SUBMISSION TO HEARING ON APPLICATION FOR RESOURCE CONSENT

INTRODUCTION

1. My name is Michael Smith (Mike), and I am a permanent resident at Mangakuri Beach. I have an Honours Degree and a Masters Degree in Civil Engineering and am a Chartered Member of Engineering NZ (CMEngNZ), a Chartered Professional Engineer (CPEng), and an International Professional Engineer (IntPE)/APEC Engineer. I also have a Masters in Business Administration (MBA).

2. My work experience is in the field of Project, Engineering and Construction Management. I worked for Royal Dutch Shell (RDS) on a worldwide basis for 27 years up to 2017 and have been working as a Project Manager for local projects since then.

3. Key positions (among others) that I held while working for RDS were as the Engineering Manager for the early phase engineering studies into the decommissioning of the Brent oil field in the North Sea and as Construction Manager for a Shell joint venture in Iraq.

4. I grew up in Waipawa and have been going to Mangakuri since 1970. My parents were able to buy one of the properties there in the 1980's and my wife and I were fortunate enough to be able to buy that property from them in 2003. It has been our permanent home ever since.

TECHNICAL REPORTS

5. As engineers it is our nature to find solutions to technical problems presented to us. The technical reports submitted by the applicant, that have been professionally produced and peer reviewed by well qualified personnel, describe the solutions found to the problem presented to the respective engineers within what is defined as "best practice".

6. "Best practice" is essentially saying that engineers cannot design for every eventuality so a trade off is made between our understanding of the environment affecting the problem and the cost of designing something to give a predictable outcome.

7. Our understanding of the environment is generally based on information and data that have been published by recognised sources or gathered in compliance with minimum industry standards of good practice. Even so, it must be recognised that the information gathered is not perfect, and there is a chance that it is inaccurate,

misses some important element or is not an adequate representation of reality.

8. Designing something to give a predictable outcome necessarily requires a limit to be placed on the input conditions that are designed for. It is possible to design facilities to give a predictable outcome for almost all input conditions, but the cost of those facilities is generally prohibitive.

9. The consequence of the above principles is that it is generally accepted that designing for a 1 in 100 year rainstorm (Average Recurrence Interval (ARI) = 100 years), for example, provides a sufficiently "worst case" scenario.

10. Having designed for the deemed "worst case" good engineering should then consider the case where the design conditions are exceeded, as nature doesn't care what the design conditions are, and assess the consequences. This may lead to changes in the original design to mitigate these further consequences.

    - An example of this is in seismic design where the basic design case is a Serviceability Limit State (SLS), but a higher design case is assessed as an Ultimate Limit State (ULS). There are different tolerability criteria for the two states.

    - A further example is the design of the offshore platforms in the Gulf of Mexico. These are designed for hurricane conditions, but all personnel are evacuated ahead of a hurricane striking. This is to recognise that it is impossible to accurately predict the strength of any single hurricane and that the preservation of life cannot be guaranteed as a result.

    - Auckland Council adopt a similar principle in stormwater design where it is recognised that a culvert cannot be designed for the extreme flood flow. They now design in areas that can be flooded if the flow exceeds the culvert capacity.

11. The art of early phase engineering is to understand the problem environment sufficiently to be able to identify the significant risks that the design must consider. Those risks must then be evaluated in enough detail to have confidence that the selected solution lowers them to an acceptable level before proceeding to the more expensive design and construction stages of a project. In my experience in New Zealand this stage is generally limited by the client organisation's willingness to pay for early engineering, leading to expensive consequences later in the project.

12. The conclusion for me is that designing to "best practice" is necessarily limited in its scope because it implies an acceptable level of risk in the designed result. Where the design is in a low hazard

area, such as a flat section near an urban area where there is good environmental data, the consequences of the design condition being exceeded are tolerable. If the design is located in a high hazard area, with limited environmental data, then the probability of the design conditions being exceeded will be higher and the consequences will be greater.

13. There are frequent references to Cyclone Gabrielle in the technical reports. It is implied that because nothing happened in the area as a result of the cyclone then nothing is likely to happen for the life of the development. I was at Mangakuri during the cyclone, and I have a weather station at my residence that has recorded local weather data since 2018. This weather station recorded 120 mm of rain over the full cyclone event of approximately 30 hours. Based on the HIRDS historical data used in the stormwater design, this equates to an ARI of 10-20 years. For the Mangakuri location this was clearly NOT an exceptional rainfall event.

