BEFORE HEARING COMMISSIONERS
FOR THE PALMERSTON NORTH CITY COUNCIL

I MUA NGĀ KAIKŌMIHANA WHAKAWĀ
MO TE KAUNIHERA O PAPAIOEA

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of proposed Plan Change I: Increasing Housing Supply and Choice to the Palmerston North District Plan

SECTION 42A TECHNICAL REPORT OF MARY WOOD ON BEHALF OF PALMERSTON NORTH CITY COUNCIL

STORMWATER

Dated 25 July 2025

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A. EXECUTIVE SUMMARY

1. The key conclusions of my s 42A technical report are:

   (a) The modelling and assessment used to establish the Stormwater Overlay is appropriate for setting provisions in Plan Change I ("**PC:I**") and identifying areas where further assessment will be necessary;

   (b) Operation and maintenance of private stormwater management devices is considered to be an aspect that would benefit from additional material (outside of PC:I) to help landowners understand their role in the stormwater management process; and

   (c) Overall, the stormwater management approach aligns with a Water Sensitive Urban Design ("**WSUD**") approach and managed flood risk in a matter that will align with the likely development opportunities in the Medium Density Residential Zone ("**MRZ**").

2. I do not recommend a change to the Stormwater Overlay, nor a change to climate change provisions or the basis for setting floor levels.

3. I do recommend that reference to the Stormwater Strategy is considered as this will give more confidence in the technical direction that will be required for development.

B. INTRODUCTION

4. My name is Mary Wood.

5. I am an Associate of GHD Limited and my role within the business is a Technical Lead.

6. I have 24 years' experience as a consulting engineer, based within Auckland and Tauranga but working on projects throughout the country. I have a Bachelor's Degree in Engineering from Canterbury University and a Masters in Civil Engineering from the University of Auckland.

C. CODE OF CONDUCT

7. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. I confirm that I have stated the reasons for my opinions in this report, and have considered all the material facts that might alter or detract from those opinions.

8. Statements expressed in this report are within the scope of my expertise.

9. I have all the information necessary to assess the application within the scope of my expertise and am unaware of any gaps in the information or my knowledge.

D. SCOPE

10. My s 42A report addresses my technical assessment of submissions received on PC:I that focus on stormwater management and flooding matters. I have evaluated the relevant submissions from a stormwater engineering perspective, considering the technical merit of concerns raised by submitters and the practical implementation of proposed stormwater provisions.

11. In preparing this report, I have reviewed the 'Stormwater Servicing Assessment' ("**SSA**") (29 October 2024), including Appendix C of that report – 'Citywide Plan Change Intensification – Model Build Report' prepared by Tonkin and Taylor ("**T&T**") in July 2024.

E. RESPONSE TO SUBMISSIONS

12. I have considered the submissions and further submissions for PC:I. In doing so I have identified several issues related to my expertise, which I address in detail below.

13. I have referenced submissions below as per the Palmerston North City Council's ("**the Council**") summary of submissions table.

14. Without listing all of the submissions, the main themes of submissions (from a stormwater perspective) related to the following issues:

    (a) Intensification in areas where residents have noted flooding;

    (b) Long-term maintenance of devices;

(c) Suitability of modelling for defining the Stormwater Overlay;

(d) Implications for works within the Stormwater Overlay;

(e) Suitability of the stormwater management approach;

(f) Permeable surface requirements impacting how sites can be developed;

(g) The need for copper and zinc provisions; and

(h) Annual Recurrence Interval ("**ARI**") to be used for flood levels – 50 year or 100-year and climate change.

15. I have attended pre-hearing meetings arranged by Ms Jenkin with the following submitters:

(a) Kāinga Ora;

(b) Rangitāne o Manawatū ("**Rangitāne**"); and

(c) Natural Hazards Commission and Horizons Regional Council ("**the Regional Council**").

16. These meetings were held on a 'without prejudice' basis and they were beneficial in clarifying the background and context behind some of the submission points received as well as discussing possible opportunities for resolution.

17. Overall, as there were a number of submission with overlapping themes, I have grouped my response to submissions by topic, rather than individual submissions.

F. STORMWATER SERVICING ASSESSMENT - METHODOLOGY OVERVIEW

18. I was not involved in the preparation of the SSA but I have highlighted the assessment methodology in the items below as this is relevant to a number of submissions points that I will respond to later in this document. As an overarching comment, however, I consider the assessment undertaken to be a pragmatic and balanced approach to assessing stormwater issues and developing stormwater provisions for a plan change.

19. The SSA considered a combination of modelling outputs, spatial data and historical records.

20. The 'Status Quo' assessment considered:

    (a) Existing piped network performance (including GIS data relating to pipe age); and

    (b) Existing flood hazard risk (including validation of 2D model flood depth outputs with historical flood data and complaints).

