.2 Based on the information currently before the Hearings Panel, there remains uncertainty regarding the extent to which Lot 1 can be suitably developed while avoiding adverse flooding, stormwater and QEII wetland effects. In my opinion, these matters are fundamental determinants of development feasibility rather than detailed engineering design matters. Accordingly, I recommend that these uncertainties are addressed through the Plan Change process and not deferred to subsequent resource consent stages.

2 INTRODUCTION:

2.1 My full name is James Robert Oakley. I am employed as a Principal Three Waters Engineer at Te Miro Water Ltd ("TMW"). I have held this position for four months. Prior to this I was a Senior Civil Engineer and Stormwater Team Lead at Studio Wainui, a position I held for 13 years.

2.2 I am a member of Water New Zealand and a Member of Engineering NZ.

2.3 I have a Bachelor of Engineering with Honours from the University of Waikato, where I graduated in 2009.

2.4 My professional career spans 15 years predominantly in the field of water, stormwater and wastewater engineering. Specifically, in the last 10 years my main area of work has been in the field of stormwater management. I have extensive experience in technical designs in flood prone sites, as well as reviewing technical stormwater designs on behalf of the Waikato Regional Council (WRC). My relevant experience includes the following examples:

a. Technical review on behalf of WRC for the Cambridge to Piarere (C2P) Expressway (SH1) referred to the EPA Fast track consenting process.
b. Technical review on behalf of WRC for the SH1/SH29 Intersection upgrade.
c. Technical review on behalf of WRC for the Horsham Downs Road upgrade including the intersection with the Hamilton Section of the Waikato Expressway.
d. Stormwater and Civil lead for the 45ha Te Kowhai Airpark, Te Kowhai Hamilton. A complex drainage project involving alleviating extensive flooding in a flat rural area with constrained outlet points and elevated groundwater.

2.5 I am authorised to provide this evidence on behalf of the Council.

3 CODE OF CONDUCT

3.1 I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2023[1]. I have complied with the Code of Conduct in preparing my evidence and will continue to comply with it while giving oral evidence before the Environment Court.

3.2 My qualifications as an expert are set out above. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

[1] https://environmentcourt.govt.nz/assets/Practice-Note-2023-.pdf

4 INVOLVEMENT WITH PRIVATE PLAN CHANGE 5

4.1 I have been involved in the PPC5 since June 2026. Prior to this an ex-colleague at Te Miro Water reviewed the PPC5 application documents in relation to stormwater and flooding and provided s92 comments to the applicant.

4.2 I have reviewed all related documents, reports and communication (including emails) exchanged between Te Miro Water and the applicant.

4.3 I have prepared this statement of evidence on behalf of the Kāpiti Coast District Council (Council) in respect of flooding, flood hazard and stormwater matters arising from the plan change request, submissions, and further submissions on the Private Plan Change 5 (PPC5) to the Kāpiti Coast District Plan (District Plan).

4.4 Specifically, this statement of evidence relates to the following matters:

a. Flood risk, flood management and stormwater management for the site 100 and 110 Te Moana Road, Waikanae Beach.
b. My assessment includes the review of all submission documents related to my area of expertise, s92 responses, updated memos and emails exchanged between the applicant's consultant and Te Miro Water.
c. I have not undertaken a review of the Tuflow model, nor have I reviewed a model build report which supports the KCDC Local Tuflow Model and its use by AWA Ltd for this project.

5 SCOPE OF EVIDENCE

5.1 My statement of evidence addresses the following matters:

a. Flood hazard and flood risk affecting the site, including:

i. Flood depths

ii. Overland flowpaths

iii. Local flood hazards

iv. Regional flood hazards and stopbank breach scenarios.

b. Groundwater conditions and soakage suitability

c. Proposed Stormwater Management approaches

d. Earthworks (including filling), loss of flood plain storage, flood conveyance and associated effects

e. Potential hydrological effects on the QEII wetland

f. Safe access and egress during flood events

g. Response to submissions relating to flooding and stormwater matters.

5.2 In preparing this statement of evidence I have reviewed the following documents:

Applicant documents

a. Appendix 5: 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management Concept Memo, Awa Environmental Ltd 13th March 2025

b. Appendix 2: Concept Plans

c. Sections of the Engineering Infrastructure Report Combined that are relevant to Stormwater and Flood Hazard.

Review documents

d. Technical Memo (1): Peer Review of 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management – Te Miro Water Ltd (February 2025)

e. Technical Memo (2): Peer Review of 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management – Te Miro Water Ltd (July 2025)

Responses to Reviews

f. Peer Review Response to 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management Concept Memo. Awa Environmental (July 2025).

g. RFI Response – Flooding and Stormwater. 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management Concept Memo. Awa Environmental (20 July 2025).

h. Additional information response – Flooding and Stormwater. 100 & 110 Te Moana Road, Flood Assessment & Stormwater Management Concept Memo. Awa Environmental -FINAL MEMO (18 August 2025).

