BEFORE HEARING COMMISSIONERS
IN THE WESTERN BAY OF PLENTY DISTRICT

UNDER THE	Resource Management Act 1991 ("**Act**")
IN THE MATTER OF	**RC13360L:** an application for resource consent to authorise development works departures and the operation of industrial activities within part of the Te Puna Business Park prior to all pre-requisite requirements being met.
BETWEEN	**TE PUNA INUSTRIAL LIMITED** Applicant
	ANDWESTERN BAY OF BAY OF PLENTY DISTRICT COUNCIL Consent authority

REPLY EVIDENCE OF MARK PENNINGTON

Before a Hearing Panel: Rob van Voorthuysen (Chair), James Whetu (Commissioner) and Fraser Cambell (Commissioner)

INTRODUCTION

Background, qualifications and experience

1. My full name is Mark Stuart Pennington. I hold the degrees of Bachelor and Master of Science in Engineering from the University of Natal, Durban, South Africa. I am a chartered member of the Institution of Professional Engineers New Zealand (IPENZ) and am registered as a Chartered Professional Engineer under the Chartered Professional Engineers of New Zealand Act 2002. I am on the New Zealand register of International

Professional Engineers.

2. I have more than 25 years of engineering experience, more than 23 of which have been spent in the specialist field of hydraulics and hydrology, with a strong emphasis on flood management in recent years.

3. A large part of my professional career to date has covered hydrological and hydraulic modelling, with a particular focus on rainfall-runoff processes as well as the hydraulic behaviour of urban stormwater and open channel river systems. My evidence falls within the fields of expertise of my current practice and competence.

4. I am a Senior Water Resources Engineer with Tonkin & Taylor, a position that I have held for the past eleven years. Prior to this I have worked in a similar capacity for other consulting engineering practices in New Zealand, and for local government in New Zealand.

5. While this is not a hearing before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have complied with the practice note when preparing my written statement of evidence and will do so when I give oral evidence before the Council.

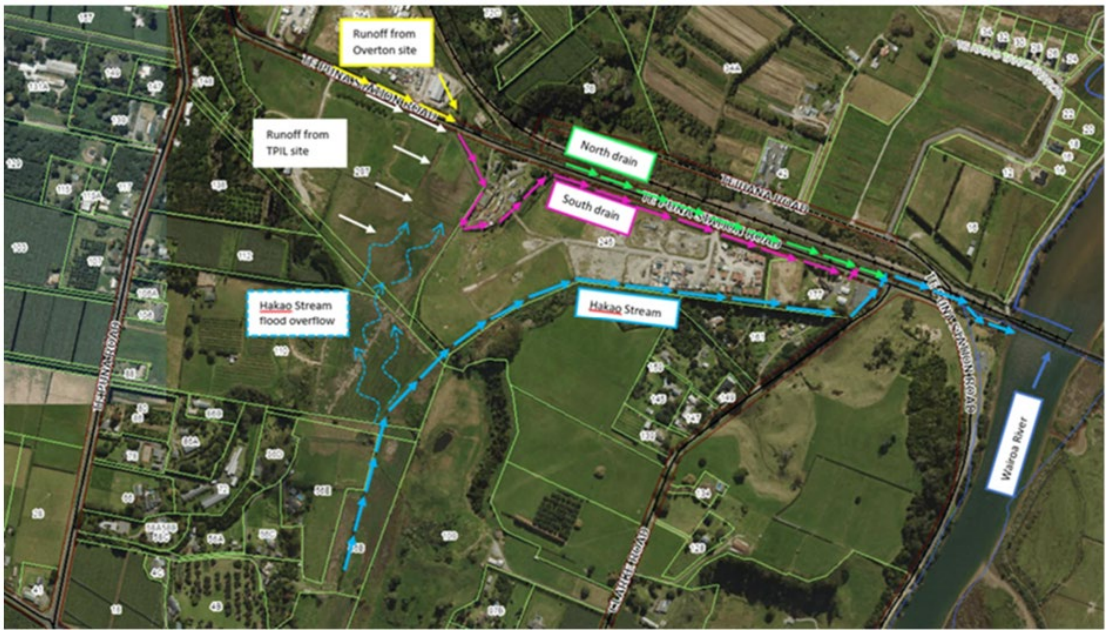
6. I have not omitted to consider material facts known to me, which might alter or detract from the opinions that I have expressed.

