Under	the Resource Management Act 1991 (**RMA**)
In the matter of	**Proposed District Plan Change E - Roxburgh Residential Area**

Statement of evidence of Mary Wood

22 April 2025

Applicant's solicitors:

Qualifications and experience

1. My name is Mary Wood.

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

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

4. My experience includes stormwater assessment and design to support consenting, development engineering, stormwater quality management for road and industrial sites as well as broader infrastructure planning and analysis.

5. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence has been prepared in accordance with it and I agree to comply with it.

Scope of evidence

6. I have been asked to prepare evidence in relation to stormwater and flooding associated with Plan Change E.

Introduction

7. As part of the planning for the Plan Change for the Roxburgh Crescent residential re-zone (Plan Change E), a stormwater assessment was undertaken to review the stormwater requirements associated with change in land use.

8. The proposed Plan Change E area is roughly a 4.5-hectare block of land located to the east of the city centre in Hokowhitu, adjacent to the Manawatū River.

9. The area is bounded by the Manawatū River and associated stopbanks, Roxburgh Crescent Reserve to the east and Ruahine Street to the west. The area is currently zoned industrial and largely surrounded by residential development (refer to Figure 1 appended for an overview of the location).

10. A piped stormwater network (that includes flow from a wider upstream catchment) passes through Roxburgh Crescent continues through the stopbank and discharges into the Manawatū River.

Methodology

11. The stormwater servicing assessment considered:

- Existing piped network performance
- Future piped network performance as a consequence of changing land use
- Assessment of flood risk in larger events
- Proposed water quality management

12. The existing stormwater performance assessment included modelling using PCSWMM to review the existing network capacity with existing Roxburgh Crescent land-use (0% pervious) and considered both current rainfall and climate adjusted rainfall.

13. The future stormwater performance assessment then considered the scale of change in runoff that could occur if the Roxburgh Cresent land use redeveloped to:

- fully (100%) pervious
- 30% pervious
- 45% pervious

14. The above redevelopment scenarios included one pipe upgrade on Roxburgh from a 225mm diameter pipe to a 300mm diameter pipe to comply with Palmerston North City Council Engineering Standards that would likely be applied as part of the redevelopment but no wider upgrades were modelled.

15. Flood risk was reviewed considering the wider flood hazard mapping for urban areas as well as review of information in regard to the Manawatu River flooding and stopbanks.

16. Proposed water quality management considered

- Water sensitive design options.
- Provision for bioretention systems where the initial 5mm of rainfall depth is captured for treatment and initial infiltration to ground.
- Treatment of driveways along with road runoff.

Findings

17. The modelling predicts that there are large portions of the existing network that are undersized for a 10% AEP event, with historical (non-climate change adjusted) rainfall applied.

18. Considering the pipe network in key locations in the Plan Change area, review has confirmed that the existing pipe capacity is undersized for both current and future climate adjusted events.

19. A reduction in runoff can be expected as a consequence of increasing the pervious coverage of the Roxburgh Crescent site through redevelopment. However, even if the Roxburgh Crescent area was converted to 100% pervious coverage, the system still surcharges and the outfall at Roxburgh Crescent remains undersized.

20. While a change in land use in itself is not sufficient to meet the required level of service, consideration was given to some development occurring where it could result in an immediate reduction in runoff and provide localised pipe capacity to convey the 10% AEP + CC event.

21. With residential lot perviousness was set at 30% for the entire Roxburgh Crescent (an equivalent of 28.4% across the entire Plan Change area), and with a local improvement within the Plan Change area (Roxburgh North 225mm diameter pipe upgraded to minimum 300mm dia pipe) then this results in post development runoff in a 10% AEP + CC event that is close to current runoff (with no climate change) but does not meet the required level of service for sizing to 10 year +CC. Wider capacity improvements (including increasing the capacity of the outfall through to the Manawatu River) will be required improve the overall level of service.

22. Recognising that that there is uncertainty on the timing of wider catchment improvements, a scenario considering partial development was considered. This considered an initial Stage 1 with a mixture of residential and industrial land use within the Roxburgh Residential area but without the wider catchment improvement in place.

23. The definition of pervious surface in this assessment recognises that:

- Pervious surfaces provide an opportunity to reduce runoff - this aligns with wider One Plan policies

- Pervious surfaces would be typically expected in a residential development and this could typically range from 30-50%.

24. Stage 1 requires a higher pervious component for residential lots (set at 45%) while there is still 100% impervious coverage of the remaining industrial land. The stormwater main on Roxburgh North needs to be upgraded to at least a 300mm diameter pipe as part of the Stage 1 works. This combination of coverage results in runoff that is close to current runoff rates with climate change considered.

25. Stage 2 is applied once wider capacity improvements are in place, and allows for residential development at 30% pervious lots.