21. The 2019 TUFLOW model was built using TUFLOW software and was constructed as a 2D model (largely considering the surface/topography of the city) with large diameter pipes represented as open channels of equivalent hydraulic performance. The model was built and validated using information obtained from the Council's GIS database circa 2016 and 2018.

22. The 2019 model provides the initial background in the Status Quo assessment into areas prone to flooding and identifies areas where pipe upgrades may be necessary, noting that the model results would be considered conservative (i.e., predict greater flooding than actually occurs) for frequent rainfall events since the piped reticulation in that model was simplified in the model as open channels.

23. Based on the modelling results, pipe capacity, pipe age information and flood complaints, the Status Quo assessment was used to initially identify areas where additional assessment would be required.

24. As with all models, on-going updates and improvements occur. In 2023, parts of the 1D piped network were added/updated in specific areas of the city and incorporated building footprints.

25. This 2023 1D-2D model was used to assess the possible impact from future intensification, considering changes in impervious surface coverage and then assessing comparative impacts on peak flood depths.

26. Future intensification was modelled with two main scenarios:

    (a) City-wide intensification; and

(b) Scenario 2 – areas where there is no increase in upstream or downstream flood depth.

27. The intensification assessment considered 100% impervious coverage in land use for the city and an increase to 80% impervious for remaining intensification areas. Results were then reviewed to determine whether there was a change in flood depths in a 100-year Average Recurrence Interval ("**ARI**") event with climate change scenario RCP 6.0:

(a) Areas that showed an increase in downstream flood depths were flagged for further assessment; and

(b) Areas that showed no change, were then reviewed separately in Scenario 2.

28. Scenario 2 involved a review of those areas where there was no change in 100-year flood depth for different rainfalls - 2, 10, 50 and 100-year ARI events – and reviewed flood extents and depths.

29. Based on the results from the above assessment the proposed zoning was separated into areas where development could be considered as a permitted activity (based on the results from Scenario 2), or where further site-specific stormwater assessment is required (a combination of the outputs from the Status Quo Scenario and the city-wide intensification scenario) – this is the basis of the Stormwater Overlay.

30. The use of the Stormwater Overlay is a precautionary approach to flag where further stormwater assessment may be required – it does not necessary indicate that development is unsuitable. For some areas, a more detailed assessment may indicate that mitigation may be required before development can occur. This could include catchment-wide improvements or localised pipe or overland flow path capacity improvements, for example.

General: Zone Extent - Intensification in areas where residents have observed flooding

31. Several submissions have been received from members of the public with regard to the zone extent – opposing or requesting the zone extent to be amended to

reflect local flooding that they have experienced. This includes submissions[1] from:

(a) **J Tipping** "*We already have significant storm water problems at the Bottom of the hill in Margaret Street, mainly house numbers 10, 12, 11 and 9 and 9A. The storm water floods the street on both sides of the road in heavy rain events. Twice the fire brigade has been called out to pump out water surrounding the house at 9A*"';

(b) **A Anderson** "…*storm water reticulation in the street has been a significant problem for a number of years, which even with regular Council staff intervention, has not [fixed] the problems*.";

(c) **S Haslett** "*Surprised that an area in Awapuni between Whikiriwhi Crescent and Buick Cresent and adjacent to the Manawatū River has been included as this area is flood prone*";

(d) **S Stewart** "…*further, the street drainage point in this street get blocked multiple times a year due to (public) trees' leaves and in heavy rain often floods the cul-de-sac entranceway and makes it difficult for pedestrians and cars*.";

(e) **M Prince** "*The area of Keeling St where I live floods from footpath to footpath (sometimes over the footpath) in periods of sustained heavy rain. Flooding occurs between 65 and 71. The water does not drain away through the stormwater grates (outside 67 and 70 Keeling St) until well after rain has eased*";

(f) **A Aird** "*Increasing density/site coverage in this area without attention to cumulative effects of stormwater ponding due to the existing disposal issue of stormwater into the gutter from land below road level will lead to localised surface flooding*"; and

(g) **B Norrish** "*The section of Linton Street that runs from Ferguson St to College St frequently floods. The storm water system is unable to cope, and cars have been flooded above there floors and carpets and*

[1] SO30.1, SO63.1, SO79.4, SO183.1, SO65.1, SO67.1, and SO111.3.

engines ruined on a regular basis. Increasing the density in the area will only make matters worse.".

32. I have annotated a figure from the SSA and provided this as **Figure 1** in the Appendix to my evidence – this shows where flooding issues have been indicated in submissions, overlain on modelled flood depth in a 100-year event.

