

## Closing Statement

# Hearing 27C: Flood Hazards and Defended Areas

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## I Introduction

1. My name is Janice Carter. I am the author of the s42A Report 27C, Natural Hazards and Climate change – Flood Hazards and Defended Areas.
2. This closing statement follows the hearing held on 10,11 and 12 May 2021.
3. A consolidated version of chapter 15 has been prepared reflecting recommended changes for all Hearing 27 Reports. I will refer to the consolidated version which I understand will be circulated to the Hearings Panel and placed at the same website location as this closing statement.
4. While no new issues emerged at the hearing, I consider the following matters require further response:
  - a. Mapping around Lake Waikare (Mercury NZ Limited [2053, FS 3034])
  - b. Flood Hazard Classification (Mercury NZ Limited [2053, FS 3034])
  - c. Level of Service for stopbanks at Meremere Dragway (Meremere Dragway Incorporated [2150])
  - d. Definition of utility (Genesis [2104])
  - e. Updating of catchment management plans (Pokeno Village Limited [2147])
5. I address each of these matters in turn. Technical information has been provided to me from Rick Liefing of the Waikato Regional Council in the preparation of this response.

## 2 Mercury New Zealand Limited [2053, FS3034]

### **Flood Mapping and Clarification of AEP's and Lake Waikare Levels in WRC 2005 Report**

6. Dr Webby quoted details of the 2005 WRC report that suggested the 1983 1% AEP Lake level of 7.37 m RL was verified through modelling undertaken for the 2005 report. Therefore the 1983 1% AEP level represented an adequate estimate of the current 1% AEP level for Lake Waikare and should be used to map the current 1% AEP level for Lake Waikare.
7. Mr Liefing has provided correction and clarification of the modelling undertaken for the 2005 report as follows:
 

*A 1% AEP flow of the Waikato river from the 1983 assessment was used to calibrate the 2005 model. The 2005 model produced a level of 7.36 m for Lake Waikare, based on the 1983 1% AEP flow of the Waikato River. Therefore, the authors concluded that the model performed well as it compared exceptionally well to the 7.37 m RL level of Lake Waikare modelled in the 1983 assessment.*
8. Mr Liefing notes that the Lake Waikare 1% AEP level is not solely based on flows from the Waikato River as inflows (other water courses draining into the lake), outflows and evaporation are taken into account to determine lake levels.
9. Mr Liefing goes on to say:
 

*The 2005 report then estimated a new 1% AEP flow (i.e., a 2005 1% AEP Design Flood Scenario) for the Waikato River and derived a new 1% AEP level for Lake Waikare of 6.70 m RL. Two other scenarios were also modelled in the 2005 report which included a 2% AEP and 'above Design' scenario. For the purposes of this statement I will only focus on the 1% AEP scenario.*

The 2005 1% AEP peak flow (i.e., 2005 1% AEP Design Flood Scenario) for the Waikato River was derived from a frequency analysis of water level recording sites at Ngaruawahia and Rangiriri. While no dates were given, the water level data used for the frequency analysis takes into account changes in the hydrology resulting from the construction of the Power generation dams in the upper Waikato up to sometime in 2005 or late 2004. The 2005 1% AEP design flood event did not include climate change.

A summary of the modelling results is best shown in the table below, extracted from the 2005 report:

*Table 3: Summary of modelling results for different flood events.*

Scenario	Peak flow at Huntly (m <sup>3</sup> /s)	Peak Flow at Rangiriri (m <sup>3</sup> /s)	Peak flow over the Rangiriri spillway (m <sup>3</sup> /s)	Maximum Lake level (m)	Maximum level at Rangiriri Ponding Zone (m)
2%AEP	1445	1400	42	6.39	7.00
1% AEP	1570	1450	118	6.70	7.53
Design	1840	1537	299	7.36	8.53
Above design	2100	1612	486	*	9.57

*Note: \* this level varies depending on northern spillway design see section 5.2.*

In the above table scenarios '2% AEP', '1% AEP' and 'Above Design' were derived in 2005. The 'Design' Scenario is the 1% AEP flood event derived in 1983.