26. Considering the ability to increase the capacity of the outfall, initial engagement with Horizons Regional Council indicated that wider catchment benefit would need to be demonstrated as part of the approval process.

27. The TUFLOW model was used to identify current flood risks and the relevant catchments as they relate to the Roxburgh Crescent stormwater network. Areas known to be susceptible to flooding include Pahiatua Street and Crewe Crescent. The Pahiatua Street and Crewe Crescent catchments discharge to the Crewe Crescent outfall, so a catchment diversion will be required to incorporate with improvements at the Roxburgh Crescent outfall.

28. The improvement option considered a design basis of:

- 30% pervious residential lots in the Roxburgh PC area (equivalent to 28.4% pervious across entire PC area),
- Sized to convey the 10% AEP + CC event,
- No surcharging in the new network due to pipe capacity, and
- As far as practicable, reduce and resolve spilling in the existing network serviced by the upgraded network in the 10% AEP +CC event.

29. The proposed improvement works are summarised in Figure 1 appended to this evidence. With these works implemented then a reduction in spill volumes is anticipated. Initial investigations and design for these works has commenced.

30. In terms of flood hazards in a 1% event, the results from the TUFLOW flood hazard maps were reviewed. Current flood hazard for a 2% plus CC and 1% plus CC was presented in the Stormwater Assessment. Based on the city-wide TUFLOW stormwater model developed by Tonkin and Taylor in 2017, the Roxburgh Crescent area is not particularly susceptible to flooding in extreme rainfall events because it is not situated in a low-lying area or located within an overland flow path. Small scale, shallow and localised ponding is currently predicted. Flood hazard is not expected to increase with a change to residential land use.

31. In terms of wider flood hazard associated with flooding of the river, the stopbanks adjacent to the plan change area are part of the Lower Manawatū Flood Control Scheme operated by Horizons Regional Council. These stopbanks are designed to provide a level of protection to the urban area in a 1 in 500 year (0.2% AEP) flood event plus climate change to RCP 6.

32. An older study prepared for Horizons Council on the scheme considered options to reduce the risk associated with stopbank breaches (Lower Manawatu Scheme Special Project, circa 1997). It is understood that Horizons have subsequently undertaken some improvement works in the area.

33. The proposed change in land use will not impact the likelihood of the stopbank overtopping or breaching. The risk, however, will change as a result of the land use enabling increased residential population resulting in an increase in the consequences from any event. While there is a change in risk as a result of the change in land use, the risk is the same as for other nearby residential areas.

34. The overall stormwater management approach has been to utilise water sensitive design. This approach includes retaining permeable surfaces, promotion of infiltration to ground, retention of stormwater volumes and treatment through the use of systems such as bioretention (rain gardens, bioretention swales), filter strips, and tree pits. Recognizing that space may be challenging, Council are also open to the use of high-rate bioretention devices that use a high rate filter media to achieve treatment within a smaller footprint.

35. Once the land is converted to residential land use then the main potential sources of contamination would be runoff from roads (and contaminants associated with vehicle usage) and roof runoff (depending on roof material). The stormwater treatment approach:

- If the roof material is inert then it can be connected directly to the stormwater system without needing further treatment.
- Driveway areas are assumed to drain towards the road and treatment devices in the road are to be sized to accommodate these areas.
- Treatment is sized based on capture and treatment of the first 5mm of rainfall.

Discussion/Response to Submissions

36. I have referenced submissions below as per PNCCs summary of decisions table and have responded in order of numbering.

37. I have attended pre-hearing meetings arranged by PNCC, that included the following submitters:

- R Watson
- Francis Holdings
- Horizons Regional Council

Submission 8 - R Hodgson

38. Submission 08.001 (R Hodgson), requested that the Plan Change took into account climate change, increased river flows, and frequency of major flow with the design, location and resilience to flooding of the new housing.

39. A further submission (FS 3.05) was received from R Watson in support of the above item.

40. Climate change has been considered both in terms of the ability of the local piped network to accommodate climate change adjusted flows, as well as assessing possible local surface flooding from runoff from climate adjusted flood events. Wider flood risk from main channel flooding is managed through the stop bank system, managed by Horizons Regional Council. This system is designed to provide flood protection to a 1 in 500 year (0.2% AEP) event. The flood hazard risk associated with the Plan Change area will be the same as for other residential development in the area.

41. The outputs from TUFLOW modelling undertaken by Tonkin in Taylor at that time was reviewed during the stormwater assessment, along with the overall topography of the area. The modelled 1% AEP flood hazard in the area is largely the formation of overland flow paths along existing roads and small areas of shallow, localised ponding. This Plan Change area, including nearby existing residential land, is slightly elevated than other areas to the west and the flood hazard is not expected to change with development.