33. I consider the modelling approach used to establish the Stormwater Overlay has been undertaken in a pragmatic manner, considering the different datasets and model outputs available at the time of undertaking the assessments.

34. Complaints and anecdotal data, while valuable, may not necessarily align with large flood event data as there can be other reasons for observed flooding that may not be apparent to those directly impacted by the flooding. For example, local flooding experienced by residents can occur for a number of reasons, such as insufficient inlet capacity compared to the rainfall intensity, inlet blockages, local pipe capacity constraints and capacity constraints downstream backing up the pipe network.

35. There is also a difference in perception of flooding. Flooding of a road can cause nuisance and distress to local residents when it occurs but does not always reflect an issue from a stormwater management perspective. Flooding of a road can be an important part of a secondary flow path system – to provide space for stormwater to pond and move when the pipe system is at capacity. Flooding of local roads was therefore excluded from the complaints review undertaken in the SSA and the review focused on flooding of private land. I consider this to be appropriate, given that the plan change is focused on redevelopment of private land.

36. While some of the submissions in my opinion reflect comparatively shallow flooding of the roads, there is reference to more significant flood depths.

37. Flooding noted on Linton Street between Ferguson St to College St made reference to depths reaching inside vehicle doors. I have reviewed the contour data for this section of road. This section of the road drains to the north, is flat and may have some smaller localised depressions within the road reserve that may result in localised deeper flood depths without necessarily being

representative of a wider flood risk with redevelopment. No flooding is predicted in this area in the T&T modelling report.

38. Similarly, the southern end of Margaret Street is flat and contours indicate some localised depression areas that could be challenging to drain. These depressions do not appear to be deep. There is a flat gradient to Main Street for the southern end of Margaret Street that may impact how quickly water will drain during and after a rainfall event but there is no flooding predicted in this area in the T&T modelling report.

39. If intensified, areas in the MRZ but outside the Stormwater Overlay will still need to meet standards with regard to the provision of attenuation, minimum permeability limits and floor levels. The modelling is slightly conservative in this regard.

40. Based on review of the maps provided in the SSA and the areas noted in the submissions, I do not believe there is sufficient information to indicate that the Stormwater Overlay should be altered to include the areas referenced in submissions listed in paragraph 31. I note that the Council review their District Plan every 10 years – at this time the overlay should be reviewed to allow for ongoing model update and network improvements that may have been undertaken.

General: New Policy - On-going performance of stormwater attenuation devices

41. **Rangitāne** are concerned that, as currently drafted, PC:I does not adequately address the need for on-going maintenance and performance of the stormwater attenuation devices that will be relied on to manage stormwater. Rangitāne seeks a new policy to address this.[2]

42. In my opinion, ongoing maintenance and performance of private stormwater management devices is an aspect that does need further consideration by the Council. From an asset management perspective, these devices must function as designed to provide effective stormwater management. Without ongoing maintenance, their effectiveness will deteriorate over time, potentially compromising the attenuation they are intended to provide.

[2] SO137.15.

43. Within my expertise, however, it is not clear that the Palmerston North District Plan ("**District Plan**") would be an appropriate method for managing this aspect of asset management.

44. Rangitāne's suggestion of amendments to the Stormwater Bylaw aligns with the approach taken by other councils such as Auckland Council, to set out the requirements of private stormwater management systems. I have reviewed the Council's current Stormwater Bylaw,[3] noting that this is next due for review in 2027. While not as detailed as Auckland City's bylaw, it does set out expectations for operation and maintenance of a device and on this basis, it provides a legal basis for enforcement by the Council, if required.

45. There would be significant cost involved in administering a monitoring and inspection programme for private attenuation devices. From discussion with the Council's Stormwater Services Manager, the Council is aware of the risk associated with poorly managed devices. Private attenuation devices are one mechanism for managing flood risk and takes into account that intensification may occur in a fragmented manner on a lot-by lot basis. Provision of attenuation tanks does not preclude the Council providing additional catchment-based approaches and devices to further mitigate flood risks and provide wider benefit. These could be identified through the SSA. I do not support Rangitāne's suggestion of an inspection and maintenance programme for private devices.

46. Other suggestions in Rangitāne's submission include publication of guidance documents for private landowners and I would support this approach.

General: Modelling for Stormwater Overlay

47. **Kāinga Ora**[4] opposes the Stormwater Overlay and requests its deletion until all information is publicly available, fully assessed and further modelling is completed.

48. The development of the Stormwater Overlay is underpinned by modelling outputs as well as other spatial data. As noted earlier, the Status Quo assessment considered (alongside spatial data) existing flood hazard risk, including

3 stormwater-bylaw-2022.pdf.
4 SO199.1.

validation of 2D model flood depth outputs with historical flood data and complaints.

