From:	Alice Lin
To:	Plan Hearings
Cc:	Karen Sky
Subject:	Proposed Plan Change 7 - Statements of Evidence for Genesis Energy Ltd (Submitter ID 422)
Date:	Friday, 17 July 2020 2:02:41 pm
Attachments:	image001.png image002.png image003.png Statement of Evidence by Mark Alan Cain (final 20200717).pdf Statement of Evidence by Roger Graeme Young (final 20200717).pdf 20200717- CLWRP PC7 - FINAL Phil Mitchell Statement of Planning Evidence.pdf

---

Hello

Please find attached, the following statements of evidence-in-chief for Genesis Energy Ltd (Submitter ID 422):

- Mark Cain (Genesis)
- Phil Mitchell (planning)
- Roger Young (ecology)

I would appreciate it if a receipt confirmation email could be provided please. Many thanks.

Kind regards

Alice Lin | Environmental Policy & Planning Manager
Genesis Energy Ltd | 660 Great South Road, Greenlane, Auckland
M. 021 0221 1943 DDI. 09 951 9334

BEFORE THE HEARING COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan

---

STATEMENT OF EVIDENCE OF MARK ALAN CAIN ON BEHALF OF GENESIS ENERGY LIMITED

17 July 2020

Introduction

1. My name is Mark Alan Cain. I have prepared this evidence on behalf of Genesis Energy (**Genesis**) in my role as the Tekapo Site Manager. I have 24 years' experience in the hydro-electricity industry and 11 years' experience in operational and maintenance roles in the mining industry.

2. I hold an Advanced Trade Certificate and Trade Certificate in Fitting Turning and Machining, a National Certificate in Mechanical Engineering (Level 4), a National Diploma in Business (Level 5), and a National Diploma in Electricity Supply (Level 5) among other qualifications.

3. In my role as the Tekapo Site Manager, I am responsible for the operations, maintenance and day-to-day running of the Tekapo Power Scheme.

4. The structure of my evidence is as follows:
    a. Company Overview;
    b. Tekapo Power Scheme Overview;
    c. Submission Overview;
    d. The Orari-Temuka-Opihi-Pareora Zone;
    e. Culvert Clearance; and
    f. Conclusion.

Company Overview

5. Genesis is New Zealand's largest electricity and gas retailer. We generate and trade electricity and natural gas through a diverse range of assets across the country. Our portfolio of electricity generation assets including hydro, thermal and wind generation, with a combined nominal generation capacity of approximately 1,600 Megawatts (**MW**). Genesis is also an equity partner in the Kupe Joint Venture, which owns the Kupe Gas Project in Taranaki.

6. In addition to the Tekapo Power Scheme, Genesis' existing electricity generation assets include:
    - Waikaremoana Power Scheme – Hawke's Bay;
    - Tongariro Power Scheme – Central North Island;
    - Huntly Power Station – Waikato; and
    - Hau Nui Wind Farm – Southern Wairarapa.

7. Genesis is continuing to reduce carbon emissions in the electricity sector by the delivery of more renewable electricity generation. This includes the Waipipi Wind Farm in Taranaki (operational in 2021) through Genesis' Tilt Renewables partnership.

8. Genesis' ability to generate electricity relies on our continued ability to appropriately use natural resources, and undertake ongoing maintenance activities. Our electricity generation facilities have been through robust resource consenting processes and operate under a comprehensive suite of resource consents and approvals.

Tekapo Power Scheme Overview

9. Please refer to **Attachment 1** showing a map and cross section of the Tekapo Power Scheme (**TekPS**).

10. Genesis has owned and operated the TekPS since 1 June 2011. Lake Tekapo is the source of water for the entire TekPS with the lake being dammed by the Lake Tekapo Control Structure at the head of the Tekapo River. Electricity is generated through two power stations, Tekapo A Power Station (Tekapo A) and Tekapo B Power Station (Tekapo B).

11. Tekapo A (30 MW) was commissioned in 1951 and generates an average of 160 Gigawatt hours (**GWh**) of electricity per year. Water is taken from the Intake Structure located on the southern shore of Lake Tekapo and diverted to Tekapo A via a 1.4km tunnel.

12. In 1970 a 25.5 km canal was constructed to take outflows from Tekapo A and the upper Tekapo River (near Tekapo A) to Tekapo B. The Tekapo Canal has a maximum design capacity of 130 cubic metres per second.