42. I have also reviewed updated flood modelling outputs prepared by Tonkin and Taylor for a separate plan change application. This modelling, considers a 2% (50 year event) with RCP 6 to 2130 climate change adjusted rainfall. An annotated extract of this modelling is shown in Figure 1 appended to this evidence and shows no predicted flood hazard in the Plan Change E area with this increased climate change factor.

43. I have also reviewed “Lower Manawatū Scheme Risk Assessment using River Manager Forum Assessment Tool” (prepared for Horizons Regional Council by Tonkin and Taylor, August 2022). This document provides an overview of risk classification for the stopbank system, including the area adjacent to the Roxburgh Residential area. Figures in the appendix of the Tonkin and Taylor report provide context to the overall stopbank risk assessment, which considered aspects such as channel aggradation, weakening of stopbank foundation, overtopping, instability of the stopbank body, and seepage and piping. This report can be provided if required. Overtopping of the stopbank in the Plan Change area is considered unlikely in the Tonkin and Taylor assessment. Additional work was recommended to refine the assessment of this relatively complex scheme. In my opinion, this

assessment did not indicate a different risk profile from overtopping at the Roxburgh site to the surrounding residential land.

44. I consider that climate change and flood hazard has been sufficiently covered with thin the Plan Change and to a level that aligns with the overall flood management approach for the wider area. There are no particular issues noted with the plan change area that would require a different flood management or climate change considerations. I do not recommend changes to the plan based on considering this submission.

Submission 9 – Palmerston North City Council

45. **Submission 9.001** notes concerns around the potential for the use of copper and zinc materials in cladding or guttering and the risk of contamination if not mitigated. The new proposed policy (15.7) requires treatment if these materials are used with rules requiring these materials to be sealed to reduce copper and zinc entering runoff or treatment if not sealed.

46. Tānenuiarangi Manawatū Charitable Trust (**further submission FS 1**) opposes the use of 'mitigated' and requests the use of 'avoided' but otherwise supports the submission point.

47. A **further submission (FS 3.5**) from R Watson supports measures to prevent these contaminants entering the receiving environment.

48. **Further submission (FS4)** from Horizons Regional Council supports this change to allow alignment with One Plan policies.

49. Where copper and zinc materials are used in exposed surfaces then these contaminants can become entrained in stormwater runoff in dissolved or particulate form. Sealing of the roof and/or guttering surface can avoid the direct contact of runoff with the metal in the first instance and therefore reduce the likelihood of contamination occurring.

50. In my opinion, the above approach is consistent with current practice within New Zealand and provides clear guidance to developers. I recommend that the changes in the 9.001 submission are adopted.

51. **Submission 9.002** relates to terminology used for bioretention systems. The proposed amendment to Rule 7.6.2.6 (d)(iii) removes specific reference to a proprietary device and instead references a design basis for a rapid infiltration stormwater treatment device.

52. Tānenuiarangi Manawatū Charitable Trust (**further submission FS 1**) supports these amendments.

53. A **further submission (FS 3.6**) from R Watson supports the proposed amendments.

54. The proposed amendment to Rule 7.6.2.6 (d)(ii) aligns with the Stormwater Assessment report but the amendment proposed to Maps 7.10A and B need to be amended further to align with the modified rule (replacing 'road reserve' with 'contributing catchment'). This reflects that driveways / accessways could drain towards the roads and therefore should be considered in sizing. I recommend that the requested change is made, with the change in Maps 7.10A and B to reference contributing catchment.

55. **Submission 9.003** proposes a modification to Policy 17.3 to remove reference to attenuation and replace with retention.

56. Tānenuiarangi Manawatū Charitable Trust (**further submission FS 1**) supports these amendments.

57. A **further submission (FS 3.6**) from R Watson neither supports nor opposes the proposed amendments.

58. This amendment aligns with the Stormwater Assessment which did not consider attenuation to be an appropriate option for this area. From a stormwater perspective, attenuation and detention are terms that can be used relatively interchangeably; retention has a different meaning. Retention reflects that a portion of the runoff is held (retained) on site instead of leaving the site as flow. The amendment provides a clarification on the expected nature of mitigation within the area and this aligns with wider WSUD design and policy guidance which supports retention as a mechanism for managing runoff flow and volumes. I recommend that the requested change is adopted.

59. **Submission 9.004** proposed a revised floor level provision for consistency with other areas of the city which identifies a floor level set at 350mm above a 50-year (2%) event +CC.

60. Tānenuiarangi Manawatū Charitable Trust **(further submission FS 1)**:

- Opposes PNCCs submission with regard to changes to floor levels/flood events
- Supports aspects to allow for consideration of climate change

61. A **further submission (FS 3.6**) from R Watson neither supports nor opposes the proposed amendments.

62. **A further submission (FS 4)** from Horizons Regional Council noting that One Plan Policy RPS-HAZ-NH-P12 applies to matters relating to stormwater inundation.