49. Future intensification was modelled with two main scenarios using a 1D-2D model for city-wide intensification and Scenario 2 – areas where there is no increase in upstream or downstream flood depth. Scenario 2 was used to further test areas within the MRZ but outside the Stormwater Overlay.

50. The modelling undertaken represents the best information available at the time for assessing stormwater and flood risk across Palmerston North. In my opinion, the level of detail provided is appropriate for identifying areas where stormwater needs further consideration during the development process, and has proven to be appropriate in other cities such as in Auckland.

51. Areas within the Stormwater Overlay have been flagged as needing further assessment and therefore review of stormwater and flooding within the Stormwater Overlay on a site-specific basis is appropriate, as development and any required mitigation can be considered at a more granular level on a case by case basis.

52. Further, the Stormwater Overlay provides a risk-based framework using the best available city-wide data. Removing the overlay until there is further information, such as sought by Kāinga Ora, would remove the key tool available for managing stormwater risk from intensification. In my opinion the Stormwater Overlay does not indicate that development cannot occur but instead flags the need for appropriate site-specific evaluation and potentially mitigation to be considered as part of planning for development in these areas. I therefore do not agree that the Stormwater Overlay should be deleted.

Policy MRZ P6 Adverse Effects Flooding and Stormwater

53. **Rangitāne**[5] seek significant amendments to this policy including:

(a) Specific mention of climate change, future resilience, a preference for nature-based solutions;

[5] SO137.13.

(b) Requirement for ongoing maintenance and repair of stormwater devices; and

(c) Mitigation measures may need to include reducing post-development flows so that they are only a percentage of the pre-development flows, to address the constraints on the existing network and existing downstream flood risk.

54. Climate change and resilience has been considered as part of developing the stormwater overlay (refer to paragraph 27) and the modelled scenarios.

55. I believe operation and maintenance aspects could be addressed through a similar response to paragraph 42-46 above.

56. A key point raised in Rangitāne's submission is that hydraulic neutrality may be inadequate in some areas and therefore propose that current levels of risk, as identified in the SSA, are *reduced*. They request that additional capacity should be built into the system, to achieve climate change resilience in areas which are already subjected to significant stormwater ponding.

57. In my opinion, PC:I attempts to balance the challenges stormwater and flooding with the need to provide for additional housing through enabling intensification. A reduction in flood risk (through attenuation or implementation of a blue-green corridor for example) is not easy to achieve in existing urban environments, largely due to space constraints – the right area, in the right location, at the right level. The proposed approach of maintaining permeable surfaces, alongside on-site attenuation and the requirement to maintain pre-development flows allows for a combination of volume and peak flow management that can be accommodated flexibly at a site level.

58. Wider, catchment management approaches could be a mechanism for achieving a reduction in flood risk with wider benefit, but I consider that this may be best addressed potentially through the SSA that is currently under development. I do not recommend a change in the wording of Policy MRZ-P6 but I have recommended a change in MRZ P7.

Policy MRZ P7 Development in the Stormwater Overlay

59. Submissions on this policy relate to its removal or amendment:

(a) **F Barnett**[6] requests removal for the need to have a stormwater management plan for all development within the Stormwater Overlay; and

(b) **K & N Smidt**[7] oppose the policy, noting that "*Council is already approving developments which were not allowed in the past- these sites are actually often very wet with ponding at times and considerable risk- also prevent run off from existing properties*".

60. Stormwater management plans are the primary mechanism available to the Council to be confident that a systematic assessment of stormwater issues and mitigation options is undertaken at the appropriate level of detail. I do not support the removal of stormwater management plans as proposed by F Barnett.

61. For similar reasons, I do not support the removal of the policy as proposed by K & N Smidt. The Stormwater Management Plans are intended to address the potential impacts that they have identified and allow for identification of mitigations at a site specific level, including management of on and off-site effects.

62. There is a question of scale of development that would trigger these policies and subsequent rules. **Phocus Planning**[8] suggests that a stormwater management plan should not be required for a small development where it clearly has no adverse effect (i.e. garden shed/pergola). Considering this submission, a threshold approach may be beneficial to balance the scale of works to the level of consenting and management that would be triggered. A limit of 30m^2 or less would be a threshold that would align with the Council's threshold for building consent exemptions.[9]

63. **Kāinga Ora**[10] opposes the policy or, if the Stormwater Overlay is to be retained, then they seek that the reference to an individual's qualifications are removed from the proposed wording as this is considered too restrictive.

