

## BEFORE THE COMMISSIONER ON BEHALF OF THE OTAGO REGIONAL COUNCIL

Consent No. RM18.004

Between the Applicant: Pioneer Energy Limited and the Consent Authority: Otago Regional Council

### Speaking Notes from Annabelle Coates, 4 July 2022

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#### Introduction

1. I have prepared evidence on ecology values and effects for the Hearing of RM18.004.
2. As the proposal is a change in conditions, the only effects on ecology that I have considered are those that result from the increased drawdown rate. A series of four scenarios have been developed that describe the lake under various operating regimes. I submitted my evidence before receipt of the peer review of the lake levels model<sup>1</sup> the s42A Officer's Report, evidence submitted by the Applicant from Mr Jack, Mr Nicolson and Mr Dungey, and evidence submitted by the Otago Fish and Game Council by Mr Couper. I have now read this material. I consider the updates to this model, and provide responses to issues raised by Mr Ross Dungey and Mr Jayde Couper in their evidence. I consider the baseline for comparison of effects to be Scenario B (current consent operated to its maximum).

#### Lake levels model

3. I first must address the comments made by Mr Couper in paragraphs 12 to 14 of their evidence. At the time of writing and submitting my evidence, the model had not been subject to review. I was therefore reliant on its accuracy in forming my opinions, and I have stated as such in my evidence. Based on the information available to me at the time, I stand by my statements. Prior to a model being available, when I first completed my review of the application in August 2021, I based my consideration of the effects resulting from the increased drawdown rate on the following:
  - a. The minimum lake level would be reached faster;
  - b. The lake may be at the minimum level for longer; and
  - c. Discharges to the Teviot River would be reliant on/affected by lake level.The model then supported these three points. My conclusions are therefore not solely reliant on the model.
4. Following review of the model, it was determined a correction factor should be applied. With this correction factor applied, the lake reaches the minimum level regularly under both Scenarios B and C. It is at the minimum level for longer under Scenario C. The same general pattern of filling and emptying is present under both scenarios and I note it was also present in the uncorrected model I cite in my evidence.
5. Figure 7 in Mr Antony Jacks evidence (also the last figure in the model review undertaken by Mr Tiago Teixeira and Mr Lobo Coutinho) show a very similar pattern under Scenarios B and C. These are the levels that should be compared, not to Scenario A (the grey line).

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<sup>1</sup> Teixeira, T. and Lobo Coutinho, L (2002). ORC Review – Pioneer Energy – RM 18.004. *Memorandum to Natasha Pritchard, Otago Regional Council dated 10 June 2022*. 18p.

6. Differences in lake level, and therefore the point where effects on ecology begin to differ between Scenarios B and C, are likely to only become obvious when the water level is at/below 3.5. (as per Table 1 of Mr Jacks).

### **Lake productivity and carrying capacity**

7. There is a lot of emphasis placed by Mr Couper on the productivity of the lake at different sizes/levels at paragraphs 28, 56 and 61-63 of his evidence. The lake is likely to be equally as productive relative to its size, at any level/size, providing it is stable. Any fluctuation will result in macrophyte die off, which in turn affects macroinvertebrates and trout. Fluctuations already occur, and will continue to occur as a result of natural phenomena, regardless of lake management.
8. With regard to Mr Couper's comments on carrying capacity at paragraphs 48-51 of his evidence. My reasoning for stating the lake is unlikely to be at carrying capacity is that in the absence of higher/larger predators (with the exception of large trout), you would expect to see 'die offs' of trout and/or stressed trout under any significant lake level decrease. The lake has experienced declines of approximately 1.5-2m in level under Scenario A (grey line on figures) which if reduced from full, equates to a lake area of approximately 75% of the full area. With a decrease of this much I would have expected there to be documented 'die offs' or stressed fish, or at least reported evidence of dead/stressed fish in and around the lake. I am not aware of any reports of this occurring at the Lake.
9. Mr Couper's statement at paragraph 50 of his evidence that "trout are likely to be at or very near carrying capacity at all times due to the excellent spawning, rearing and food sources outlined above and therefore limited by the habitat available" is not accurate. Trout do not spawn in the lake. They require clean gravels with a continuous flow of cool, well oxygenated water to spawn successfully. This occurs in the tributaries to Lake Onslow and will not be affected by the proposal. Large numbers of relatively small trout, to me, suggest abundant recruitment, but not necessarily a healthy, sustained population able to reach carrying capacity. A healthy carrying capacity for trout means you would expect to see the full cohort of sizes (think bell curve with lots of moderate sizes and less smaller and larger).
10. I also disagree with Mr Couper's statement in paragraph 64 that the population of trout under Scenario B would consist of low numbers of smaller trout though at high densities. As is generally agreed by all ecologists, the productivity of the lake is dependent on the macrophytes, and their abundance is dependent on the size of the lake and periods of stability. I see no reason for the trout fishery to be any less productive under Scenario B, compared to A, it will just be smaller. I would expect the same population structure, just less individuals. There will still be apex type trout that hold the best territory. They will predate on smaller trout/bullies/koura.