14. Further to the preceding paragraph, I then refer to the data presented in my original submission from the NIWA Historical Weather Event database that shows that the 250-year ARI event has been exceeded in the general area of Mangakuri 4 times in the last 107 years. The best practice designs presented in the technical reports have not considered this. For reference, the 2011 event in the table below caused more damage in the Mangakuri area than Cyclone Gabrielle did.

Year	Event	Location	Rainfall	ARI
1917	Unnamed	Elsthorpe	381mm in 60 hrs	>250 yrs
1936	Unnamed TC	Maraetotara	254mm in 24 hrs	>250yrs
1953	Heavy Rain	Kahuranaki	224mm in 9hrs	>250yrs
1996	Cyclone Beti	Waipoapoa	201mm in 24hrs	80 yrs
2011	HB Rain Bomb	Pourerere	480mm in 18 hrs*	>250yrs

*Not recorded/reported by NIWA

15. In addition to the foregoing design philosophy issues, it is noted that many of the technical reports make statements to the effect that further work will need to be done in the detailed engineering phase, or to support a building consent application. With reference to Paragraph 11 above, this suggests that there are project risks that still need to be resolved that may have significant consequences given the high hazard area of the development. It may even mean that the design, as it is currently presented, will be substantially changed during the detailed engineering phase.

TRAFFIC MANAGEMENT

16. The traffic management technical memorandum (TM) rightly states that the effects on the road of the increased traffic will be low as the increased axle loads should be well within the capacity of the road. There is also a recognition that a safety assessment is required for Williams Rd.

17. While the road may be capable of carrying the additional traffic from a technical perspective, the impact that this additional traffic has on the amenity of the coastal settlement is significant. On an exceptional day there MIGHT be 100 vehicle movements on Williams Rd, but on a normal day there will be less than 10. An increase of 35 vpd will be VERY noticeable, and this estimate is likely to understate the reality. Residents of the new properties are likely to drive down to the beach frequently in a range of vehicles (motorbikes, 4WDs, ATVs, cars) throughout the day.

GEOTECHNICAL

18. This technical report, and the TM of the reviewer, agree that the design has been done in accordance with "best practice". Reference is therefore made to the previous paragraphs discussing this. The geotechnical report also refers to the lack of effects from Cyclone Gabrielle (TM report item 8.6), which I do not consider to be a good basis for engineering confidence, as explained in Paragraph 13.

19. Reference is made to TM report item 9.4 that states that the calculated factors of safety are "*not significantly greater than the minimum requirements for best practice*" and that if "*lower material strength parameters [are] adopted, this might result in insufficient factors of safety in the models used*".

20. Further reference is made to TM report 9.9 which states "*We would anticipate, however,.. that Building Control will require a site specific engineering certificate in the form of a Producer Statement Design (PS2) explicitly confirming that the ground is suitably stable to support the development globally, and that the proposed developments will not create or exacerbate instability on this or adjacent property*" (underline added).

21. The above paragraphs illustrate my point that while the design is regarded as best practice by the peer reviewer that does not necessarily mean that all the risks have been completely controlled.

STORM WATER

22. This technical report, and the TM of the reviewer, also agree that the design has been done in accordance with "best practice". There are some technical details that both parties believe can be deferred to the

detailed engineering phase. Reference is made to Paragraphs 11 and 15 above. In addition, it is proposed that engineering issues are "mitigated" by imposing relevant consent conditions on the applicant and the future property owners within the subdivision. This does not resolve the concerns but just makes them somebody else's problem.

23. The HIRDS data used in the design use the mean result from the statistical assessment completed by NIWA. This implies there is a 50% probability that these conditions will be exceeded within the design case ARI selected. Given the high hazard location it is my view that the input conditions should have at least a 95% confidence limit (i.e. mean value plus two standard errors) or possibly a 99% confidence limit (i.e. mean value plus three standard errors) to have truly evaluated the risk within current knowledge. Note that the standard errors for the rainfall data are also published in the HIRDS information so were readily available to the designers.

24. All detention assessments are based on the detention dams having the full detention volume available. If the extreme rainfall event occurs as part of a longer, less extreme, event then the dam may be close to full. In this case the discharge from the dam will be the full inflow rate (due to overflowing) and there will be no detention benefit from the dam. The downstream area will suffer the full effects of concentrating the stormwater flow to the dam. This scenario is also relevant to the assumed detention volumes on the rainwater collection tanks which will just overflow if the tanks are already full. The result will be even more concentration of stormwater flows downstream. This risk has not been considered as it may not fall into the category of what is required to achieve "best practice".