6 SO68.1.
7 SO116.7.
8 SO185.13.
9 building-30sqm-or-less.pdf.
10 SO199.22.

64. I do not support the deletion of the Stormwater Overlay, for the reasons stated in paragraphs 48-52. The policy states a preference for experience in Water Sensitive Urban Design ("**WSUD**"), not a qualification. I consider that this wording should be retained.

65. **Rangitāne**[11] seek significant amendments to this policy (similar to those for MRZ-P6) including:

(a) Specific mention of climate change, future resilience, a preference for nature-based solutions; and

(b) Mitigation measures may need to include reducing post-development flows so that they are only a percentage of the pre-development flows, to address the constraints on the existing network and existing downstream flood risk.

66. Overall, Rangitāne consider that important technical direction (such as matters listed above) should be identified and clearly signalled via the policy.

67. In my opinion, this direction could be addressed through referencing the SSA that is being prepared, with the addition of a new item "6: demonstrates alignment with the Council's Stormwater Strategy and MRZ P6 and P8". This document is being prepared in conjunction with Rangitāne and will provide the required technical direction, alongside the Council's Engineering Standards which reflect requirements for climate change and WSUD.

68. Nature-based solutions relate to similar tools and approaches to WSUD, and, particularly in an urban environment would result in similar approaches being applied to stormwater management. I believe that the reference to WSUD is sufficient and aligns with the Council's Engineering Standards. I do not support additional references in PC:I to nature-based solutions.

69. Maintenance of private devices, I have covered in item 42-47 of my evidence previously.

[11] SO137.14.

Policy MRZ P9 Building materials

70. **Rangitāne**[12] seek an amendment of the policy so that it signals that materials such as copper and zinc should be avoided in the first instance, or else mitigated.

71. In my opinion, the policy could be adjusted – treatment in this context references sealing or protective coatings to the material itself, rather than a treatment device. I recommend the following amendment "…*surface* treatment, *to reduce contaminant generation*".

72. **Chris Teo-Sherrell**[13] requests the addition of 'and plastic' after 'zinc' to reflect the risk from microplastics.

73. Microplastics are an emerging contaminant of concern but at this time there is not a sufficient body of evidence to support source control on new building materials (within the context of possible other sources of microplastics), nor guidance on local non-plastic alternatives. I do not recommend that microplastics are added to this policy at this time but note that this could be reassessed when the district plan is next reviewed.

Policy SUB-MRZ-P4 – Subdivision in the Stormwater Overlay

74. **Rangitāne**[14] seek a number of amendments to this policy that align with their submission on SO137.14, on MRZ-P7discussed earlier in my evidence. I consider that an amendment to SUB-MRZ-P4 could be similarly addressed through a comment referencing alignment with the SSA that is being prepared.

75. **Kāinga Ora**[15] oppose this policy and request its deletion, similar to SO 199.22, identified in paragraph 63 of my evidence. As per my response in paragraph 64, I do not agree that the Stormwater Overlay should be deleted.

Rules: MRZ-R10 Construction within the Stormwater Overlay

76. A range of submissions were received on this rule, including those that oppose any development within the Stormwater Overlay **(K and N Smidt**[16]**)**, those that

12 SO137.17.
13 SO184.21.
14 SO137.39.
15 SO199.8.
16 SO116.18.

oppose and suggest permitted activity status pathway **(Phocus Planning**[17]**)** and those that request development to be permitted only in an exceptional set of circumstances **(R and G Norris**[18]**)**.

77. The Stormwater Overlay effectively flags that there could be an issue with stormwater management when considering intensification of sites within the overlay, and that further assessment is required. Review on a site specific basis may provide the opportunity to refine this risk and where necessary, apply appropriate mitigation. I consider that application of the Stormwater Overlay is a balanced, pragmatic approach to manage future risk associated with intensification while enabling development. The overlay does extend over a large portion of the MRZ but this reflects some of the challenges of the city – largely flat land, bounded by two river systems.

78. Considering this submission, aligned with my earlier response (item 61) a threshold approach may be beneficial to balance the scale of works to the level of consenting and management that would be triggered. A limit of 30m^2 or less would be a threshold that would align with the Council's threshold for building consent exemptions.

79. The submission from **Rangitāne**[19] suggests an amendment to item 3 that gives the Council scope to ensure neighbouring stormwater attenuation devices are not compromised by new development (e.g. overland flow from a new development being directed across a boundary and overloading the capacity of neighbouring systems). While I understand the cross-boundary issue that Rangitane are raising, I would consider this to be addressed sufficiently in clause 1 of the rule. I do not support further changes to this rule.