63. There are two aspects being discussed across these submissions. The first is flood hazard - for the Plan Change area, the wider flood hazard is managed with the Lower Manawatū Scheme (managed by Horizons Regional Council). This scheme provides a level of protection from main channel flooding for events up to a 1 in 500 year (0.2% AEP) event.

64. With the stopbanks in place then the flood hazard in the Plan Change area is effectively the same as other residential land and this can be managed with the same floor level requirements to manage the risk of local flooding (as compared to flooding from the main river channel). In terms of floor levels, PNCC are proposing a consistent approach with other areas of the city to manage the risk of local flooding which identifies a floor level set at 350mm above a 50-year (2%) event +CC.

65. Considering the local environment, topography and potential changes with future redevelopment, I do not consider there is a need for a higher level of protection in the Plan Change Area (when compared with similar residential areas) with the stopbanks scheme in place.

66. The second aspect raised in FS 1 relates to breaches of the stopbank system.

67. I have discussed stopbank breach scenarios earlier in this evidence – while this is a risk, I do not believe that this is something that can be specifically managed in this proposed redevelopment nor do I believe there is evidence of a particularly higher risk in the Plan Change area of a breach occurring. .

68. The aspect of safe access would require more detailed analysis best undertaken once the development details are known (for example, position of buildings) to identify areas where depth/velocity issues may impact the ability of residents to leave the area. This analysis would be better undertaken on a wider scale, outside of this Plan Change as these issues can impact a wider area within Palmerston North. I do not believe there is an elevated risk in this area compared with adjacent residential developments, given that there is limited flooding predicted in the area now and the relatively flat topography. Overall I recommend that the requested change from Submission 9.004 is adopted.

69. **Submission 9.005** proposes an amended guidance note to provide clarity as to why detention is not considered in this plan change.

70. A **further submission (FS 3.6**) from R Watson neither supports nor opposes the proposed amendments.

71. Tānenuiarangi Manawatū Charitable Trust (**further submission FS 1**) supports these amendments.

72. This submission aligns with Stormwater Assessment, where a combination of constraints (space, position within the catchment) mean that detention is not considered to be an appropriate solution in this location. I recommend that the guidance note is changed as outlined in the submission.

Submission 10 - J Temperley

73. **Submission 10.002** (J Temperley) notes that there are no Stormwater easements or no build zones shown in Figure 1 (of the Plan Change) and considers this to be a concern given that surface flooding is a recurring issue.

74. A further submission from R Watson (**FS 3.007**) neither supports nor oppose but notes that the no-build area / stormwater easement is shown in the proposed plan change

75. I have reviewed the figure in the Proposed Plan Change and a no-build area / stormwater easement is shown. I consider this no-build area to be appropriate to maintain future access to the pipe. Surface flooding is not considered to be a specific issue in this area. I do not recommend any amendments to the proposed Plan Change in regard to this matter.

Submission 11 – Frances Holdings Limited

76. **Submission 11.001** (Frances Holdings Limited) requested:

- Delete the permeability standards in Rule 10.6.1.8 (d).
- Either delete Policies 17.2, 17.3 and 17.4 or amend to reflect the points raised in the submission

77. In terms of the permeability standards, Frances Holdings Limited note that as the current land use is largely fully impervious, then a reduction in impervious coverage would result in less runoff. They also note concerns about whether the increase in permeability will be beneficial given the existing ground conditions and will also be restrictive in terms of residential design opportunities for the area.

78. Frances Holdings Limited also consider that there may be other acceptable solutions in terms of water sensitive design other than permeable surfaces and on-site measures.

79. **Further submission FS 3.7** (R Watson) notes the confusion about runoff and permeable coverage and reflects on her submission point (19.019 – addressed later in my evidence). FS 3.7 neither supports nor opposes 11.001.

80. Horizons Regional Council (**further submission FS 4**) opposes the deletions proposed by Frances Holding Limited and requests the retention of Policy 17.3, Rule 10.6.1.8 (d) and Rule 10.6.5.6 to align with One Plan objectives and policies and the FDS.

81. Tānenuiarangi Manawatū Charitable Trust (**further submission FS 1**) opposes the deletion of permeability standards proposed by Frances Holding Limited.

82. I agree that runoff rates will be lower with residential development however, this reduction is not sufficient to mitigate the need for capacity improvements to the existing stormwater network, nor for the higher permeability requirements before network improvements are operational.

83. Water sensitive urban design (WSUD) is identified in PNCCs Engineering Code of Practice (5th Edition) and a fundamental aspect of this is to reduce runoff volume and flow rates generated in the first instance. There are other options available in terms of WSUD but these options tend to focus on collecting and managing runoff *after* it has been generated.

84. At an overarching level, the provisions noted above also align with RPS-UFD-P8 within Horizon's One Plan which includes "… water-sensitive design and nature-based solutions)".