### **Teviot River flows**

11. I have additional questions regarding how the scheme will be managed if the lake reaches its minimum level. If this occurs, any discharge of required low flows to the Teviot River is likely to result in lake levels continuing to decrease. If lake levels are maintained, the low flow may not be discharged. Either way, there is likely to be at least one consent condition breached. How will this be managed? Low flows are vital for the persistence of ecological values in the Teviot River.
12. In paragraph 81 of Mr Couper's evidence he disagrees with the assessment that the Teviot River would benefit from higher flows in summer under Scenario C. Discharge of water to the Teviot River above consented low flows will result in increased habitat compared to what would be

present under low flow conditions only, though I do acknowledge the likely warmer temperatures of the lake water may affect temperature in the river. I am unaware of any temperature data for either the lake or river, though I note most native fish have preferred temperatures of around 15°C. Discharges at the consented low flows are beyond the scope of this assessment as they will not be altered by this application.

### **Lake under natural conditions**

13. I would also like to point out the comment Mr Couper makes in paragraph 78 that *“there is no Lake under “natural” conditions, I recommend that these statements be viewed with caution.”* This is entirely correct. The lake is an artificial environment, creating habitat that would not be present without a manmade structure. The habitat is best suited to an introduced, exotic species that predates on native fish. I also emphasise that just because it is a non-natural environment, does not mean natural phenomena can be discounted. My reference to natural conditions refers to precipitation and evaporation, phenomena well outside the control of the Applicant. The reference to natural conditions is not there to discount the impacts of the drawdown, rather to put the effects into perspective. If the dam was not present, the trout fishery would be greatly reduced, and habitat quality likely to be significantly higher (riverine environment with cobble/rock substrate, riffles/runs/pools, habitat heterogeneity).

### **Rocky substrate mitigation**

14. The addition of rocky substrate would provide an alternative spawning substrate/habitat for macroinvertebrates. My evidence does not say it would replace macrophytes as habitat as inferred by Mr Couper at paragraph 93.
15. I agree that placement of rocky habitat around the perimeter of the lake would be exceedingly difficult and expensive. In recommending it, I intended that structures similar to groynes could be placed in appropriate locations (accessible and suitable), perpendicular to the shoreline. This would allow habitat to remain as the lake levels fluctuate. My explanation in my evidence may not have conveyed this concept. As I am not an engineer, I cannot comment on the suitability of locations, and I defer this to appropriate experts.

### **Monitoring plan**

16. With regard to the monitoring plan, I am happy to support electric fishing based on the results appended to Mr Dungey’s evidence. Though I recommend inclusion of an electric fishing time in order to calculate a catch per unit effort (CPUE). CPUE provides a standardised number that can be compared to others, and accounts for differences in methods, sampler and conditions. No further justification has been provided for collecting three macroinvertebrate samples, other than to say that is what has been done previously. Five replicates would greatly reduce variability and provide more accurate results. No sampling depths have been confirmed.
17. Following review of Mr Dungey’s evidence, I believe it would be useful to rewrite/reformat the monitoring plan into a formal methodology. There remains some ambiguity as to the location of samples, set up of survey, number of samples. I am aware the current LOMP was likely written by Mr Dungey, with the intention that he would carry out the monitoring. However, if circumstances resulted in Mr Dungey being unable to undertake a monitoring session, I am not sure the methods currently available are sufficiently detailed to allow another person to step into the monitoring role, and complete it efficiently and accurately allowing accurate comparison to previous years data.

### **Conclusions taking into consideration applicant and submitter evidence**

18. Overall, I still consider the effects on ecological values from increasing the drawdown rate on ecological values will be low. The majority of the effects have already been realised, as they are generally the same as what would occur under the current consent if it was operated to its maximum. In my opinion, the trout fishery will remain similar to what is currently present, but will be affected by the size of the lake. I emphasise again, the size of the lake, and therefore habitat, has been considered already under the current consent. If the lake is at lower levels for longer periods, the trout fishery will still be present in the smaller lake, but the size of the fishery will reflect this.
  
19. I am available to answer any questions the Commissioner has.