Memorandum

To:	Gina Sweetman	**Date:**	27 June 2022
From:	Kate Purton	**Our Ref:**	4293304-67661593-3953
Copy:			
Subject:	PPC28 Maitahi Bayview - Addendum K Purton Stormwater and Flood Risk		

INTRODUCTION

1. The purpose of this memo is to provide an addendum to update my Stormwater and Flood Risk memo dated 28 May 2022, as included in Appendix J of the section 42A report, following receipt of the applicant's evidence.

2. The key documents for stormwater and flood risk management are:
   a. Applicant's Legal Analysis on the Section 42A Reports
   b. Evidence of Damian Velluppillai
   c. Evidence of Maurice Mills, including the Stormwater Management Plan
   d. Evidence of Tony Milne, including updated Structure Plan
   e. Evidence of Mark Lile
   f. Proposed provisions Schedule X.

3. This memorandum addresses the following matters:
   a. Relevant issues raised in Applicant's Legal Analysis on the Section 42A Reports
      i. Level of information sought at plan change stage
      ii. Other issues
   b. New information provided
   c. Proposed plan provisions
   d. Conclusions

RELEVENT ISSUES RAISED IN THE APPLICANT'S LEGAL ANALYSIS OF THE SECTION 42A REPORTS

Level of information sought at Plan Change stage

4. The Applicant's Legal Analysis on the Section 42A Reports comments on the level of information required at plan change stage compared to that required at subdivision consent stage.

5. I can confirm that I have considered this difference in the level information required in preparing both my original memo and this addendum.

6. In my opinion the information provided at the plan change needs to be sufficient to understand the stormwater and flood risk effects of future development should the rezoning proceed, set out the proposed stormwater and flood risk management system to mitigate these effects, and demonstrate that this is sufficient to mitigate the effects on the environment.

7. For a large and complex site such as this, this requires:
   a. A multi-disciplinary approach to developing a concept design for stormwater and flood risk management, including spatially overlaying the relevant elements.
   b. Hydraulic modelling to demonstrate the performance of the concept design.

8. Refer to paragraphs 38-51 of my original memo for my opinion on the level of information required, and paragraphs 51-57 on the reasons for this.

9. How this concept design will be developed and implemented as future development occurs then needs to be adequately addressed though the plan provisions.

Other issues

10. In paragraph 11 of the Applicant's Legal Analysis on the Section 42A report, Mr Maassen notes that he believes I have overstated the potential flood risk because much of the site will remain rural or open space or be revegetated and "*the development potential may have been over-estimated by Ms Purton*", and because the Kākā Stream catchment is small and "*catchment management solutions are commonplace in New Zealand on flood plains that comfortably manage markedly more significant risks through common engineering solutions*".

11. With regard to the first point, Mr Maassen's footnote 2 refers to Table 1 of Mr Milne's evidence. I am not clear what this refers to. There does not appear to have been clear information provided by the applicant on the expected yield for future development should the site be rezoned through PPC28. In the Stormwater Management Plan, Table 5.4 provides assumed percentage average impervious area for each of the proposed zonings, as used in the applicant's modelling.

12. With regard to the second point, it is not sufficient to simply state that similar stormwater and flood risk effects have been managed elsewhere and therefore can be here. The applicant needs to understand the effects, set out how these will be managed at this site, and provide information to demonstrate that this will be sufficient to mitigate the effects on the environment.

13. In paragraph 12 of the Applicant's Legal Analysis on the Section 42A report, Mr Maassen notes that he understands that Tonkin & Taylor has carried out and provided more modelling information and "*That satisfies the outstanding flooding information request from the Joint Witness Statement*".

14. I do not agree with this statement. In JWS Flooding (3) 25 May 2022 it is noted under item 3.3 Areas not Agreed "*Several areas of disagreement have been raised through the expert conferencing sessions, some of which are related to the additional Tonkin and Taylor report dated 5 May 2022*", however these issues are not listed in the JWS. Refer to of my original memo dated 28 May 2022 (in particular paragraph 34 for comments on the Tonkin & Taylor report dated 5 May, and paragraph 49 for comments on additional hydraulic modelling required), and paragraphs 17 to 25 of this addendum for comments on additional information provided as part of the applicant's evidence.

15. In paragraph 19 of the Applicant's Legal Analysis on the Section 42A report, Mr Maassen notes my concerns regarding managing cumulative effects of staged development. He notes

that "*The risks of unintegrated development are somewhat lower considering the limited number of owners controlling the site. However, the planning regime should be sufficiently robust whatever ownership changes occur*."

16. I disagree with the first part of this statement, as the current ownership is not relevant to the form of future development should the site be rezoned through PPC28. I agree with the second part of this statement that robust plan provisions are required for PPC28 so that the stormwater management and flood risk management approach and outcomes proposed in the applicant's evidence are required to be achieved by any future development at the site.

NEW INFORMATION PROVIDED

17. The applicant's evidence includes new information on operational stormwater and flood risk management, most notably the Stormwater Management Plan dated 15/06/2022 included in Mr Mills' evidence.

18. For both sides of the ridge, the proposed water quality management approach has been clarified to include restrictions on building materials (exposed zinc and copper) to limit contaminant generation, and first flush treatment of runoff from contaminant generating surfaces (parking areas and roads).