85. The use of specified minimum permeability requirements is necessary to align with modelled runoff and capacity assessments and to provide the ability for some development to occur until wider capacity improvements are in place (assuming that consent is granted from Horizons Regional Council in the future).

86. I consider that the permeability provisions meet the requirements of WSUD and capacity requirements while still providing flexibility as to how this permeable surface can be used within the development or within residential lots. I do not agree that the permeability standards in Rule 10.6.1.8 (d) should be deleted. Similarly, I do not consider the permeability reference in Policy 17.2 or 17.4 should be deleted.

87. Policy 17.3 provides flexibility in the event that the permeability standards cannot be achieved. I consider that this provides some flexibility to the developer so this Policy should be retained. Overall I do not support the

changes sought by this submission point and do not recommend any changes to the proposed plan provisions.

88. The permeability limits were also raised by Frances Holdings during pre-hearing conferencing (28 March 2025) and they queried whether the limits in this Plan Change were consistent with Plan Change I – 'Increasing housing supply and choice'.

89. Plan Change I is intended to "enable medium density housing across those parts of the city which are not impacted by existing stormwater constraints and provide for medium density housing across those parts of the city where site-specific mitigation for flooding and stormwater is likely to be required." (Section 32 Evaluation Report, PNCC[1]).

90. Plan Change I identifies 30% permeability to be maintained (subdivision rules – MRZ-S9) for permitted activity status. Areas that cannot achieve the permitted activity standard (or are contained within the stormwater overlay) would require consent and site specific assessment.

91. It is important to note that Plan Change I takes a broad, city-wide approach to manage intensification across a large portion of Palmerston North – compared to Plan Change E which is site specific. From a stormwater management perspective, however, the principles of WSUD, retention of permeability and a more precautionary approach to stormwater for areas where there may be capacity constraints is consistent across both plan changes.

92. **Submission 11.019** considers that Policy 17.3 should be deleted on the basis that neither permeability standards nor attenuation are required given the commitment to the new outfall infrastructure.

93. Tānenuiarangi Manawatū Charitable Trust (**further submission FS1**) opposes this deletion, noting that permeability and retention standards are required to drive improved stormwater outcomes.

94. R Watson (**further submission 3**) neither supports nor opposes the submission but notes the some uncertainty around timing.

95. Horizons Regional Council (**further submission FS 4**) opposes the deletions proposed by Frances Holding Limited and requests the retention of Policy

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[1] https://www.pncc.govt.nz/files/assets/public/v/1/documents/have-your-say/pci/technical-assessments/plan-change-i-section-32-evaluation.pdf

17.3, Rule 10.6.1.8 (d) and Rule 10.6.5.6 to align with One Plan objectives and policies and the FDS.

96. The key points around the permeability limits are:

- Limits have been set as part of a wider strategy to manage network capacity, reduce runoff and implement WSUD, not because the change in land use will generate additional runoff.
- These limits, combined with local upgrades have been identified to enable opportunities for partial redevelopment while more extensive and larger network capacity improvements can be undertaken, subject to consent being granted by Horizons Regional Council in the future.

97. While Council are committed to progressing with the outfall improvement, there remains uncertainty in the timing as to when this work could be consented and constructed. The permeability limits are used to manage runoff from the Plan Change area in a manner that aligns with the available pipe capacity depending on whether the pipe outfall upgrade is in place or not. If permeability limits cannot be achieved, then Policy 17.3 provides for an alternative approach to be proposed, as long as the same flowrate is achieved. I do not consider that this policy should be removed as it provides context to subsequent planning assessments, particularly in regard to the need for flow management. I recommend no changes are made to the proposed provisions as a result of this submission.

98. **Submission 11.020** considers that the permeability standard (Rule 10.6.1.8(d) is redundant and should be deleted.

99. Tānenuiarangi Manawatū Charitable Trust (**further submission FS1**) opposes this deletion, noting that permeability and retention standards are required to drive improved stormwater outcomes.

100. Horizons Regional Council (**further submission FS 4**) opposes the deletions proposed by Frances Holding Limited and requests the retention of Policy 17.3, Rule 10.6.1.8 (d) and Rule 10.6.5.6 to align with One Plan objectives and policies and the FDS.

101. R Watson (**further submission 3**) neither supports nor opposes the submission but notes the importance of 'getting it right'.

102. I consider that permeability standards should be retained, for the reasons listed previously in my evidence in response to submission 11.

Submission 12 – P&A Gregg

103. P and A Gregg (**Submission S12.001**) queried whether the plan change makes provision for possible retreating in the future from flooding. The submission suggested piles rather than concrete pads for houses.

104. A further submission (**FS3.11**) was received from R Watson, neither supporting or opposing but noting support of consideration of options that reduce potential flooding to the Plan Change are and surrounding development.