Rules: MRZ R23 Managing copper and zinc materials

80. **K and N Smidt**[20] and **R and G Norris**[21] oppose the requirement for sealing of copper or zinc building materials for new buildings and structures, noting that

17 SO185.29.
18 SO191.18.
19 SO137.26.
20 SO116.30.
21 SO191.30.

Palmerston North's location and industries make this type of contamination unlikely.

81. The main mechanism for zinc and copper leaching from roofs is from corrosion over time. The rate of corrosion is impacted by the acidity of the rain but leaching is also impacted by other factors such as the age of the material, roof slope, and rainfall intensity. Rainfall in New Zealand would naturally be slightly acidic so even without additional acidity or deposition risks from climatic conditions or industrial activities (as suggested in these submissions) a precautionary approach is warranted to limit leaching. Sealing of these materials enables them to still be used but limits the opportunity for metals to enter stormwater.

82. The leaching of metals from building materials represents a direct consequence of urban development and building design choices. The cumulative effect of multiple properties within a catchment can result in elevated metal concentrations in stormwater runoff. By managing these effects at the point of development through building and design controls, the Council can address the environmental impacts of urbanisation development that it is enabling through this plan change before they contribute to broader water quality issues. This approach aligns with managing the effects of land use activities within the district. I do not recommend deletion of MRZ-R23.

Rules: MRZ R24 Stormwater treatment for carparks

83. **The Council**[22] has proposed an amendment to MRZ-11 to move to an area-based requirements for treatment rather than a number of carparks and garages.

84. Treatment of external car parks and turning areas is appropriate in my opinion, as these areas have a greater potential to generate stormwater contaminants due to the increased friction from turning as well being exposed to stormwater. I agree with the proposed amendment to remove reference to garages as these areas would not typically be exposed to stormwater. I consider the proposed use of 100m^2 or less for permitted activity status strikes a balance between the need

22 SO166.19.

for treatment of higher risk areas and the ability to administer at a pragmatic scale. Accordingly, I would support adoption of this amendment.

85. Similar to their earlier submission points, **Rangitāne**[23] raised concerns in regard to ongoing maintenance of private stormwater treatment devices. They have suggested that this could be required through a consent notice or similar. As noted earlier, in paragraphs 42-45, I agree that maintenance, access and monitoring of performance is a challenging aspect for devices on private land. For reasons given earlier, I consider that this would be a challenging issue to manage through a resource consenting process and can be best accommodated through the Stormwater Bylaw.

86. **Leith Consulting**[24] have suggested amending so that four on-site car parks for residential living do not require a resource consent. As noted in my response to item, I consider that treatment should be provided where there is a larger area of car parking and turning surfaces and that the threshold of 100m^2 or less is appropriate.

87. **Kāinga Ora**[25] have requested the deletion of MRZ-R24 and suggest that stormwater treatment matters should be included as a matter of discretion within Rule MRZ-R8. They also suggest this rule should be located within the Land Transport Chapter and be based on an area and not the number of carparks. I do not agree with removal of this rule as treatment of larger car parking areas is necessary to manage the risk associated with vehicle-derived contaminants. The suggestion of moving these matters to MRZ-R8 is not appropriate as the need for treatment is broader than the application of MRZ-R8 (which is specific to development of 4 or more dwellings or papakāinga). I consider that the application of the area-based approach as per the Council's submission discussed earlier addresses the comment around area vs the number of carparks.

23 SO137.28.
24 SO170.46.
25 SO199.29.

Rule: SUB-MRZ-R1

88. **Rangitāne**[26] seek to have the rule amended so that it:

(a) Requires alignment with the Stormwater Strategy;

(b) Addresses operation and maintenance of devices; and

(c) the need for off-site effects to be considered.

89. I consider that alignment with the SSA is already addressed in item 5 of the Restricted Discretionary Rule, and I consider that the on and off-site effects are already addressed in the rule as it is currently drafted. Operation and maintenance has been discussed previously in my evidence and I consider that it can be managed through the current Stormwater Bylaw as noted in paragraph 44 of my evidence. I do not agree that further amendments to this rule are required.

Standards: MRZ-S9 Permeable surfaces

90. **Rangitāne**[27] are supportive in part but raising concerns regarding the ability to maintain permeable surfaces in private land on an ongoing basis. Their submission makes specific reference to permeable paving in this context.

91. I agree that while permeable paving is a tool available to the industry for reducing the generation of runoff, there is a limited pool of information currently available in terms of long-term maintenance and upkeep of these surfaces within New Zealand. Soakage-based devices (including permeable paving) would typically not be supported within a residential area (based on the Council's Engineering Standards, item 6.7.1.7) and would require specific approval from the Stormwater Service Manager. This approval would be subject to performance and maintenance requirements. On balance, I believe that the wording in the Council's Engineering Standards provides sufficient guidance such that permeable paving would not be a preferred option but still leaves opportunity for some flexibility to be considered, subject to performance and maintenance requirements being identified.