Council information

i. KCDC Three Waters Services Map.

j. KCDC Flood Hazard Planning Maps.

k. KCDC Land Development Minimum Requirements

l. KCDC Stormwater Management Framework

m. Correspondence from Greater Wellington Regional Council (GWRC) regarding Waikanae River flood hazard modelling updates and flood risk considerations relevant to PPC5 (2026).

6 ASSESSMENT OF THE EXISTING ENVIRONMENT

Existing Site Topography and Infrastructure

6.1 The existing site comprises two lots, identified as Lot 1 and Lot 2, as shown in Figure 1, which presents an extract of the scheme plan submitted with the application. Lot 1 is delineated in orange and Lot 2 in yellow. The lots exhibit different topographic characteristics and are subject to different flooding and stormwater constraints.

6.2 The topography of Lot 1 is predominantly low-lying, falling from Te Moana Road towards the adjacent QEII wetland. Lot 2 comprises a mix of elevated dune features, lower-lying land, and areas occupied by the QEII wetland. The site is located immediately downstream of the M2PP Expressway overbridge crossing of the Waimeha Stream.

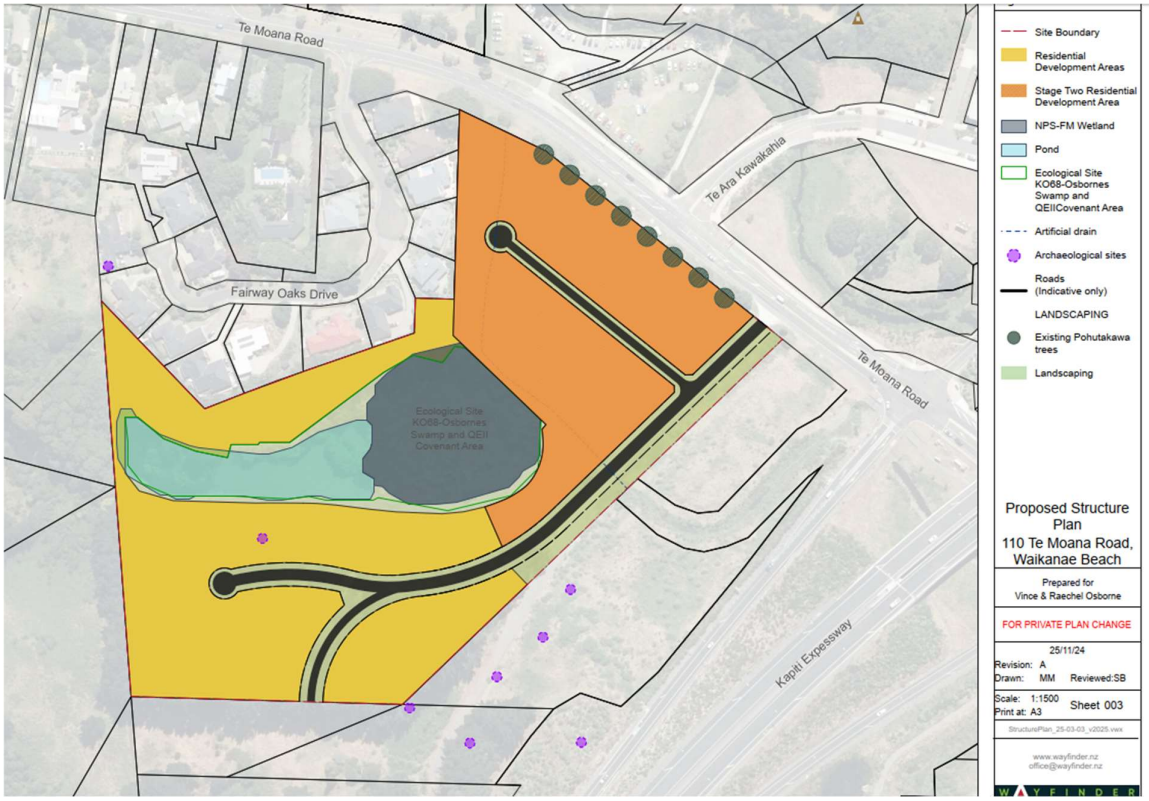

Figure 1. Delineation of Lots and Structure Plan

6.3 The site and associated upstream sub-catchment discharges stormwater via two culverts under Te Moana Road discharging to the Waimeha Stream. A culvert in the northwestern corner of Lot 1 and the second culvert located adjacent to Te Moana Road and the Expressway off-ramp. The KCDC Three Waters Services Map as presented in Figure 2 show these culverts as 450mm and 1350mm diameters, respectively. These culverts form a key component of the site's drainage network and influence the ability of floodwaters and stormwater runoff to discharge from the site.