13. Tekapo B (160 MW) was commissioned in 1977 and is the only power station in New Zealand surrounded by water. Sitting in Lake Pukaki, essentially as an island, the station is connected to land via a 74 m long bridge.

14. The outflows from Tekapo B enters Lake Pukaki. The water then passes through a further six power stations within the Waitaki Catchment owned by Meridian Energy.

15. A number of additional structures, gates and weirs enable the operation of the TekPS. The power stations and associated structures are operated and maintained to a high level to ensure compliance, safety and optimum operation.

16. Genesis currently holds a total of 35 active resource consents from Environment Canterbury covering the operation, maintenance and one-off projects at the TekPS. Operational consents include to dam the Tekapo River; to control and operate Lake Tekapo between the consented levels; and to take, use and discharge 130 cubic metres per second of water at multiple sites to operate the power scheme.

Submission Overview

17. The TekPS generates approximately 980 GWh of renewable electricity per annum – this is equivalent to the amount of electricity used annually by approximately 120,000 households. In generating this electricity, the TekPS makes an important contribution to New Zealand's security of electricity supply, particularly in the South Island and the Canterbury region, which are dependent on hydro-electricity generation. Given the national importance of the TekPS, Genesis' interest in Proposed Plan Change 7 is to ensure it appropriately provides for the continued existence of the TekPS, including the ongoing operation, maintenance, upgrade or replacement requirements.

18. Further details of Genesis' submission and concerns will be discussed in the evidence of our planning (Dr Mitchell) and ecology (Dr Young) experts. However, the two critical concerns we have identified relate to the proposed policy framework for out of catchment water use in the Orari-Temuka-Ophi-Pareora (**OTOP**) Zone, and the identification of Irishman Creek as a Critical Habitat of Threatened Freshwater Species.

Orari-Temuka-Opihi-Pareora Zone

19. Genesis' submission raised concerns regarding the proposed policy framework in the OTOP Zone. Genesis is aware the concept of drawing water from the Upper Waitaki Catchment (particularly from Lake Tekapo), and transferring it out of catchment to South Canterbury (i.e. in the OTOP catchment) via Burkes Pass has been proposed for many years.

20. As mentioned earlier in my evidence, water stored in Lake Tekapo is the only source for the TekPS. The same water passes through a further six power stations in the Waitaki Catchment and also provides for numerous downstream users in the wider Mackenzie Basin catchment. Preservation of the water availability within Lake Tekapo, and the wider Upper Waitaki Catchment is important, not only for the existing hydro-electric power schemes, but also for existing water users within the catchment.

21. For this reason, Genesis does not consider it is appropriate to introduce a proposed policy framework that allows for the opportunity to use out of catchment water from water bodies in the Upper Waitaki Catchment. Any potential loss of water from Lake Tekapo for hydro-electricity generation through TekPS and the remaining Waitaki Power Scheme will likely affect the electricity market, and New Zealand's overall renewable electricity supply.

Culvert Clearance

22. The identification of Irishman Creek as a Critical Habitat of Threatened Freshwater Species has the potential to negatively affect Genesis' continued operation and maintenance of the TekPS as the Tekapo Canal crosses over Irishman Creek.

23. There are nine culverts along the 25.5 km Tekapo Canal. The culverts are in place to allow Forks Stream, Irishman Creek, Mary Burn and several unnamed waterways to flow beneath the canal.

24. The culvert structures vary depending on the width and flow characteristics of the watercourse, and include box culverts, multiple barrel culverts and single barrel culverts. In **Attachment 2**, two examples of culvert structures are shown, with Image One showing a six-boxed culvert at Irishman Creek, and Image Two showing a double-barrel culvert at an unnamed tributary of Irishman Creek.

25. Immediately downstream of the Irishman Creek culvert, energy dissipater blocks are also installed across the width of the creek bed. The blocks are necessary to reduce the speed of the flow, thus avoiding erosion, particularly during flood events. The energy dissipater blocks can be seen in Images Three and Four of **Attachment 3**.