26 SO137.40.
27 SO137.31.

92. **C. Teo-Sherrell**[28] has requested greater permeable surface to be considered than the 30% currently proposed. This is echoed in the submission from **H. Teo-Sherrell.**[29] In my opinion, I consider 30% to be a reasonable balance between the need to maintain a level of permeability to align with WSUD stormwater practices but also to enable increased intensification and provision of increased housing supply. I do not recommend a change to the proposed permeability to be required across the MRZ zone.

Standards: MRZ-S10 Stormwater attenuation devices

93. **Rangitāne**[30] considers there is a need to highlight the difference between rainwater harvesting and attenuation tanks. I agree with this, as this can be confusing to the general public. An advice note clarifying the different functionality would be an appropriate method for addressing this.

94. Rangitāne also raise concerns about the ability to monitor and assess compliance and maintain the performance of attenuation tanks over time. I consider that the details of the tank design and placement would be addressed as part of the Building Consent process for individual properties. The Council's Stormwater Attenuation Design Guide provides guidance for stormwater attenuation tanks, including recommendations for maintenance. This process would be sufficient to clearly set out the requirements for attenuation.

95. On-going maintenance and performance are a more challenging issue and as noted earlier in my evidence in paragraph 44, the Stormwater By-Law as it currently stands provides a requirement for operation and maintenance and enforcement, if required.

Standards: MRZ- S10 Stormwater Overlay

96. **G Binns**[31] opposes the Stormwater Overlay and indicates that increased network capacity combined with larger attenuation devices would be more appropriate and suggests that 35% of the city should be protected by detention systems.

28 SO184.5.
29 SO104.6.
30 SO137.32.
31 SO93.3.

97. While larger attenuation devices can be appropriate in some situations, land for attenuation can be challenging to find. This is further compounded by the relatively flat land within Palmerston North, as this can result in deeper systems (and therefore larger footprints) for devices that can fill and drain via gravity-based network.

98. In my opinion, managing stormwater on site, using source control and management is a preferable approach for managing runoff and (for intensification of the type to be enabled by PC:I) allows for storage to be provided by the developer, as development occurs.

99. **Phocus Planning**[32] raises concerns that non-intensification works (for example, construction of a garden path) within the Stormwater Overlay will be subject to the same constraints as for intensification and requests a permitted activity status for works.

100. Considering this submission, aligned with my earlier response (item 61) a threshold approach may be beneficial to balance the scale of works to the level of consenting and management that would be triggered. A limit of 30m^2 or less would be a threshold that would align with the Council's threshold for building consent exemptions.

Standards: MRZ-S11 - Floor levels 1% vs 2% and climate change

101. The **Natural Hazards Commission Toka Tū Ake**[33] requests that standards be based upon a precautionary approach using 1% AEP and climate change scenario RCP 8.5, instead of the proposed standard considering a 2% AEP and climate change scenario of RCP 6.5.

102. Considering climate change, the results from the modelling as provided in the SSA at section 5.3.1 indicated no significant difference in flood extent between RCP 8.5 and RCP4.5 in a 1% event. This is unsurprising as although it is important to include climate change, the actual change in rainfall data between different climate scenarios can be relatively small and the impact on flood extent and depth may not be noticeable within typical model limitations.

32 SO185.54.
33 SO210.14.

103. I do not consider a change to RCP 8.5 will alter the findings of the SSA and I do not support a change at this time.

104. Minimum floor levels for the MRZ have been set based on a 2% AEP flood event plus climate change, including freeboard as identified by the Council. This is consistent with the Building Code of New Zealand,[34] and NZS4404.[35] NZS4404 is a key reference for the Council's Engineering Standards 2025.

105. While I have not reviewed the model nor its numerical results, I have reviewed the model outputs presented in the SSA.

106. The general intensification scenario showed only small differences in flood extent in the wider intensification area between the 50 and 100 year ARI flood levels. For areas that are flat then the differences in flood depth can be less pronounced – water will spread out a little more in areas that already subject to flooding but may not increase significantly in depth.

107. I have discussed the basis for setting floor levels with the Council's Stormwater Service Manager. The Council consider that the 50-year ARI plus freeboard is appropriate for Palmerston North, noting that this is a minimum baseline requirement and where Council consider there could be additional risk then an increased freeboard allowance will be specified by the Council. I consider that this is a balanced approach, as it allows for alignment with Building Code requirements, but it does provide the Council with the flexibility to apply a higher freeboard where appropriate. On this basis, I do not support a change to the flood standard.