Therefore, the modelling clearly shows that that 2005 1% AEP Lake Waikare level of 6.70 m RL is significantly different to the 1983 1% AEP design event level of 7.37 m RL. The 2005 modelling aligns with my statement that the 1983 1% AEP level for Lake Waikare does not provide an adequate 'current' 1% AEP lake level, as suggested by Dr Webby.

The 2005 report also highlights that changes in the hydrology and hydraulics of the Waikato River are likely and would affect our current understanding of a 1% AEP for both the Waikato River and therefore Lake Waikare.

10. Mr Liefiting and I concur with Mercury that the area around Lake Waikare is susceptible to flooding; there is information in various forms that show that, including on the WRC Hazards Portal. It is also considered that the area could be mapped based on the Northern Stopbank design crest level of 8.0 m RL. If the panel was minded to do this, I note that it would not represent a defined flood frequency level for flood mapping around Lake Waikare and would require a specific definition to clearly distinguish it from the Flood Plain Management Area (FPMA) in the Proposed District Plan. Corresponding policy provision would also be required.
11. I note that there are other similar areas in the Lower Waikato Catchment that are flood susceptible that have also not been mapped as they too do not yet have a definitive 1% AEP level, and form part of the WRC work stream mentioned in my s42A Report.
12. I retain my view that the best outcome would be achieved by awaiting the WRC completing its flood modelling of the area around Lake Waikare and incorporating the mapping within a variation or plan change. From a planning process perspective, I have concerns that the area to be mapped is large and contains a number of land owners who have not had the opportunity to comment, bearing in mind that all other landowners in the FPMA were provided with a letter at the time of notification of the PWDP (Stage 2), advising that their property was located within the FPMA and/or High Risk Flood Area. There was no spatial extent provided

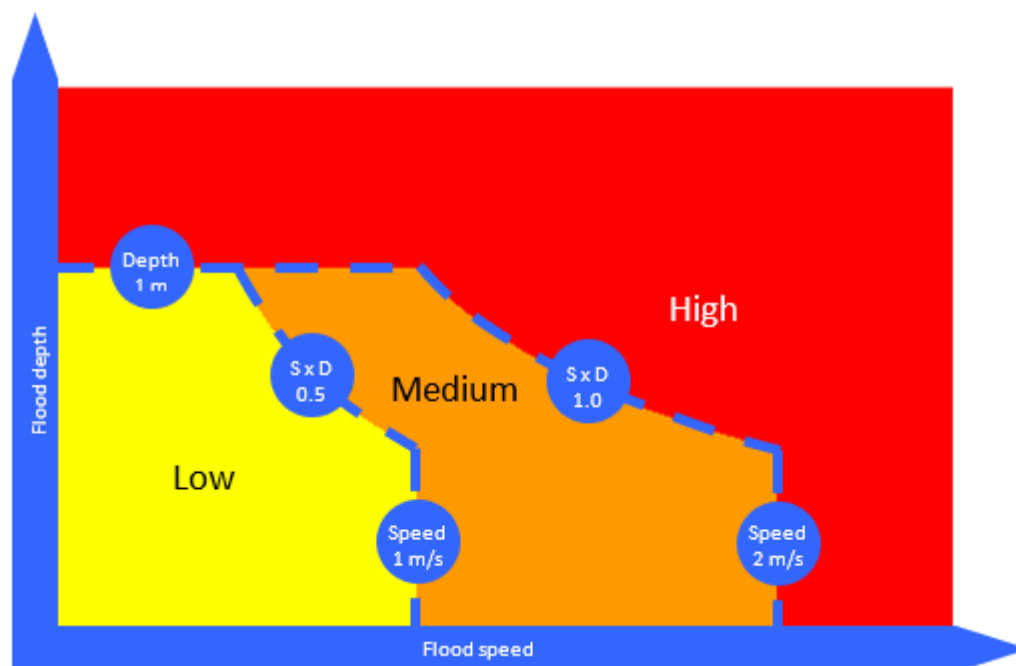
in the Mercury submission, and most land owners would not be aware that they are below 8mRL without such notification.

