

Pattle Delamore Partners Limited

TECHNICAL MEMORANDUM

INVESTIGATION	Douglas Links Golf Course Hearing	PROJECT	Horizons Consent Reviews
CLIENT	Horizons Regional Council	PROJECT NO	C025145360
CLIENT CONTACT	Fiona Morton	PREPARED BY	Tom Garden
CLIENT WORK ORDER NO/ PURCHASE ORDER	APP-2020203164.01	SIGNATURE	
		DATE	28/04/2022

1. Introduction

Pattle Delamore Partners (PDP) have been engaged by Horizons Regional Council (HRC) to review an application by Grenadier Developments Ltd (the Applicant) to abstract groundwater from a newly drilled bore for irrigation of golf greens and fairways, as well as for related landscaping and beautification, in relation to a proposed Douglas Links golf course development. I (Tom Garden) provided a Section 42A report, dated 6 April 2022, on groundwater issues related to the proposed development.

This technical memorandum provides a response to the evidence of Alexandra Johansen, project hydrogeologist for the Applicant.

2. Response to Evidence

Sections C to E of the evidence of Alexandra Johansen state that she considers that there will be no significant adverse groundwater effects from the proposed abstraction. In Section E of the evidence she states that my evidence provides the same conclusions as her, in that the adverse effects will be less than minor. I agree with her evidence in this regard.

3. Consent Conditions

In paragraph 24 of her evidence, Alexandra Johansen suggests changes to the proposed consent conditions. My responses to her points are as follows:

Paragraph 24a:

Condition 11 provides electrical conductivity 'trigger levels' of 750, 850 and 1,000 $\mu\text{S}/\text{cm}$ where abstraction shall decrease if these levels are measured, with abstraction ceasing if electrical conductivity is measured above 1,000 $\mu\text{S}/\text{cm}$. Alexandra Johansen states in paragraph 24a of her evidence:

"The Electrical Conductivity (EC) values as proposed appear very low. The pumped aquifer groundwater sample analysed an EC of 561 $\mu\text{S}/\text{cm}$, which does not provide a lot of scope for error".

I consider it reasonable for the trigger levels to be increased.

Paragraph 24b:

Alexandra Johansen suggests higher electrical conductivity trigger levels. In paragraph 24b she states:

"It is suggested that the EC limits proposed in Condition 11 (a, b and c) are amended to 1000, 1500 and 2000 $\mu\text{S}/\text{cm}$, respectively. A similar coastal water take with consent granted by Hawkes Bay Regional Council (HBRC),

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stipulates an EC limit of 1500 uS/cm as a condition (EC values above which would require a reduction of 32% of the daily volume) and a limit of 2000 uS/cm as a condition to cease pumping."

The electrical conductivity levels that Alexandra Johansen suggest are higher than I would be comfortable proposing. I suggest that the tiered trigger levels be set at 1,000, 1,250 and 1,500 µS/cm. This means that the electrical conductivity can almost triple before pumping must cease.

Paragraph 24c:

Proposed consent condition 19 states that if electrical conductivity is measured at 50% higher than any earlier measured value or at greater than 500 µS/cm then the consent holder shall fulfil subsequent conditions regarding installation of telemetry and laboratory sampling.

Alexandra Johansen states in paragraph 24c of her evidence that:

"The screened aquifer water quality test analysis included in my report, records an initial EC of 561 uS/cm. Therefore, the EC limit proposed in Condition 19 is too restrictive. It is suggested that the EC value limit is removed, leaving Condition 19 to moderate EC using a limit of 50% increase. This would then be similar to an example consent granted by HBRC."

I agree with this point, and consider it reasonable to remove the conductivity limit in condition 19, so that the condition would read: If measurements of electrical conductivity under condition 17 increase by 50% from any earlier measured value then the Consent Holder at their expense, shall [subsequent conditions relating to telemetry and sampling]. I note that the value of 561 µS/cm recorded in the bore imply that a cutoff value would therefore be set at 842 µS/cm ($561 * 1.5 = 841.5$).

Paragraph 24d:

Alexandra Johansen suggests that condition 19.d. be deleted due to uncertainty regarding ionic balance. She states:

"It is recommended that Condition 19 (d) be deleted as many variables in and out of the laboratory's control (suspended solids, sample filtration, inorganics, iron concentration, EC and sample containers) can affect ionic balance."

I disagree with this point, as ionic imbalance can show that the sample is of poor quality, for example it may be contaminated or not representative. Ionic imbalance can therefore provide a useful quality control check.

Paragraph 24e:

Alexandra Johansen states:

"Condition 19 Advice Note: The ionic balance of the sampled water should not have a discrepancy of greater than 5%."

It is recommended that the Advice Note be deleted as many variables in and out of the laboratory's control (suspended solids, sample filtration, inorganics, iron concentration, EC and sample containers) can affect the ionic balance."

As stated above, I disagree and consider ionic imbalance a useful quality control check and therefore recommend that the advice note be retained.

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