105. The Plan Change does not specifically provide for future retreat and as noted previously in my evidence, the flood risk in the Plan Change area will be the same as for other nearby areas within Palmerston North. As noted above, the stopbanks are designed to provide a level of protection from main channel flooding for up to a 1 in 500 year (0.2% AEP) event. Ultimately, the issue of retreat is a complex discussion that, in my opinion, is wider than the extent of this Plan Change, as this will impact relatively large portions of the Palmerston North community including surrounding residential land. I recommend no change to provisions as a result of this submission.

Submission 16- Tānenuiarangi Manawatū Charitable Trust

106. **Submission 16.003** (Tānenuiarangi Manawatū Charitable Trust, Te Ao Turoa Environmental Centre) raises concerns about whether development should be able to occur before the required outfall upgrade is in place. As noted earlier in my evidence (item 61) while the timing of this outfall upgrade is uncertain, it is a committed project for PNCC. The permeability limits have been used to aligned opportunities for development to available pipe capacity. Upgrades aside from the outfall project (ie the upsizing of the existing 225 to a 300mm dia pipe would be addressed by the developer through subsequent planning and approval stages. No change to Rule 10.6.1.8 is recommended.

107. **Submission 16.004** (Tānenuiarangi Manawatū Charitable Trust, Te Ao Turoa Environmental Centre) requests amendments to the Subdivision provisions proposed in Section 7 relating to:

- Biofiltration
- Overland flowpaths
- Initial treatment
- Erosion and sediment control
- Connection of roofs
- Roofing materials (zinc and copper)

108. I have also considered this submission in the context of amendments proposed in Submission 9.002-9.004 (prepared by Palmerston North City Council).

109. Rule7.6.2.6(d) specifies a basis for sizing that has been developed from a high-rate filter media – and Submission 16.004 notes that this is not specified in the text. Submission 9.002 recognises this and proposes changes to the road cross-sections as well as revised wording (Submission 9.004). I consider the wording proposed in 9.004 goes part-way to addressing this concern – although I recommend this wording is amended on the road cross-sections to: "270m2 *contributing catchment "* to account for driveways and accessways that could drain towards the road and to align with the terminology used in the Stormwater Servicing report and the PNCC submission 9.002.

110. In terms of overland flowpaths, there are no specific overland flow paths identified in the Roxburgh area. No change to the provisions is therefore recommended.

111. Initial treatment of the first 5mm of rainfall is included through the provisions around biofiltration and the proposed revised wording identified in Submission 9.004 for Rule 7.6.2.6 (d). I consider the wording proposed in 9.004 addresses this item from Submission 16.004.

112. Erosion and sediment control requirements would be subject to consent from Horizons Regional Council and would not be specifically referenced in the plan change. No change to the provisions is recommended for this item.

113. Connection of roof leaders, as noted in 16.004, has not been specifically required in the proposed provisions. I consider this to be managed in part through the sizing basis for bioretention (revised wording proposed above) as well as the proposed provisions outlined in Submission 9.003-9.004. Therefore I do not recommend any change as a result of this specific submission point.

114. **Submission 16.005** (Tānenuiarangi Manawatū Charitable Trust, Te Ao Turoa Environmental Centre) raises some concerns about the longevity of permeable pavements as a method for increasing permeability within a site. While permeable pavements are an option for reducing runoff, there can be challenges with life expectancy and maintenance. The latest version of PNCC's Engineering Standards for Land Development (March 2025) would not support use of permeable pavements within a residential area. It is recommended that reference to permeable pavements be removed from the provisions.

115. **Submission 16.006** requests that a stormwater management plan (SMP) be prepared in accordance with the Stormwater Servicing Assessment. I have reviewed typical scope for SMPs identified in the Stormwater Servicing Assessment but also in other examples used within Palmerston North. I have also considered this submission in the context of amendments proposed in Submission 9.002 (prepared by Palmerston North City Council)

116. **Further submission (FS 3.13)** is provided by R Watson in support of the submission point requesting the inclusion of a plan to clarify development requirements and better site stormwater control outcomes.

117. Stormwater management plans are typically used to provide additional detail on the methodology, approach and expected outcomes for managing stormwater in an area. I consider that connectivity, pervious area assumptions, and the need for treatment are already included in the Plan Change provisions, particularly through the amended provisions identified in Submission 9.002. Similarly, flood impacts are managed through the pervious requirements captured in the Plan Change provisions (particularly Chapter 10). If residential land development cannot meet the performance standards identified in Chapter 10 then a resource consent would be required and this would trigger the need for a stormwater management plan. I do not agree that preparation of a SMP should be required as a performance standard for permitted activities. I recommend no change to the plan as a result of this submission point.

118. **Submission 16.009** identified concerns in relation to the potential impacts from a breach in the stopbank system and requested amendments to:

- require an access route to a safe area for evacuation from dwellings, and
- avoiding more than minor adverse effects on the effectiveness of existing flood hazard structures such as the existing stopbanks, and overland stormwater flow paths.