7. In February 2022 I was engaged by Western Bay of Plenty District Council (WBoPDC) to assist with technical review of the stormwater and flooding elements of consent applications lodged with Council relating to land use at the three separate land holdings forming the Te Puna Industrial Zone. I have remained involved, on behalf of WBoPDC, in this capacity since that date.

8. I have reviewed the stormwater and flood management aspects of the application, on behalf of Western Bay of Plenty District Council.

9. I confirm that I have visited the site and am familiar with the existing activities occurring on the site insomuch as they apply to my assessment.

10. In this statement of evidence, I refer to various waterways in the subject area in accordance with the referencing as shown in Figure 2.1 of my report dated 14 June 2024 that was used to inform the s42A report. For clarity I have inserted this same figure in my evidence below.



Purpose and scope of evidence

11. The purpose of my evidence is to outline the findings of my technical assessment of the application. This covers stormwater management and flood management.

12. The scope of my evidence is includes my providing my assessment of material that has been presented at this hearing, together with material provided by the Applicant in support of the consent applications that covers the following:

    (a) Stormwater quantity management, which involves on-site collection, treatment and conveyance of local stormwater.

    (b) Flood management, which includes wide area consideration of the effects of the proposed development on flooding (mainly on peak flood levels attained) as a result of the proposed development.

EVIDENCE

13. I understand that the Commissioners have taken Ms Perring's

section s42A report as read, which contained my review of the stormwater and flooding effects (paras 179-189) relating to the application, as at my report date of 14 June 2024.

14. I agree with Ms Perring's summary of my technical review as described in the s42A report, dated 17 June 2024.

15. In my evidence I have not repeated the findings of my technical report dated 14 June 2024, as these have been covered in Ms Perring's s42A report and, to some extent, have been superseded by subsequent work by the Applicant.

16. On 24 January 2023 I met with Dr Joynes, and he and I went through the model, as it existed at that time, that he had developed. At that stage, it was my opinion that the model was suitable for the use to which it was put, which was concept investigation relating to the future development of the subject site. It is evident that this model has evolved significantly since that date.

17. Since the s42A report was completed, the Applicant has undertaken further work to address stormwater and flooding concerns that were highlighted in that s42A report. To my understanding, this further work has effectively changed parts of the application.

18. On 2 July 2024 stormwater and flooding experts and planners from the Applicant, from WBoPDC and from the Bay of Plenty Regional Council (BoPRC) held expert caucusing to go through changes to the application, in an attempt to document the points of agreement and disagreement.

19. The joint witness statement that was agreed by all parties as a true and accurate reflection of that expert caucusing, and I understand that the Commissioners have that document.

20. Since compiling that joint witness statement, further work has been completed by the Applicant and has been provided to me. This was reported in a further amendment to the report prepared by Dr Joynes, and makes attempt at addressing some of the issues that remained as reported in the joint witness statement.

21. As captured in the joint witness statement referred to in paragraph 19 of my evidence, it is my opinion that (at the time of writing this statement of evidence) there remain numerous issues to be resolved for the stormwater management elements of the

application.

22. This joint witness statement is comprised of 20 numbered bullet points. Of these 20 bullet points, it was agreed (by all in attendance) that 12 of them require further assessment and reporting back to Council (numbers 1-6 inclusive, 11-13 inclusive, 15, 16 and 18), with this work to be undertaken by the Applicant. A further 2 bullet points were not addressed due to time constraints (numbers 17 and 19).

23. Until all of these issues have been satisfactorily resolved, it is my opinion that insufficient evidence has been provided to me in my review capacity for me to have certainty that the proposed flood and stormwater management measures are workable within the space allowed, and will not cause adverse flood effects off site.