### Waikato Hydro Scheme and Karapiro dam discharges in relation to managed projected increases in rainfall due to climate change.

13. I confirm from Mr Liefing that the approach to use the current 1% AEP discharge (and more frequent discharges) from Karapiro for projected impacts for climate change on rainfall within the Waikato Hydro System and Lake Taupo catchments is valid, based on current understanding and information. The approach was recently reconfirmed by Mercury Energy Hydrologist, David Payne (21/05/2021).

### Flood Hazard Classification

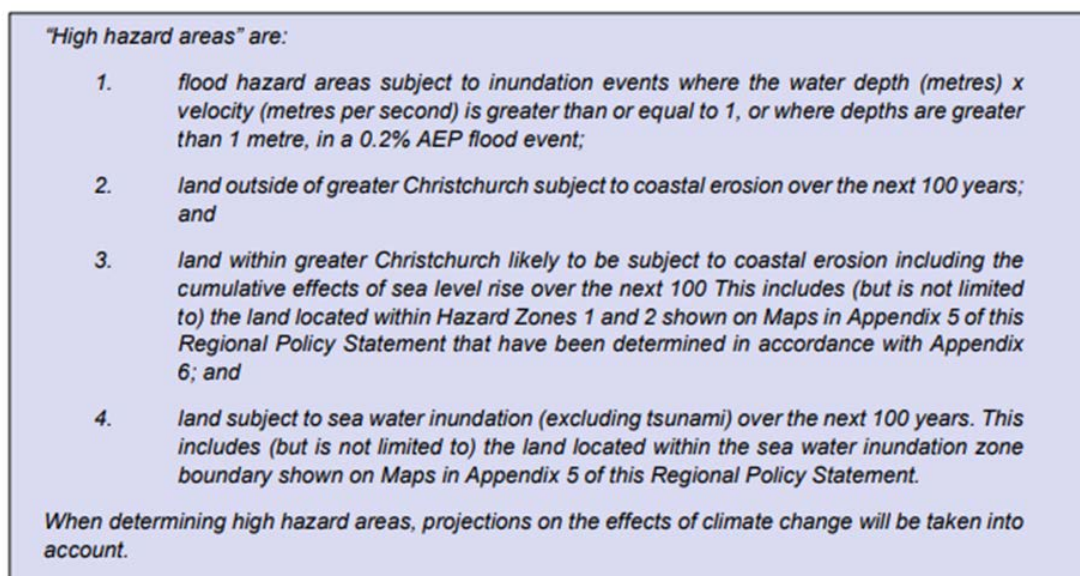
14. Dr Webby stated that the High Risk Flood Area did not include flood flows/depths that would be considered as being significant based on a Flood Hazard Classification from Australia, in support of including the Floodplain Management Area within areas identified as being of significant risk.
15. As provided in my s42A Report and rebuttal evidence, the High Risk Flood Area is based on the definition of High Risk Flood Zone in the Waikato Regional Policy Statement (WRPS). Any change to the High Risk Flood Area for the Proposed Waikato District Plan (PWDP) will not be consistent with the WRPS. The flood classification used to determine the High Risk Flood Zone in the WRPS and hence the High Risk Flood Area in the PWDP is based on the flood hazard classification used by the Waikato Regional Council (WRC) which is summarised in Figure 1:



**Figure 1 WRC Flood Hazard Classification used to define the High Risk Flood Zone classification in the WRPS.** Source: Waikato Regional Council. 2008b: Karaka Stream river flood hazard assessment. Environment Waikato Technical Report April 2008 (Doc # 11301821).

16. The extents of the low and medium classification areas are contained within the FPMA. Mr Liefing advises that should a different classification be used for any specific development, the existing model information available can be used to assess and map any flood hazard classification schema consistent with the WRC classification.