26. Overtime, bed material or vegetation build-up in or on the edges of the watercourses can occur, which could cause blockages at the culverts, and raise water levels or change the flow paths. At times, the build-up can even create "islands" within the watercourse. Regular maintenance and clearing of the culvert structure and around the energy dissipater blocks is therefore required to ensure they maintain structural integrity and continue to pass flow in the intended manner. If the ability to pass flow is not maintained, water can flood on the upstream side of the culvert, which could potentially erode the structural integrity of the Tekapo Canal and create a dam safety hazard.

27. Inspection of the culverts is carried out by the Genesis site team and civil engineers on a regular basis. The culverts are also surveyed each year during the Annual Civil Inspection.

28. If there is build-up of bed material and vegetation within the culvert or waterway, clearance is scheduled according to the requirements in the relevant resource consent conditions, and taking into account of flow and weather conditions.

29. The process of clearing is typically sequenced, and involves diverting the flow to one side of the culvert with a small excavator, excavate/clear bed material and vegetation on the dry area by mechanical plant or by hand, and repeating the process on the other side. The sequencing allows work to be completed on dry bed, which minimises discharge of sediment while maintaining flow and fish passage. Depending on the extent of clearing required, works are normally completed within a two-week period.

30. Clearance work may be required up to 100 metres upstream and 100 metres downstream of the culvert structure, depending on whether in-stream "islands" have formed due to bed material and vegetation build-up. The size of these "islands" can vary significantly. An example is provided in the aerial views[1] included in **Attachment 4**, where a 40-metre buffer (as recommended by the section 42A Reporting Officer) will only cover part of the "islands"**.** A buffer distance of up to 100 metres is therefore required to allow full clearance of any in-stream "islands" that may have formed, in order to maintain the normal flow within the watercourses and through the culverts as much as possible. This also ensures that the channel is kept clear for large rainfall events and maintains the channel within its intended path. **Attachment 5** shows an aerial view of the Irishman Creek culvert with the 100-metre clearance marked to demonstrate the extent of potential work required.

31. Since Genesis took ownership of the TekPS in 2011, inspections and/or clearance works have occurred in 2013, 2015, 2016, 2017, 2018 and are intended to take place in 2020.

32. Of the nine culverts along the Tekapo Canal, clearance work is most often required at the Forks Stream and Irishman Creek culverts. This is due to the watercourses having higher and fluctuating natural flows. Higher flow causes increased erosion and the build-up of bed material more easily.

33. Examples of before and after photos of maintenance downstream of Irishman Creek Culvert can be seen in **Attachment 3**. Image Three show the depth of the bed material that builds up on the apron and around the concrete energy dissipaters, and Image Four shows the change after maintenance clearing is complete.

Conclusion

34. In summary, Genesis opposes the proposed policy framework which signals the possibility of introducing water into the OTOP zone from waterbodies in the Upper Waitaki Catchment. Any such proposal has the potential to affect water availability within the catchment, impacting on existing hydro-electric generation capacity and water users.