24. I do, however, believe that it is possible to address all of these stormwater and flood related issues and produce a proposed development plan that is both workable and addresses potential adverse stormwater and flooding effects (noting that these are centred on peak flood level criteria). In my opinion the site is not so heavily constrained as to make development necessarily unworkable.

25. In my opinion many of the issues that require further resolution could affect the development plan itself, and cannot simply be deferred to some future design stage.

26. It is my recommendation that a comprehensive development plan be delivered by the Applicant for the proposed land use consent application that sets out the intended layout of the proposed development in sympathy with the stormwater and flooding constraints referenced in my evidence and in the joint witness statement. This plan will require independent review before being able to be approved and implemented.

Technical assessment

27. Technical assessment on behalf of the Applicant undertaken by Dr Steven Joynes, has been aimed at demonstration that the application (which includes recent changes) can be given effect to in a way that results in minimal increase to modelled peak flood levels at various key locations.

28. I understand that the application has been recently amended to

now show modelled peak flood level increases at various relevant locations of no more than 14mm, across a range of different design flood events.

29. In my opinion, a modelled peak flood level increase of no more than 14mm is a minor effect. However it is not, as stated by Mr Murphy in paragraph 7.41 of his evidence, an “unequivocal reduction in flooding”.

30. Regarding the proposed future development area for which little design work has been provided, it is my opinion that future use of this area should not occur in a way that increases hazard to people and property. It may be the Applicant’s desire to accept a flood hazard rather than fill the platform, but there are published safety criteria for people that should not be exceeded, and I recommend that appropriate conditions should be imposed to ensure no increase to flood hazard.

31. After attending submissions as part of this hearing, it has become evident to me that changes to peak modelled flood level are not the only effect of importance. To date, assessments of flood effects have been focused on this single measure of effect on surface water systems. For example, my understanding of the evidence of Ms Julie Shepherd and my reading of the Pirirakau Assessment of Cultural Effects (PACE) indicates a wider set of concerns relating to the management of surface water (which includes flood water), without the singular focus on peak flood levels attained.

32. In her evidence, Ms Alison Cowley also raised the criterion of flood duration, and Dr Joynes’ modelling has shown flood duration has been modelled to decrease as a result of implementation of the proposed works. In my opinion this effect is directly due to the additional outlet capacity provided by the third Teihana Road culvert.

33. There are three potential flood “sources” that might affect the subject site. These are:

    (a) Extreme local rainfall that will cause flood conditions in the Hakao Stream and connected drainage networks.

    (b) An extreme flood in the Wairoa River catchment. While this river is dammed at McLaren Falls, a short distance upstream, the event that might cause an extreme flood

in this river system might be different from the worst case local rainfall event described in (a) above.

(c) An extreme sea level event. This would probably be accompanied by rainfall, but the predominant cause of flooding would be driven by coastal process, including tide, surge and wind setup.

34. The assessments considered to date relate primarily to the "source" as described in paragraph 33(a) above. However in his latest report, Dr Joynes indicates the extreme sea level event (3.8 mRL as per Section 5, page 21 of his report) to surpass the level of the rainfall driven extreme event (of 3.0 mRL). These two separate events share the same probability of occurrence – both have a 1 percent chance of occurrence in any one year, as at the projected date of 2130.

35. A number of submitters (well articulated by Mr Russell Williams and Mr Peter Lochead) raised the issue of what was referred to as "spring" flows, filling drains and waterways even during dry weather.

36. I believe the technical term here might be "baseflow". To my understanding, the flood modelling undertaken by Dr Joynes ignores the presence of baseflow, and has been conducted on the basis of dry waterways at the start of the modelled rainfall event.

37. Knowing that the tide gate where the southern drain crosses Te Puna Station Road would be closed during the higher part of the tide cycle, this baseflow would very likely back up in the connected waterways and might not be empty at the start of the modelled rainfall event. The significance of this effect was addressed in the latest report from Dr Joynes in section 4.5 (page 19).