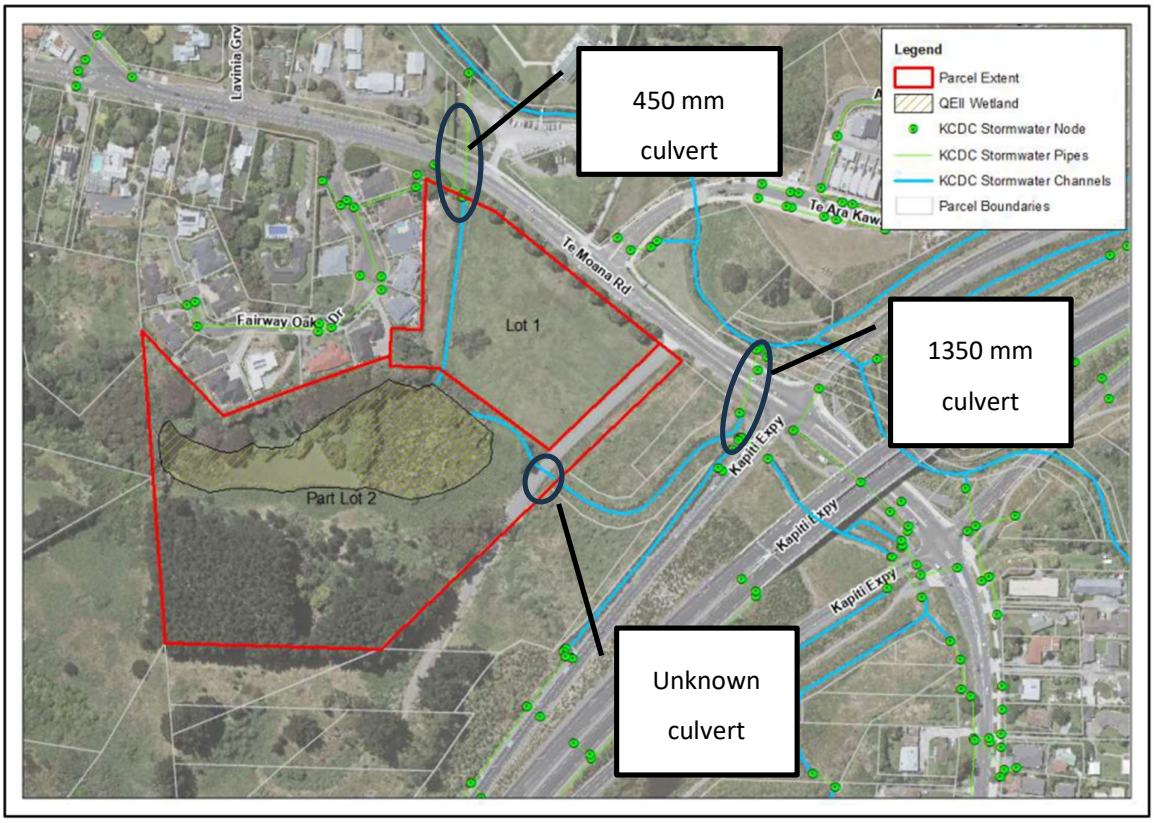

Figure 2. Lot 1 and Part Lot 2 overlain Stormwater Network and Location of culverts

6.4 The AWA Environmental Ltd Stormwater Management Report (SMP) for the Applicant notes these culverts are tailwater controlled during the KCDC 100-year ARI 2130 model as a result of stream flows and downstream tide levels. Consequently, the ability of the culverts to discharge runoff from the site becomes constrained during major storm events.

6.5 I understand from Mr David Pickett, Council's ecologist for PPC5, that the drain connecting the site and QEII wetland to the 1350mm culvert is severed, likely as a result of the construction of the accessway into the site. On that basis, I understand that the original hydraulic connection may have been altered or severed. However, the Kāpiti Coast District Council (KCDC) Three Waters Services Maps show a culvert beneath the accessway crossing, although its size and condition are not known to me.

Existing Site Flooding and Flood Risk Issues

6.6 The SMP identifies that the site is affected by a number of Kapiti Coast District Council (KCDC) flood hazard categories, including:

a. Stream corridor;

b. Residual overflow path;

c. Ponding areas; and

d. Residual ponding areas.

6.7 The SMP notes that the KCDC Flood Hazard Planning Maps are, in part, outdated in the vicinity of the site due to the construction of the M2PP Expressway, which has altered flood flow paths and removed some previously mapped ponding areas.

6.8 Based on my review of the information presented in the SMP, I agree that the existing flood hazard planning maps do not fully reflect the current catchment configuration and support the use of the revised flood hazard mapping prepared for the site as a more representative assessment of current flood behaviour.