119. I have discussed the risk of a breach earlier in my evidence (considering submission 9). While I agree that this is a risk, I consider that the ability to control this is outside the scope of this Plan Change and the risk to the Plan Change area will be no different from surrounding residential land. Safe evacuation similarly would be a matter for wider discussion and would require a level of information that cannot be assessed at the Plan Change stage.

120. There are no overland flowpaths noted in the Plan Change area (refer to Figure 9 in the Stormwater Assessment) and setbacks from the stopbanks have been identified in the Plan Change documents. I do not believe any amendments to the proposed Plan Change is necessary in regard to this matter.

121. The Roxburgh Cresent area sits in proximity to the stopbank system for the Manawatū River. Major river flows will be managed through the stopbank system which has a level of protection to the 2130 RCP 6 for a 0.2% event. This system is managed by Horizons Regional Council and offers protection to the wider Palmerston North community. The Roxburgh Crescent redevelopment would be subject to the same likelihood of flooding from breaches or overtopping of the stopbanks as surrounding residential land.

122. The consequence of a breach in the stopbank will change as a result of the change in land-use from industrial to residential. The likelihood of a breach is difficult to assess at this time and the consequences of such a breach would impact larger portions of Palmerston North, as identified in in the Stormwater Assessment. Improvement works undertaken by Horizons Regional Council are expected to have reduced the risk of a breach but I cannot comment on the scale of improvement. The Tānenuiarangi Manawatū Charitable Trust on behalf of Rangitāne o Manawatū submission reflects on this risk and in my opinion their proposed amendments would be best considered at a city-wide level rather than specifically tied to this Plan Change. As mentioned earlier, I do not consider that this area has an elevated risk compared to the surrounding residential land.

Submission 19 – R Watson

123. **Submission 19.009** (R Watson) noted inconsistency in terminology between the Stormwater Servicing Assessment and the Section 32 report and specifically queried how imperviousness had been considered in the modelling undertaken to date.

124. As noted by R Watson, the area does have some small pockets of pervious areas, and there is gravel in the southern industrial yard (based on aerial photos). I do not believe the small pockets of pervious/vegetated areas within the Plan Change area to be significant in this context but the gravel yard is larger.

125. In terms of the modelling, the current plan change area was considered to be largely impervious for the initial assessment of flow and then this flow was then compared to available pipe capacity. While there is an existing gravel yard on part of the site, at a catchment wide level, this was considered to be largely impervious for the purpose of runoff calculations.

126. Given that the yard is used for vehicle movements, then the material is likely to be well compacted and could perform more like a sealed surface, particularly in larger events. In addition, the pipe capacity calculations and associated modelling for larger events consider the wider catchment and as such, the results are unlikely to be sensitive to a small change in the curve

number used for a portion of the current industrial land. No changes to the proposed provisions are recommended.

Submission 22 – Horizons Regional Council

127. The submission from Horizons Regional Council (**Submission S22.008**) notes that the stopbank system is intended to provide protection against riverine flooding up to a 1 in 500 year (0.2% AEP) event, but it does not safeguard the area from localised flooding or stormwater inundation. The submission also notes that they encourage additional on-site mitigation to control runoff rates from any development.

128. The Plan Change stormwater assessment included review of local flooding and pipe capacity analysis along with commenting on wider flood hazards from the Manawatū River. I consider this to be consistent with the submission point above.

129. This submission (S22.008) also encourages additional on-site mitigation strategies to control runoff rates from development, noting that increased runoff from new developments can exacerbate flooding downstream.

130. Again, this is consistent with the Plan Change approach which introduces pervious limits to reduce site runoff. No amendment to the Plan Change is proposed in regard to this submission.

131. The submission supports a no-build area over the existing stormwater outfall through the Plan Change area.

132. A **further submission** (**FS 2.1**) was received from Frances Holdings Limited, opposing the need for additional on-site mitigation, referencing their original submission. I have responded this item earlier in my evidence.

133. A further submission (FS-2.2) from Frances Holdings Limited also considers the 'no build' area to be temporary until such time as the improved outfall solution is implemented.

134. The 'no build' area is intended to provide for access to the main stormwater outfall pipe both now and in future. At this time, the design of the improved outfall has yet to be confirmed (or consented) and could include improvements in addition to the existing outfall, rather than replacement of the current outfall pipe through the Plan Change area. Retention of the 'no build' area is recommended.

Submission 23 – J Carr

135. **Submission 23.003** (J Carr) requests that the Plan Change is amended to acknowledge climate change.

136. A further submission on this (**FS 3.20**) from R Watson, in support, recognising the need for risks to be correctly identified and assessed.