17. There is no consistently used flood hazards classification used in New Zealand by local government. Many district councils defer to the scheme provided in the regional policy statements, if there is one, due to the requirement to give effect to the higher order planning documents. Other regional councils such as Canterbury Regional Council, use a similar, but not exact, classification to define High Flood Hazard to that used by Waikato Regional Council. Consequently, Hamilton City Council (which must give effect to the WRPS), Christchurch City Council and Waimakariri District Council (which must give effect to the Canterbury Regional Policy Statement CRPS) also use a similar classification. The Canterbury Regional Policy Statement high hazard area Classification is as follows:



Source: Canterbury Regional Policy Statement [page 240].

18. It is noted that neither Mr Webby's diagram nor the WRC High Hazard classification in Figure 1 refer to significant risk. As mentioned in my rebuttal evidence, this is not surprising because the term "significant risk" in the RMA post-dates the development of the WRPS. Therefore, to ensure consistency and provide clarity I am recommending that submissions in relation to this matter from Mercury and WRC be changed from reject to accept in part, and the respective policies 15.2.1.1, 15.2.1.2, 15.2.1.3 and 15.2.1.4 be amended to replace use of the words significant risk with high risk. These changes are shown in the updated consolidated version of chapter 15.

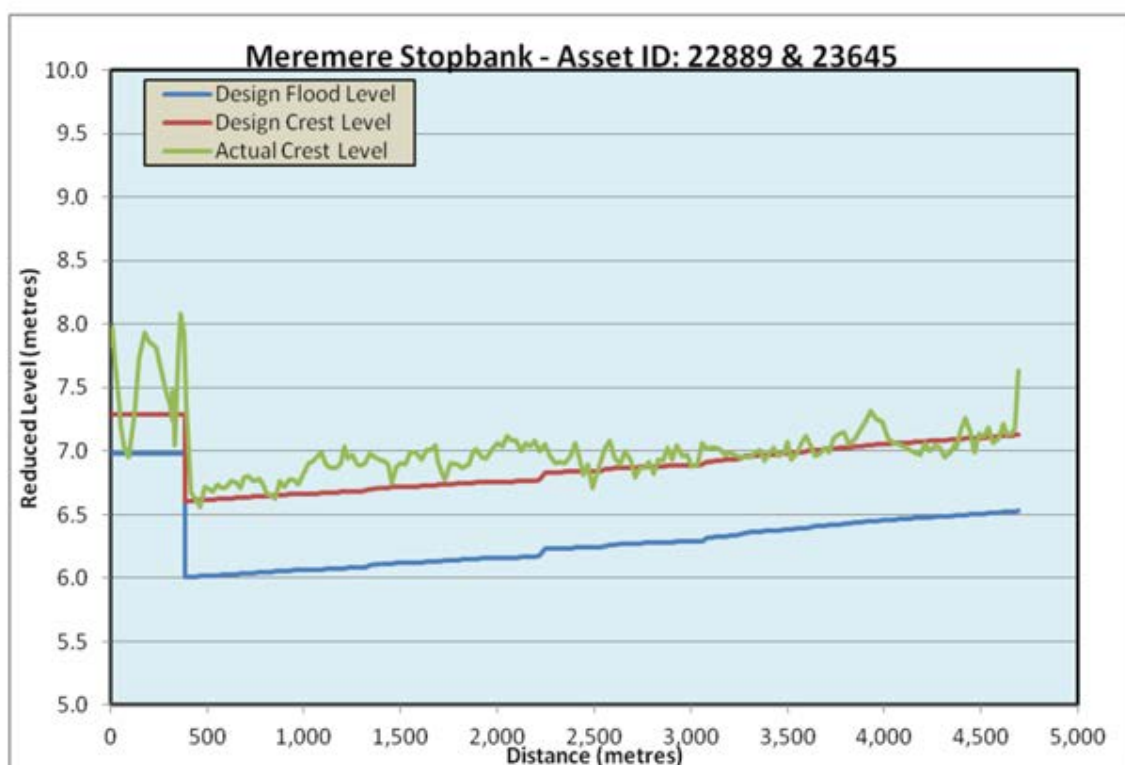
### 3 Meremere Dragway Incorporated [2150]