38. The effect of groundwater and baseflow was indicated to be "minimal" by Dr Joynes (section 4.5 of his amended report). I have not independently been able to assess this given the short time available from when this report was received. Of specific note is that Dr Joynes appears to imply that tidal backflow up the South Drain would negate that effect. To my understanding, and as supported in the submission from Ms Sarah Rice, there is no connection between the South Drain and the tidal estuary of the

Wairoa River – refer to the figure shown in paragraph 10 of my evidence – that will convey tidal flows.

39. During this hearing there has been discussion on model accuracy and model calibration. To my understanding, the model has not been calibrated against any observed rainfall and resulting flooding events.

40. In recent times there have been events that may be suited to this calibration, and two of these have been raised in submissions – especially in the evidence of Ms Sarah Rice. The events are those from 2018 (September if my memory serves me correctly) when flooding in the area was driven my extreme tailwater conditions (combination of Wairoa River flow and sea state), and the ”Anniversary Day” flood from February last year (to my understanding this was more driven by rainfall than by tailwater).

41. Regarding model accuracy, the hydraulic model will be, at best, as accurate as the input data. Dr Joynes confirmed this in his verbal evidence, where my recollection had it that he confirmed an absolute model accuracy of 200-300mm. This effectively means that any reduced level from the modelling is subject to this level of (in)accuracy. Calibration could improve this accuracy.

42. Also stated by Dr Joynes is that the relative accuracy is better than this, and is at some plus or minus 50mm. This appears confusing, but I will attempt to explain over the next paragraph.

43. Any lack of absolute accuracy will be carried through all modelling assessments. When assessing a pre- versus post-development effect, the absolute (in)accuracy applies to both cases (pre and post) and can be seen to effectively cancel out through subtraction, to result in a net difference.

44. I have noted reference, during this hearing, to the vertical datum used in the assessments. To my understanding, the MVD53 datum has been globally used. This is a local datum and is not used across the whole country. However, I understand there to be a desire to move to the NZVD2016 vertical datum, and care should be exercised in any decisions that quote reduced levels.

45. Regarding catchment area, Figure 3.1 in the report by Dr Joynes is a figure that shows the catchment area used in his assessment. This does extend to the northern side of the railway line in the north. I am not sure whether or not the railway culvert,

referred to by both Mr Williams and Mr Lochead, has been included in the model.

46. During this hearing there has been discussion on the performance of wetland planting versus overland flow path planting. Hydraulic roughness is the term engineers use to describe the different surfaces and their flood flow performance.

47. Hydraulic roughness is proportionally linked to discharge. A 10 percent increase in hydraulic roughness will mean, if all else remains the same, a 10 percent reduction in flood flow.

48. However the hydraulics are more complex than this. A rougher surface will require a steeper hydraulic grade to pass flows. A steeper hydraulic grade can be formed by increasing the upstream flood level. Without delving into this is any more detail, it is my opinion that getting hydraulic roughness correct is very important in determining the hydraulic performance. This matter requires careful attention.

49. The Applicant has made reference to there being two surface water network options, one of which is to connect the Northern Drain to the Overton site on the northern side of Te Puna Station Road. While I understand that the feasibility of this has been assessed and confirmed (as confirmed by Mr Ross Kernot), I have not independently reviewed this. In particular, I see waterway depth and resultant width, together with potential backwater and saline intrusion as being key issues to be resolved.

50. During the course of this hearing I received amended landscape plans for the proposed development. I understand that these now show there to be no bund on the northern side of the proposed development, adjacent to Te Puna Station Road. To my understanding, this bund was removed to reduce the modelled flood effect of the proposed development. The plans have not been updated to clarify if the filled area has subsequently been setback further within the site, which I assume would need to occur given the modelling determined that the bunds would have an adverse effect on flooding.

51. There has been discussion on the use of “consistent” rainfall data across various assessments for surface water at the site. I agree that consistency is required and that further cross checking of this

should be undertaken.

Mark Stuart Pennington
11 July 2024