6.9 The SMP further reports that the KCDC 100-year ARI (1% AEP) 2130 flood model (presented in Figure 3), which incorporates the M2PP Expressway, indicates that:

a. Lot 1 experiences ponding depths generally ranging from approximately 10 mm to 800 mm;

b. Lot 2 experiences more isolated flooding, with depths generally ranging from approximately 10 mm to 700 mm; and

c. Peak flood depths within the QEII wetland area are approximately 1.6 m.

6.10 In my opinion, these reported depths demonstrate that Lot 1 is subject to significant flood constraints and has an important floodplain function, and that the QEII wetland performs an important flood storage and flood attenuation function within the wider catchment.

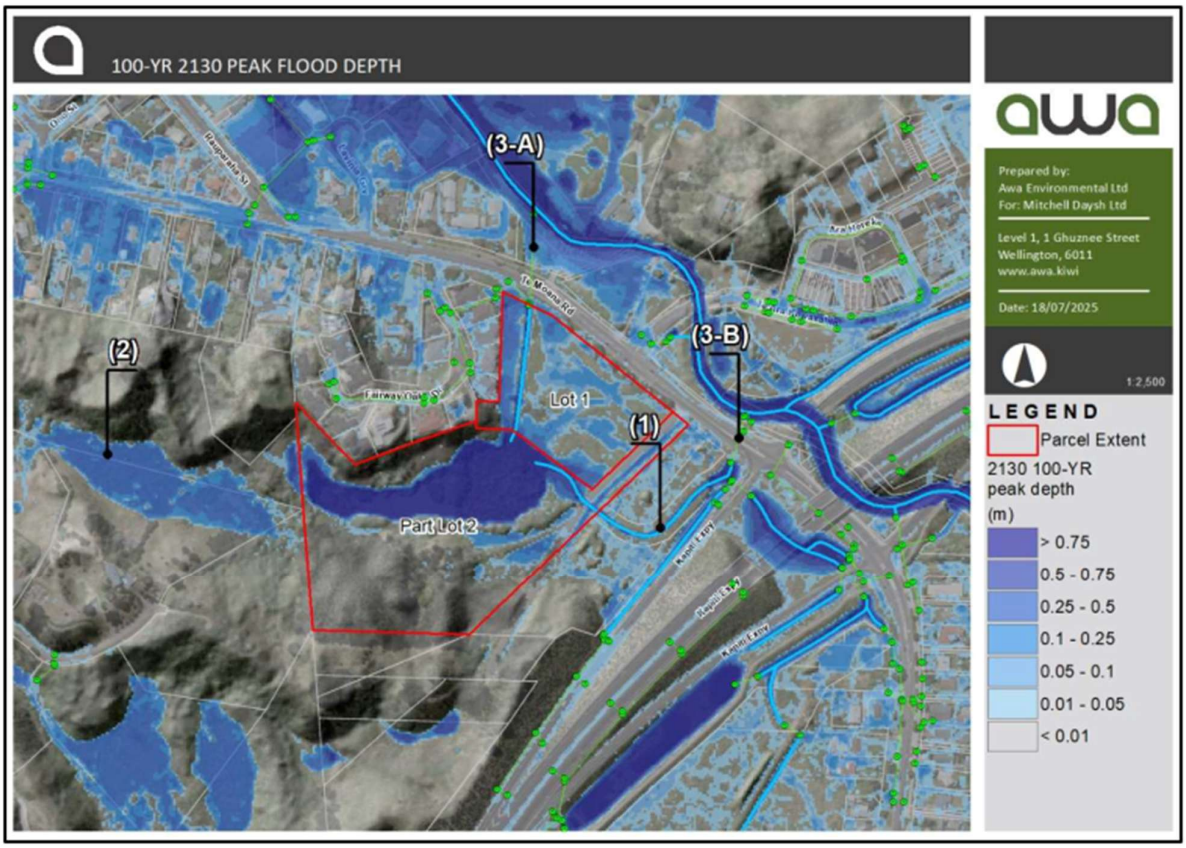

Figure 3. 100 year ARI 2130 existing flood depth map as presented in the SMP

6.11 The SMP reports that Local flooding on the site results from a combination of:

a. Runoff to the QEII wetland via expressway swales and channels associated with the M2PP Expressway;

b. Overland flow from higher ground to the west;

c. Tailwater effects from the Waimeha Stream and tidal influences resulting in backflow through culverts during the 100-year ARI event.

6.12 Based on my review of the information presented in the SMP and the flood modelling results, I generally agree that these are the primary mechanisms influencing flood behaviour within the site. I also agree that the flood depths reported in the SMP are generally consistent with those shown on Figure 3 and are representative of the flooding hazards affecting the site, subject to confirmation of depths and levels as described below.