19. Meremere Dragway Incorporated provided legal submissions at the hearing in respect to its submission stating that they wish to be provided with detailed design information in respect to the stopbanks protecting their property. The reason for this is that they consider the current stopbank (Meremere West Stopbank) is to a 1% AEP level of service which would justify remapping the site to be within the Defended Area on the Planning Maps rather than in the FPMA.
20. Mr Liefing has provided comment on this issue as follows:

*The Meremere West Stopbank was originally designed as part of the Lower Waikato Waipa Control Scheme has a 10% AEP Level of Service. The adjacent Meremere Main Stopbank has a 1% AEP level of service.*

Figure 2 below shows a plot of the Meremere Main and West stopbanks longitudinal section. The Meremere Main stopbank is from distance 0 to 400 and Meremere West from distance 400 onwards. The plot clearly shows the difference in 1% AEP and 10% AEP design flood levels. The design flood levels where the two stopbanks meet (distance 400) are 6.98 m RL (1% AEP) and 6.02 m RL (10% AEP). While there is no overlapping line of the 1% AEP with the 10% AEP shown in Figure 2, along the Meremere West Stopbank, the 1% AEP flood level is approximately 0.96 m above the 10% AEP flood level along the Meremere West Stopbank and the majority of the Waikato Main Channel.

Therefore, the 1% AEP flood level is above both the Design Crest level and majority of the Actual crest level (as Surveyed in 2010) of the Meremere West stopbank.



**Figure 2 showing the Design Flood and Crest levels and actual Crest Level as surveyed in 2010 for the Meremere Stop banks 'Main' (Asset ID 23645) and 'West' (Asset ID 22889).** Source: Figure I6 Appendix I, Lower Waikato Flood Protection – Service Level Review 2013.

21. Land within a Defended Area is required to be protected from a 1% AEP flood event. Therefore, stopbanks must be both designed and maintained at that level of service to provide that guaranteed level of protection. The Meremere West Stopbank Level of Service (LoS) is to protect land from a 10% AEP Design flood of the Waikato River and therefore does not meet the criteria to be identified as a Defended Area. I understand from discussions with Mr Lifting that there is considerable process to be undertaken with WRC for a change of LoS of the stopbanks and change to the targeted rate for property owners.
22. If at some stage in the future the stopbanks are increased to a 1% AEP LoS then it would be appropriate to change the planning maps through a schedule I process, including any other land affected by upgrades to the level of service of stopbanks that also meet the Defended Area criteria. I retain my view that it is not appropriate to change the planning maps at this

stage because the LoS of the Meremere Dragway land located in the FPMA is a 10% AEP LoS as explained by Mr Liefing.

23. The Meremere Dragway Incorporated's legal submissions outline an alternative rule that would enable the rules of the Defended Area to apply and enable the FPMA rules to fall away once that LoS was attained for the Meremere Dragway land. I have considered this proposed new rule. Dr Mitchell made a comment at the hearing that if the panel were of a mind to consider such a rule appropriate, it would need to be certified by the Council itself rather than as proposed by the submitter and I agree with that (noting that the WDC would need to seek confirmation from WRC that the certification was appropriate).
24. The practical application of the notified policy and rule framework is that **if** the land became defended to a 1% AEP LoS at some time in the future, then that would support a resource consent application, where any matter can be taken into consideration as a full discretionary activity, including Policy 15.2.1.12 (iii). There are many landowners for whom this would be the pathway should the stopbanks be upgraded in the future prior to a plan change process to amend the Defended Area mapping. However, I note the comments from Mr Liefing that the process of upgrading the stopbanks takes time and is costly to property owners who are provided with added protection.
25. I disagree with the legal submission's interpretation of the activity status of an accessory building in the FPMA. While it is correct that an accessory building without a floor is a permitted activity under Rule 15.4.1 P4, an accessory building with a floor does not automatically become a discretionary activity as described at paragraph 19 (a) of the legal submissions. Under Rule 15.4.1 P1 a new building is a permitted activity provided it complies with the minimum floor level activity-specific condition.
26. Overall, I retain my recommendation to reject the relief requested by Meremere Dragway Incorporated [2051.1] to change the planning maps to include its land within the Defended Area. I have also considered the alternative rule presented at the hearing which would (with some improved drafting) enable the Defended Area rules to apply in place of the FPMA rules at a future date. For the reasons discussed above I do not consider the proposed alternative rule to be appropriate.