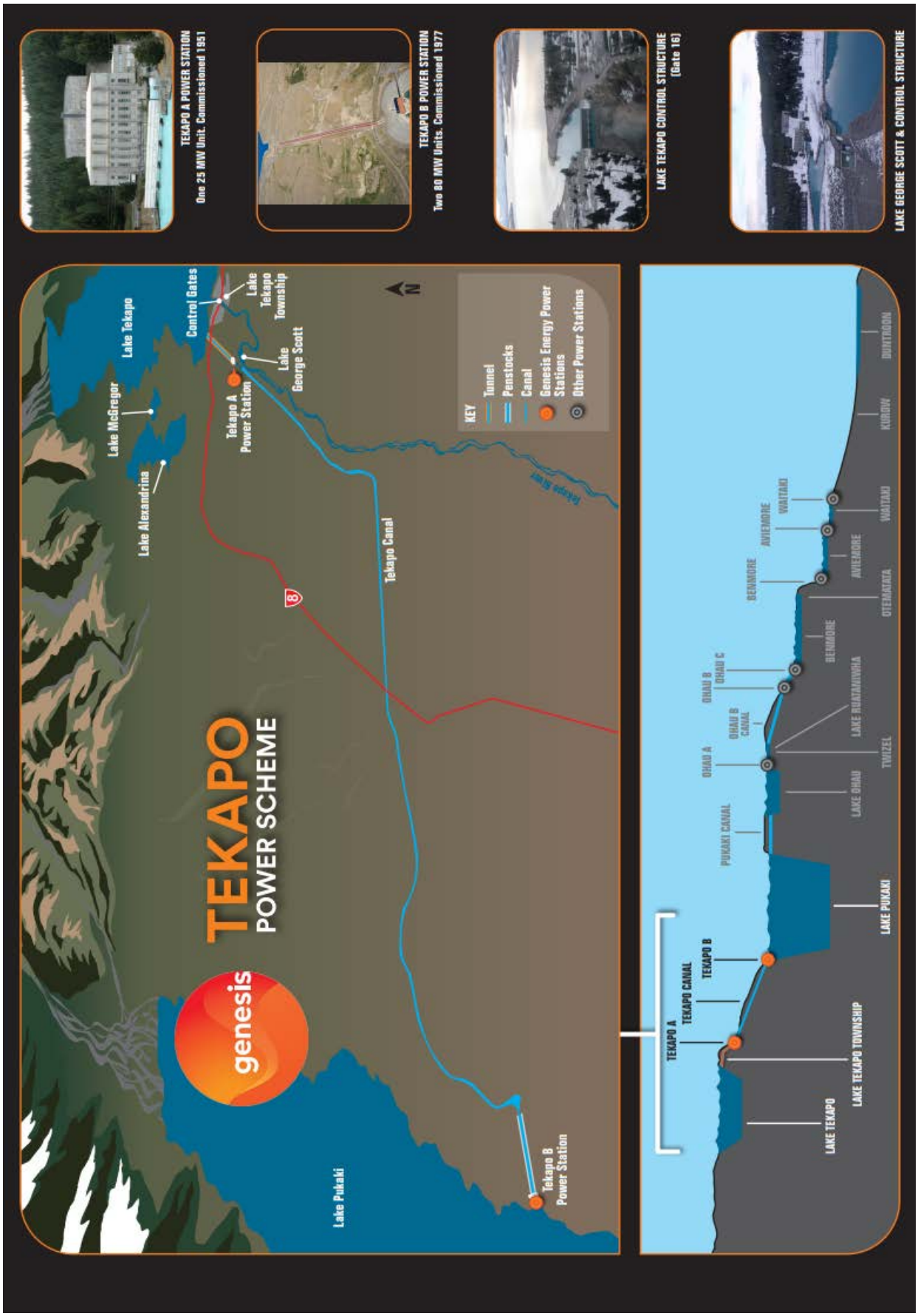
[1] Canterbury Maps Viewer, accessed 14 July 2020, unknown aerial photography date.

35. In order to continue the ongoing safe operation of the TekPS, Genesis is required to undertake regular clearance of the nine culverts along the 25.5 km Tekapo Canal. Genesis is concerned that its ability to undertake regular clearing at the Irishman Creek culvert (including up to a 100 metres buffer upstream and downstream of the culvert), may be restricted due to Irishman Creek being identified as a Critical Habitat of Threatened Freshwater Species.

36. As described in my evidence, Genesis undertakes its clearance activities in accordance with a suite of resource consent conditions to ensure its effects on the environment, including Irishman Creek ecology, are avoided or minimised. The clearance activities are vital to allow water in Irishman Creek to flow unimpeded, whilst protecting the Tekapo Canal and the surrounding landholdings. Any restriction on the ability to undertake the appropriate culvert clearing has the potential to cause significant damage to the Tekapo Canal and result in a significant flood risk hazard.

Mark Cain
17 July 2020

Attachment 1: Tekapo Power Scheme map and cross section



Attachment 2: Culvert examples

Image One: Irishman Creek six box culvert

Image Two: unnamed tributary to Irishman Creek double barrel culvert

Attachment 3: Irishman Creek culvert (downstream energy dissipater blocks)

Image Three: Irishman Creek culvert downstream – before clearing (photo taken from the centre of the culvert)

Image Four: Irishman Creek culvert downstream – after clearing (photo taken from the centre of the culvert)

Attachment 4: Irishman Creek culvert (40m clearance areas)

Image Five: Irishman Creek culvert upstream with a 40m clearance area

Image Six: Irishman Creek culvert downstream with a 40m clearance area

Attachment 5: Aerial view of Irishman Creek culvert (culvert structure extent marked in orange and the 100m clearance area marked in green)