137. The Plan Change document does consider climate change in terms of runoff both through the local network capacity assessment as well as flooding in larger events, locally and from the Manawatū River. As discussed earlier, the risk of flooding with the developed site is expected to the same as for neighbouring residential development. No amendment to the Plan Change is proposed in regard to this submission.

Recommendations

138. I recommend the proposed amendments by PNCC be adopted (submission points 9-001-9-005, inclusive), along with revised wording on the road cross-sections to: "270m2 *contributing catchment "* to account for driveways and accessways that could drain towards the road.

139. I do not recommend removal of permeability limits or associated guidance as requested by some submitters.

140. I recommend that the use of permeable pavers be removed as a method of achieving the permeability standards.

141. I do not recommend additional measures such as stormwater management plans or higher levels of flood protection are adopted in this area as requested by some submitters.

142. I do not recommend removal of the 'no-build' area.

Conclusion

143. The stormwater management in this area is complex and this is reflected in the detail carried though to provisions relating to stormwater management in the Plan Change.

144. I consider the permeability limits are fundamental to enabling some development to occur while aligning with wider Policy contained within Horizons One Plan and a WSUD approach.

Mary Wood

22 April 2025

Figure 1 Proposed improvements identified in the Stormwater Assessment

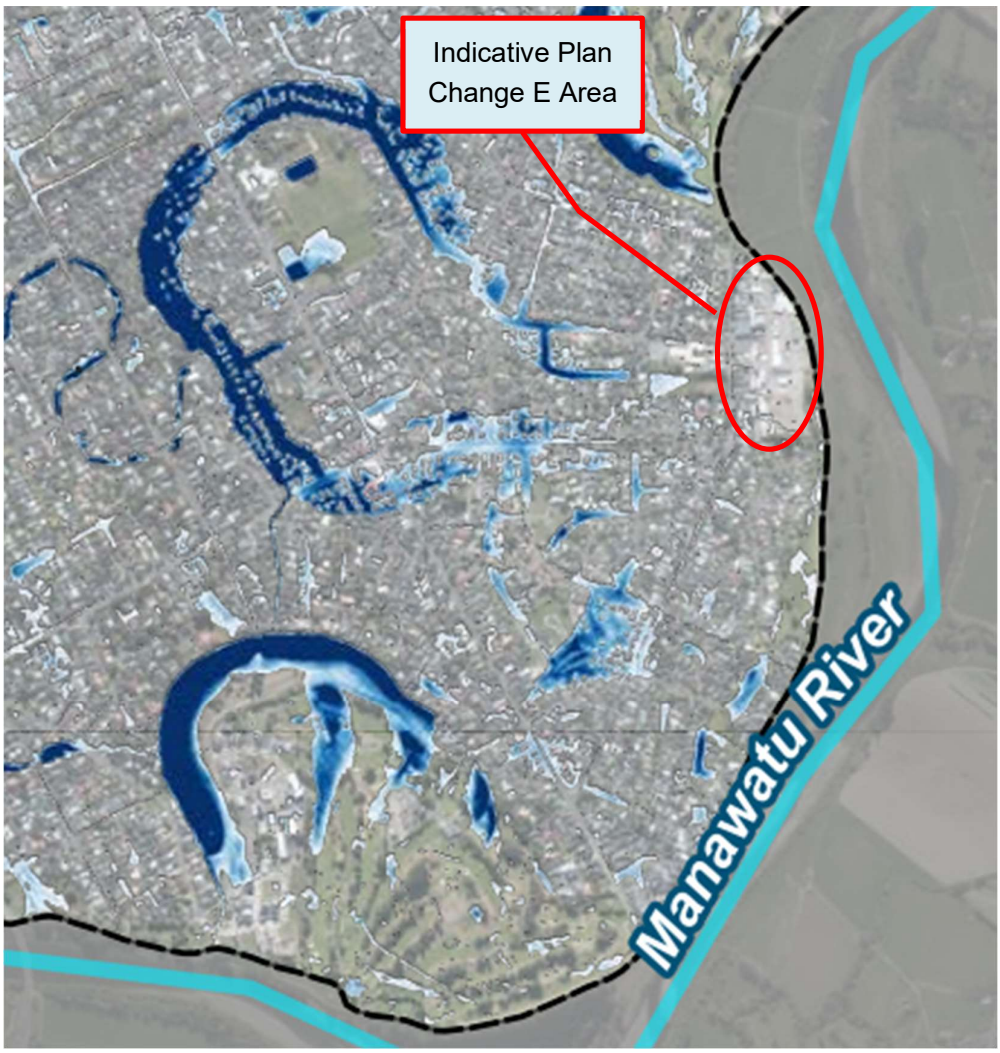

Figure 2 Annotated extract showing 50 Year Flood Depth with RCP 6.0 Climate Change to 2130 (source: PC I Stormwater Servicing Assessment, Appendix C Model Build Report October 2024, Figure 3)