## 4 Genesis Energy Limited [2104]

27. In response to a comment by Commissioner Sedgwick at the hearing regarding whether it is appropriate to include Genesis Energy at the end of clause (1) in the definition of utility, I make the following comments. The definition of utility is intended to include electricity generators such as Genesis. Section 2A of the RMA outlines the situation for successors and states the following which might be helpful:

### 2A Successors

- (1) *In this Act, unless the context otherwise requires, any reference to a **person**, however described or referred to (including applicant and consent holder), includes the successor of that person.*

28. I also note that there may be other electricity operators or generators in Waikato District who are also not network utility operators or requiring authorities. The submission from



Genesis is broad in respect to this issue, as it seeks that infrastructure as defined in Chapter 13 be included in the relevant policies and rules. Clause (d) in the definition of infrastructure states the following:

- (d) *facilities for the generation of electricity, lines used or intended to be used to convey electricity, and support structures for lines used or intended to be used to convey electricity, excluding facilities, lines, and support structures if a person:*
- i. *uses them in connection with the generation of electricity for the person's use; and*
  - ii. *does not use them to generate any electricity for supply to any other person;*

29. Clause (d) is similar in terms of its practical application to clause (1) of the definition of utility but does not have the restriction requiring network utility operator or requiring authority status.
30. Consequently, I consider that it would be appropriate to remove the words 'provided by network utility operators or requiring authorities' altogether from the definition of utility. This would satisfy the alternative relief requested by Genesis in its evidence at para 45 and 49 as Genesis's 'electricity generation infrastructure' would be effectively included in the utilities definition. This relief responds to a number of Genesis Energy's submission points [2104.6, 2104.7, 2104.8, 2104.9, 2104.10].
31. I have therefore amended the consolidated chapter 15 provisions to reflect this recommended change, by deleting 'provided by network utility operators or requiring authorities' from clause (1) of the definition of utility.
32. In terms of s32AA, I consider the exclusion of Genesis Energy Limited being able to utilise the utilities definition in chapter 15 to its benefit is an oversight, resulting from the drafters being unaware that Genesis was not a network utility operator or a requiring authority. Consequently, I consider that the proposed correction is more effective in achieving objective 15.2.1 of the Proposed Plan and implementation methods 13.2.5 and 13.2.6 of the Waikato Regional Policy Statement. I also consider the original s32 evaluation adequately covers and justifies the amendment now proposed.

## 5 Pokeno Village Holdings Limited [2147]

33. Since my s42A report recommendations were written, I have become aware that there is an updated version of the Pokeno Catchment Management Plan for 2020 that is in draft form and may be finalised and approved by the WDC in the near future. As a result of considering this I am recommending to the panel that additional words be added to 15.13 Information requirements for all resource consent applications addressing natural hazards, to refer to any updates of the management plans listed. I consider this is a minor change and is within the scope of the original submission from Pokeno Village Holdings [2147.4]. The change I propose is to add the words 'or any approved updated version' and I have included those words in the consolidated chapter 15.

## 6 Summary

34. This concludes my closing statement for the hearing 27C Flood Hazards and Defended Areas topic. I wish to thank the Panel for the opportunity to provide the above right of reply and trust that it assists with the Panel's decision-making process.