19. For both sides of the ridge, the proposed water quantity management approach has been clarified to include extended detention (of the 50% AEP 2-hour volume, released slowly over 24 hours), infiltration of 5 mm of runoff from new impervious surfaces (when located in a recharge zone), rainwater re-use (where feasible), as well as peak flow attenuation for the 1% AEP event.

20. There is information on the proposed Kākā Hill Tributary/ Kākā Stream realignment, including an indicative cross-section.

21. For the Kākā Hill Tributary/ Kākā Stream catchment, the Stormwater Management Plan includes:

    a. Information on sub-catchments, impervious and hardstand areas, and proposed raingarden or wetland footprints.
    b. Information on sub-catchments, pre- and post-development land cover, proposed attenuation storage volumes, and hydrological and hydraulic modelling, including some model inputs and pre- and post-development flows (including in Appendix B calculations).
    c. Figures in Appendix A of the Stormwater Management Plan showing the proposed locations of stormwater attenuation (Figures 1 and 2) and treatment (Figure 4) facilities, overlaid with contours, zoning and slope stability risk categories.

22. For the north side of the ridge (Walters Bluff/Brooklands catchment), the Stormwater Management Plan includes:

    a. Some information on proposed water quality treatment.
    b. Information on sub-catchments, pre- and post-development land cover, pre- and post-development flows (hydrological modelling), and proposed attenuation storage volumes (including in Appendix B calculations).

c. Figures in Appendix A of the Stormwater Management Plan show the proposed locations of stormwater attenuation (Figures 1 and 2) facilities, overlaid with contours, zoning and slope stability risk categories. No proposed treatment facilities for the north side of the ridge are shown on Figure 4.

23. The Stormwater Management Plan provides more information as to how stormwater from catchments on both sides of the ridge is proposed to be managed, however there are still some gaps and inconsistencies which I have not been able to resolve within the time available, due to the information being provided late in the process.

24. For example:

a. While information is provided on the hydrological modelling in Appendix B, there is limited information provided on the hydraulic modelling used to establish that the proposed attenuation storage is sufficient.

b. There are inconsistencies in the numbers in Table 5-5 Attenuation requirements for Kākā Stream.

c. Only limited information on the hydraulic modelling for Kākā Stream realignment has been provided, and the proposed arrangement of the stream, riparian planting, 40 m wide strip and adjacent wetland is not clear due to inconsistencies between the Stormwater Management Plan and landscape graphics.

d. There is no information on the size of the devices shown on the plans in Appendix A, making them difficult to check against those tabulated in the report.

25. While the proposed stormwater and flood risk management approach may be able to mitigate the effects, this has not been clearly demonstrated. Some further work is still required.

26. If PPC28 is granted, then the PPC28 plan provisions will need to clearly set out the stormwater and flood risk management requirements, so that the effects of future development are mitigated.

PROPOSED PLAN PROVISIONS

27. Updated proposed PPC28 Schedule X plan provisions have been provided with the applicant's evidence.

28. For stormwater and flood risk management, the key proposed plan provisions are Schedule X.9 Ecological Outcomes and Freshwater and Schedule X.13 Stormwater Management Plan.

29. For Schedule X.9 Ecological Outcomes and Freshwater, only very minor edits have been made to these in the updated version included in the applicant's evidence compared to the version included in the PPC28 request. My comments on Schedule X.9 in paragraph 67 of my original memo dated 28 May 2022 still apply.

30. Schedule X.13 Stormwater Management Plan requires "*A Stormwater Management Plan shall be prepared and submitted with any application for subdivision or development within Schedule X*." However, it is not clear what needs to be included in this development/subdivision Stormwater Management Plan and how it relates to the site-wide Stormwater Management Plan dated 15/06/20022 included in the applicant's evidence.

31. In my opinion Schedule X.13 should be expanded to refer to a site-wide Stormwater Management Plan (to be developed from the Stormwater Management Plan dated 15/06/2022, and peer reviewed), and require individual developments/subdivisions to prepare their own Stormwater Management Plans, which are consistent with the site-wide Plan but provide more detail for their site. This rule should include lists of the elements to be addressed in the site-wide Stormwater Management Plan and in the individual development/subdivision Stormwater Management Plan. For example, the outline design for the stream realignment and the over-arching attenuation requirements would need to be addressed as part of the site-wide Stormwater Management Plan, whereas the location and design of treatment and attenuation devices could be at the individual development/subdivision Stormwater Management Plans. Both would need to include hydraulic modelling.

CONCLUSIONS

32. While the applicant's evidence has made good progress in advancing the understanding of the stormwater and flood risk issues and their proposed management, there are still some gaps and inconsistencies.

33. Further work is required on the proposed PPC28 provisions to clearly set out the stormwater and flood risk management requirements for future development of the site, and how it shall be demonstrated that these have been met. For instance, these rules should cover: restrictions on building materials to limit contaminants; treatment of first flush runoff from carparks and roads; infiltration of 5 mm of runoff from new impervious areas (when located within a recharge zone); on-site rainwater reuse tanks; extended detention of 50% AEP 2-hour runoff, released slowly over 24 hours; and attenuation of 1% AEP post-development peak flows to 80% of pre-development peak flows, with performance demonstrated by hydraulic modelling. The provisions should also include rules regarding site-wide and individual development/subdivision Stormwater Management Plans.

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