25. There is an agreement that consent conditions should be imposed on the future property owners to ensure that the required detention volumes are maintained. The effectiveness of these conditions relies on the enforcement capability of the CHBDC. I do not have confidence that this compliance monitoring will be sustained which will undermine the effectiveness of the designed mitigations. It will only take one extreme event where this monitoring hasn't happened for there to be significant impacts on the downstream zones.

26. If the assumption that the new properties are not permanently occupied is accepted (refer response to the traffic management submissions) then the probability of drains being kept clear is even less. There will be no-one at the properties to do the checks and take the necessary actions.

27. In recent rain events that have led to surface flooding it was reported that the flooding was the result of "blocked drains" (NZ Herald, June 16th 2024). This occurred in urban areas of Auckland and Northland,

so what chance is there that the drains designed for this subdivision will be kept clear? Even if they are clear ahead of the storm there is always the possibility that the drains block up during the storm.

28. I restate what I said in my original submission - building detention dams on unstable ground, classed as a high hazard area by the CHBDC, to capture stormwater from theoretical design criteria that doesn't adequately represent a possible future event seems seriously irresponsible.

RISK MANAGEMENT

29. The overall risk management strategy of the applicant and the technical design is to impose consent conditions for those risks that haven't been designed out. The various proposed conditions are extensive (67 conditions over 23 pages) which will require the applicant and all the subsequent property owners to be aware of, and understand, everything that is required of them to control those risks.

30. Safety management recognises that the root causes of incidents fall into three general categories – people (i.e. behaviour), procedures and design. In this case, the design element has set up potential failure scenarios which are then proposed to be controlled by procedures (consent conditions) that rely on people behaving correctly (complying with the consent conditions in perpetuity).

31. Risks are usually evaluated on the basis of probability and consequence. The pre-development risk is essentially driven by the probability of a natural event occurring (severe storm or earthquake). The post development risk has the same natural event probability, but has the additional probabilities associated with non-compliance with the consent conditions. The consequences have also increased as there will be new people and asset consequences from the developed properties. The hillside risk would then require compliance with the consent conditions by:

- The developer and designers in the development detailed design, and completing a design that fully incorporates the currently identified issues
- The construction contractors establishing the accessways, building platforms and stormwater infrastructure and ensuring that the construction methods used do not cause any new issues
- The property purchasers in the design of their new residences, and in the operation of their stormwater systems and the shared infrastructure
- Subsequent property owners on resale

32. Noting the remote location of Mangakuri, a serious event from a natural disaster could have significant location consequences in terms of loss of life and asset damage. Increasing the magnitude of those consequences with a development such as this will make the aftermath of such an event even more challenging. The biggest consequence from Cyclone Gabrielle was the loss of power, communication and access. Adding a greater potential for loss of life to that situation seems very short sighted.

33. To quote from a Harvard Business Review article on Risk Management[1]

"*Remember that the biggest risk lies within us: We overestimate our abilities and underestimate what can go wrong. The ancients considered hubris the greatest defect, and the gods punished it mercilessly*."

LAND DEVELOPMENT

34. I am in full agreement with the assessment by Erin Griffith relating to the effects of the development on the Mangakuri environment regarding the visual impacts from the development works and the potential light pollution from development along the ridge. Below is a photograph of the aurora event in May that was taken from my front gate looking back across the ridge to be developed. It is hard to describe how dark it is at Mangakuri on a moonless night, and how spectacular the night sky is as a result. Housing development along the ridge line would have altered the silhouette and impacted on visibility of such an event.

35. My family and I have lived in some very busy places (Singapore, Kuala Lumpur, Dubai, The Hague) and visited many others. The peace and tranquillity of Mangakuri was, and is, a welcome contrast to those locations. The lack of obvious evidence of habitation, and the true darkness of the night sky, are treasured features of the Mangakuri location and our home.

36. In coming home from one of those locations the impact of driving over the crest of Williams Rd and down to the beach cannot be understated. To arrive at the beach following the development of the proposed subdivision and be met with an array of houses, rather than a beach vista, as you crest the hill will irreparably damage that sense of peace and escape from a busy world that the beach has always represented to me.

37. Once at the beach the vista looking back up the hills is currently one with very little obvious development. The houses that are there are

[1] The Six Mistakes Executives Make in Risk Management, HBR, October 2009

set into the base of the hill, cause minimal visual interruption and do not detract from the natural landscape. The dunes screen the houses even more. The lasting impression is of a remote location, which is what the current residents, my family and I prize very highly.

38. I am also in agreement with the assessment by Ryan O'Leary that the proposed development does not comply with the objective of the Proposed District Plan (PDP) to limit the development of the coastal margin. Approving this consent application would, in my view, create a precedent that would undermine the PDP before it has even come into effect.

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