108. **Leith Consulting**[36] considered that MRZ-S11 should be deleted, based on limitations noted in the T&T report as well as noting issues with the potential for modifications in ground level. I believe the modifications proposed by the Council clarify that changes in ground level should not be part of the standard. I consider the level of detail covered by the modelling to be appropriate for the

34 Acceptable Solutions and Verification Methods for Clause E1 Surface Water (effective 2 Nov 2023) | 1st edition | Amendment 12.
35 New Zealand Standard: Land Development and Subdivision Infrastructure, 2010.
36 SO170.11.

purpose of informing a plan change – as discussed earlier in my response to SO199.1 (in paragraphs 48-52).

Mary Wood

25 July 2025

APPENDIX 1

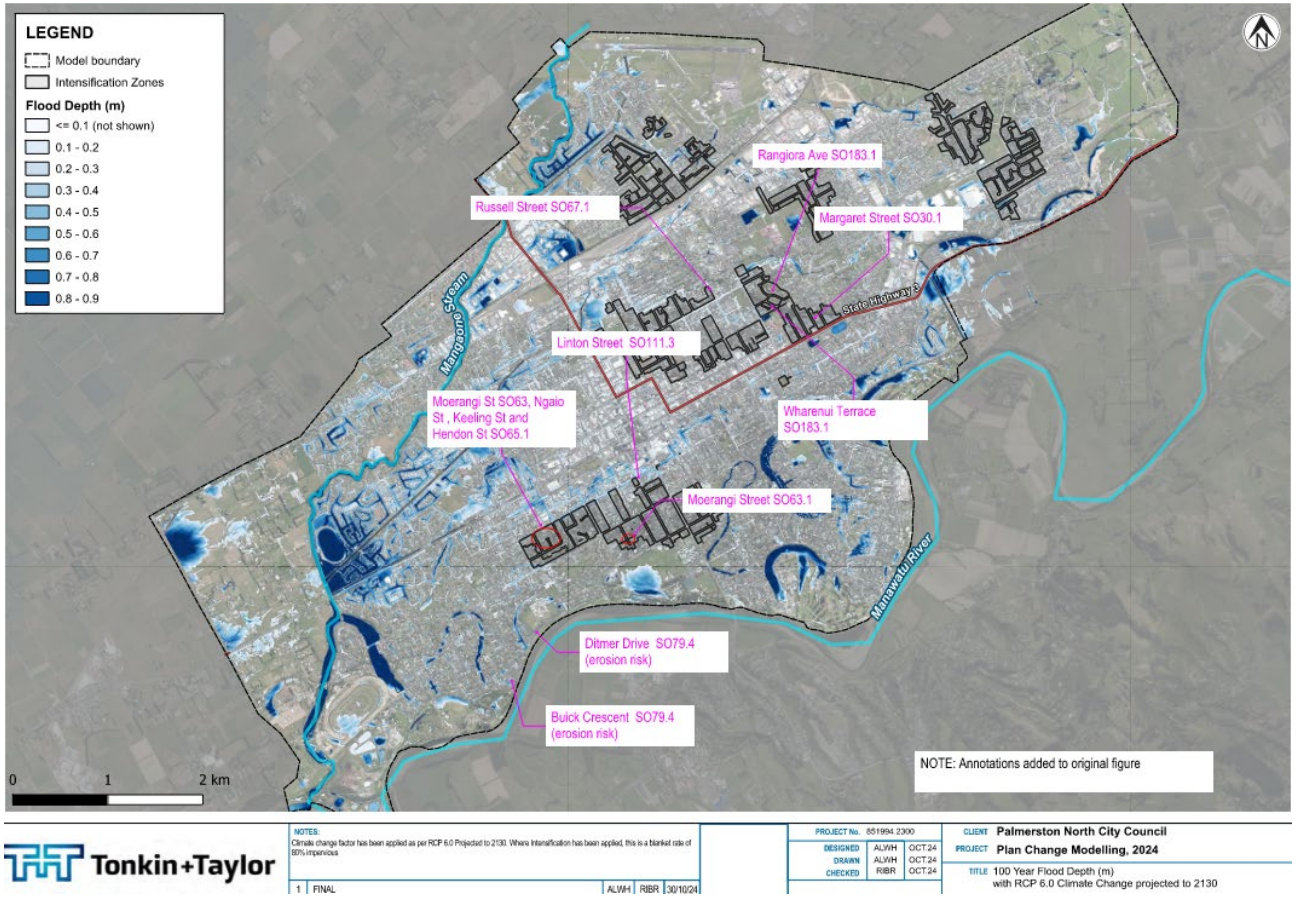

Figure 1 Annotated 100-year model output (copied from Stormwater Servicing Assessment) showing location of submissions relating to overlay extents