Regional Flood Hazard

6.13 The SMP states that the site is not affected by 100-year ARI flooding in the Waikanae River as it is protected by three stopbanks;

a. Chillingworth stopbank;

b. Kauri-Puriri stopbank; and

c. Jim Cooke Memorial Park stopbank.

6.14 The SMP presents an updated regional flood assessment using Greater Wellington Regional Council (GWRC) breach hydrographs incorporated into KCDC's latest Local Waikanae TUFLOW model. The SMP concludes that this approach provides a more representative assessment of flood hazard than the legacy flood hazard mapping and earlier breach modelling.

6.15 The use of breach hydrographs within a hydraulic model is a well-established flood assessment methodology, and I support this approach. I understand that KCDC is currently updating its Local Waikanae flood hazard mapping. I further understand that these updates are expected to incorporate the latest climate change rainfall guidance, which may result in changes to the predicted extent and depth of flooding affecting the site.

6.16 The updated modelling presented in the SMP shows no flood impacts on the development site i.e. no increase in flood depths within Lots 1 or 2, from the Jim Cooke Memorial Park Breach Scenario as flows are largely contained within the existing urban area around Nimmo Avenue West and Charnwood Grove and are conveyed through local low-lying areas and the stormwater network before reaching the Waimeha Stream.

6.17 The updated modelling also shows no flood impacts on the development site from the Kauri-Puriri breach scenario. The Expressway embankment and existing dune topography act as barriers that contain and attenuate breach flows before they can reach the site. Flood storage occurs in low-lying areas adjacent to the Expressway and there is no increase in flow beneath the Expressway bridge towards the site.

6.18 The SMP states the Chillingworth breach is the only regional flood breach scenario that affects the development site. Breach flows travel northwest towards the Expressway, are partially stored in low-lying land adjacent to the embankment, then pass beneath the Expressway and enter the site, affecting Lot 1. Floodwaters subsequently move across Te Moana Road and discharge towards the Waimeha Stream.

6.19 The SMP reports that under this breach scenario, peak flood depths within the site are modelled to be approximately 10 mm to 600 mm with a reported top water level of RL3.7m (VD1953) in both Lots 1 and 2.

6.20 The SMP reports the Chillingworth breach scenario results in the "Residual Overflow Path" flood hazard category under the Kāpiti Coast District Council Flood Hazard planning Maps (FHPM). The residual hazard classification confirms the sites function in conveying floodwaters in this breach event and is therefore relevant to the assessment of future earthworks and development.

6.21 I agree with the conclusion that the Chillingworth Stopbank breach scenario is the only stopbank breach case considered that materially affects flooding on the subject site. However, I am unable to reconcile the SMP summary statement that maximum flood depths on the site are 600 mm during the existing development scenario 100 year ARI peak inundation (no breach scenario) results.

6.22 I understand from correspondence provided to me from Greater Wellington Regional Council (GWRC) that GWRC is currently updating the Waikanae River flood hazard model to reflect changes in catchment hydrology and hydraulics associated with urban development and construction of the Kāpiti Expressway. GWRC advises that updated hydrological inputs together with revised national climate change guidance adopted since the previous Waikanae River model was developed in 2011 may result in changes to the flood hazard profile affecting this site.

6.23 GWRC further notes that construction of the Kāpiti Expressway involved widening portions of the Waikanae River corridor to increase flood conveyance capacity. I understand from GWRC that this work has altered sedimentation patterns and river adjustment processes within the Chillingworth Stopbank reach. In my opinion, these observations are particularly relevant given that the Chillingworth Stopbank breach scenario affects flooding within Lot 1. The evolving river

morphology and hydraulic behaviour described by GWRC introduces uncertainty regarding the reliability of existing breach modelling results used in the Applicant's assessment.

6.24 In addition, GWRC has recommended that further detailed flood modelling should be undertaken that includes assessment of sensitivity to hydraulic roughness assumptions, bridge blockage scenarios (including blockage associated with debris accumulation and river aggradation), hydrological uncertainty, and the interaction between elevated groundwater levels and stopbank breach flooding. In my opinion, sensitivity checks such as these would provide confidence that the full extent of potential flood hazard affecting the site has been adequately characterised.

6.25 The results presented in Section 6.9 above (taken from the SMP) for the 100-year ARI existing development scenario, peak inundation (without a stopbank breach) indicate flood depths of up to approximately 800 mm within Lot 1. In my opinion, the reported peak depth of 600 mm is inconsistent with the modelling results presented elsewhere in the SMP. Furthermore, it would generally be expected that the additional floodwaters associated with a stopbank breach would not reduce flood depths on the site but would likely increase flooding relative to the no-breach scenario. Clarification from the Applicant of this discrepancy is necessary before reliance can be placed on the reported flood depths associated with the stopbank breach assessment.

6.26 Further, the SMP discusses site levels using the NZVD2016 vertical datum, while flood levels associated with the stopbank breach scenarios are presented using the VD1953 datum. I have not independently verified the conversion between these datums and therefore have not confirmed the accuracy of the reported flood depths resulting from the stopbank breach scenarios. I recommend that the flood levels and site topographic data are provided in the same datum so that flood depths can be readily verified.

Soakage Testing and Ground water

6.27 The SMP states that four soakage tests were undertaken across the site during October 2024, comprising two tests within Lot 1 and two tests within Lot 2. The methodology adopted for the soakage testing is not described in the SMP, and I have therefore been unable to review whether the testing was undertaken in accordance with recognised industry practice.

6.28 The SMP Soakage test results as reported are as follows

- Test 1 2384mm/hr
- Test 2: 11087mm/hr
- Test 3: 6874mm/hr
- Test 4: 5600mm/hr

6.29 The KCDC Subdivision and Development Minimum Requirements document recommends that a reduction factor of 0.25 be applied to soakage test results when determining design soakage rates.

6.30 The SMP notes that the reported soakage rates are unexpectedly high and concludes that further testing is required to verify the applicability of soakage and establish appropriate design rates in accordance with the KCDC Subdivision and Development Minimum Requirements document. I agree with this conclusion.

6.31 The SMP reports that groundwater levels vary across the site in response to seasonal conditions, rainfall events, soil characteristics and local drainage conditions. Groundwater was encountered by both AWA and Cuttriss during hand auger investigations at varying depths. Within Lot 1, AWA reportedly encountered groundwater at approximately 1.5 m below ground level, whereas Cuttriss encountered groundwater at approximately 0.6 m below ground level. The variation in observed groundwater depths suggests that groundwater conditions may be spatially variable and/or influenced by seasonal or recent rainfall conditions. The difference between the reported groundwater levels is significant and increases uncertainty regarding the suitability of infiltration-based stormwater disposal within parts of the site.

6.32 AWA recommends the installation of standpipe piezometers across the site, together with ongoing groundwater level monitoring, to better understand groundwater conditions. I support this recommendation and recommend that groundwater monitoring be undertaken over a sufficient period to capture seasonal variation and wet weather responses.

6.33 I support the recommendation that additional soakage testing is undertaken, together with assessment of groundwater levels, to confirm whether soakage disposal is appropriate within Lot 1 and the lower lying areas of Lot 2.

6.34 Based on the information presented in the SMP, I agree that soakage may be a viable stormwater disposal option within the elevated parts of Lot 2. The suitability of soakage and the adoption of design soakage rates should nevertheless be confirmed through additional investigation, testing and appropriate geotechnical assessment. I note that portions of Lot 2 comprise lower-lying land and may not exhibit the same infiltration characteristics as the elevated dune areas. Further investigation is therefore required, (in the same manner as Lot 1) to confirm the spatial variability of soakage rates across the Lot 2 site and the suitability of soakage as the primary stormwater disposal method throughout the lower areas of Lot 2.

7 ASSESSMENT OF THE PROPOSED STORMWATER MANAGEMENT STRATEGY

7.1 The SMP proposes two distinct stormwater management approaches for Lot 1 and Lot 2, reflecting the differing topographic, groundwater and flood hazard characteristics of each area.

Lot 1 Proposed Strategy

7.2 Lot 1 is low-lying land (approximately RL3.0m NZVD2016) that is affected by local ponding, elevated ground water and residual flood hazards.

7.3 The SMP concludes that high soakage rates were recorded across the site, indicating that infiltration-based stormwater management may be feasible. However, groundwater was encountered at varying shallow depths within the site and the reported soakage rates remain subject to verification through further testing and assessment.

7.4 Partial filling of the site is recommended in the SMP to facilitate future development to:

a. provide flood-free building platforms;

b. achieve recommended residential building levels; and

c. address both flood hazard and fluctuating groundwater levels.

7.5 The SMP presents various options to manage stormwater including use of low-impact soakage solutions, infiltration devices and storage/soakage crates located above the winter groundwater table. An alternative approach is the provision of a lowered attenuation basin or constructed wetland to provide compensatory flood storage to maintain hydraulic neutrality, avoid

floodwater displacement onto neighbouring properties, improve stormwater treatment and provide amenity values.

7.6 I generally agree that there are a number of potential stormwater management approaches that could be adopted within Lot 1. However, the suitability of these options remains dependent on further investigation of infiltration capacity, groundwater levels and the extent of earthworks required to mitigate flood hazards. In my opinion, additional assessment is required to determine the preferred stormwater management solution and its implications for the development. This should include consideration of the location and sizing of any stormwater management devices and potential effects on development yield and layout, maintenance access requirements, retention of existing drainage levels and connectivity, and any potential effects on the adjacent QEII wetland. Stormwater management should also consider the extent of filling required, as provision of compensatory flood storage may occupy a significant area of Lot 1 and could materially influence the achievable development layout and yield.

Lot 2 Proposed Strategy

7.7 A majority of Lot 2 is located on elevated dunes overlooking the QEII wetland and is generally located above both the local and regional flood hazard models. Soakage testing returned a high soakage rate.

7.8 The SMP proposes a low impact stormwater design option utilising soakage and infiltration within both public and private areas. Stormwater would be discharged to ground as close as practicable to its source (not directly via an outlet to the wetland), with the intention of replicating the pre-development hydrological regime.

7.9 I refer to Charles McDermott's evidence, which as I interpret it, does not preclude the application of concentrated stormwater soakage to ground within the elevated dune areas of Lot 2 on the basis of geotechnical risk, including risks associated with tomos (subsurface erosion features), liquefaction, or stability.

7.10 The SMP suggests the proposed approach will ensure the quality and quantity of water from the development will not cause adverse effects on the wetland.

7.11 Overall, I support the proposed stormwater management approach for the elevated dune areas of Lot 2, including the use of distributed soakage techniques to dispose of stormwater in a manner that more closely replicates the natural hydrological regime and pre-development hydrology. However, this support is subject to confirmation of appropriate design soakage rates through additional testing and geotechnical assessment confirming soakage is appropriate.

7.12 Soakage viability in the lower lying areas of Lot 2 is subject to verification as specific testing hasn't been undertaken in this area of the site and as this area is topographically similar to Lot 1, in my opinion may exhibit similar groundwater variability and soakage rates.

7.13 I agree with the recommendation in the SMP that earthworks within the site should be undertaken in a manner that minimises compaction of the free-draining sandy soils. Maintaining the infiltration capacity of these soils is important to the long-term effectiveness of the proposed soakage-based stormwater management approach. Accordingly, I would support a provision, condition, or assessment criterion within the Plan Change framework that seeks to minimise unnecessary soil compaction and maintain existing infiltration and hydrological soil characteristics to the extent practicable.

Natural Inland Wetland Effects (Lot 2)

7.14 The SMP states that the proposed stormwater design focusses on retaining the natural hydrological function of the wetland areas. To mitigate any negative impacts of development on the existing hydrological processes occurring within the wetland areas, the proposed design methodology will return stormwater to the ground by focusing on distributed soakage solutions mimicking natural infiltration patterns as reasonably possible.

7.15 The SMP reports that as such the groundwater hydrology is unlikely to be altered and the only rainfall diverted away from groundwater will be the water that ends up in each home rain tank.

7.16 I generally support the position that utilising soakage techniques to return stormwater to ground i.e. mimicking the natural hydrological cycle will reduce impacts on the natural inland wetland. However, the soakage potential on the Lot 1 area and the lower areas of Lot 2 is, in my opinion, limited due to high ground water and the high likelihood of filling on this area, and will require runoff to be managed via surface storage or other such means. This will potentially

reduce the recharge of groundwater in Lot 1 and the lower Lot 2 area which may in turn alter the hydrological conditions that support the wetland ecosystem.

7.17 Further, another important aspect of the site drainage which may affect the QEII wetland is the retention of the existing drains and culverts, at existing levels. Any lowering of these drains or culverts to facilitate site drainage or attenuation/flood storage may result in groundwater drawdown and associated changes to wetland hydrology. Any proposed modification to the existing drainage network would be subject to the relevant provisions of the National Environmental Standards for Freshwater and the Greater Wellington Regional Council Natural Resources Plan. Potential effects on groundwater levels, wetland hydrology and ecological values can therefore be assessed and appropriately managed through the future resource consenting process.

District Plan Hazard Provisions

7.18 The SMP report addresses the District Plan policies NH-FLOOD-P10 – NH-FLOOD-P13. The policies seek to maintain flood conveyance, avoid increases in flood hazard, and appropriately manage development within flood-affected areas.

7.19 The SMP concludes there is sufficient scope within the site to ensure the post-development site is consistent with the District Plan flood hazard policies.

7.20 The SMP reports that site design can maintain the effective functioning of residual overflow paths by providing controlled flood conveyance routes through the development and that any future design will need to demonstrate that any filling, earthworks, or floodwater diversion results in no more than minor increases in flood levels on adjoining properties and the surrounding residential area.

7.21 I agree in part with the conclusion that the effective functionality of the residual overland flowpath can be maintained. However, based on my review of the information provided, in the Chillingworth Stopbank breach scenario the flows though the site occurs over the entire south-eastern boundary of Lot 1 (~100m length) with reported maximum depths of 600mm. Reducing this flowpath width to enable residential development will likely require the concentration of flows resulting in increased flow depths, and potentially increased flood hazard.

7.22 The SMP states that some earth working of the site, particularly within Lot 1, will be required to create flood free building areas above the 1% AEP flood hazard. The SMP states that earth working can be off-set utilising soakage or storage within crates or compensatory storage areas to ensure less than minor increases in peak flood depths in surrounding properties and no reduction in storage capacity.

7.23 I agree in part with this statement. Earthworks within the Lot 1 area are more than likely to result in a measurable loss of flood plain storage volume which cannot be offset using below ground storage i.e. soakage. The extent of this storage loss has not been quantified in the material available to me. In my experience, underground soakage and storage systems are not typically relied upon as compensation for large-scale floodplain storage associated with overland flood inundation.

7.24 Further to the above point- the proposed scheme plan has a single vehicle access route to Te Moana Road which is shown to be inundated during the Chillingworth stopbank breach event. There is a risk that future design may require the internal road to be raised above existing ground levels to be clear of flood waters and the impact of lifting the internal road level could result in increased flood depths upstream. Maintaining flow conveyance over this proposed access will potentially require the concentration of flood waters and may result in flood depth over the accessway which may preclude safe access and egress during a flood event. Based on the information currently available, I have not seen evidence demonstrating that safe access and egress can be maintained during the Chillingworth stopbank breach scenario while also preserving flood conveyance and avoiding increased upstream (offsite) flooding.

7.25 I note that GWRC has identified the site as currently functioning as an important floodwater storage area. GWRC also notes that the rolling palaeo-dune topography means that earthworks and filling are highly likely to alter flood pathways and influence flood effects on neighbouring properties. These observations are consistent with my concerns regarding the extent of filling likely to be required within Lot 1 and the currently unresolved questions regarding hydraulic neutrality, floodplain storage compensation and maintenance of flood conveyance through the site. In my opinion, a detailed understanding of the scale and configuration of earthworks is required before the feasibility of development can be properly assessed.

8 RESPONSE TO SUBMISSIONS

I make the following comments in response to the submissions received on PPC5 relating to flooding, flood hazard, groundwater and stormwater management matters.

Submission S1

8.1 Submission S1 raises a number of related concerns regarding flooding, groundwater and stormwater management. I respond to the key flooding and stormwater matters below.

8.2 The flooding and stormwater concerns raised in Submission S1 are generally consistent with a number of the issues identified in my evidence. In particular, uncertainty remains regarding the ability of Lot 1 to maintain flood conveyance, floodplain storage, hydraulic neutrality, groundwater function and wetland hydrology, and safe access and egress following development. While engineering solutions may be available, sufficient information has not yet been provided to demonstrate that these matters can be appropriately addressed. In my opinion, these issues should be resolved through the Plan Change process rather than deferred to future resource consent stages.

Submission FS1

8.3 NZTA supports aspects of Submission S1 relating to the need for sufficient evidence to demonstrate that stormwater generated by future development can be appropriately managed and will not adversely affect downstream infrastructure, including NZTA stormwater assets associated with the Te Moana Road/MacKays to Peka Peka Expressway Interchange. NZTA notes the site's drainage catchment connects with swales and culverts forming part of the state highway stormwater network and emphasises the importance of demonstrating compliance with the District Plan stormwater management requirements as part of the Plan Change process.

8.4 I generally agree with NZTA's position. As discussed throughout my evidence, there remains uncertainty regarding the suitability of the proposed stormwater management approach for Lot 1, including groundwater conditions, soakage performance, flood conveyance requirements, floodplain storage and hydraulic neutrality. In my opinion, additional information is required to demonstrate that future development can be achieved without adverse effects on downstream

receiving environments or infrastructure, including the NZTA stormwater network. These matters should be resolved through the Plan Change process rather than being deferred to subsequent resource consent stages.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Based on the information currently available, I consider that Lot 2 has the potential to accommodate development with fewer flood and stormwater constraints than Lot 1. However, the extent to which Lot 1 can be developed while maintaining flood conveyance, flood storage, groundwater function and wetland values, whilst achieving the proposed development outcome remains uncertain.

9.2 In my opinion, these matters are fundamental determinants of the developability of Lot 1 and should be demonstrated through the Plan Change process. Additional investigation and assessment are required to confirm that adverse flooding, stormwater and wetland effects can be appropriately avoided, remedied or mitigated, and that development can occur without increasing flood hazard on surrounding land.

9.3 I also note GWRC's advice that the Waikanae River flood hazard model is currently being updated and that the revised modelling may alter the flood hazard profile affecting the site in the stop-bank breach scenarios. The pending GWRC model update creates further uncertainty and supports my opinion that the current information base is insufficient to conclude that development can occur within Lot 1 without adverse flood effects. Given the significance of flooding considerations to the developability of Lot 1, I consider it prudent that the most up-to-date flood modelling is used in the Applicant's assessment.

Date: 14th August 2026

James Oakley

Principal Stormwater Engineer

Te Miro Water Ltd