EXPERT WITNESS CAUCUSING CONFERENCE AND JOINT WITNESS STATEMENT: Groundwater quality

BEFORE THE TASMAN DISTRICT COUNCIL IN THE MATTER	Of application RM200488, RM200489 (Land use consents) and RM220578 (Discharge Permit to Land) at 134 Peach Island Road, Motueka
APPLICANT	CJ Industries Ltd

Date / Time	1pm to 4pm, 15 February 2023
Venue	https://us02web.zoom.us/j/85643672447?pwd=QU1lRndxNEhqTmhKaXFubDdUOEt0dz09

Witnesses	**For**
Mr Nicols (RN)	Applicant
Dr Rutter (HR)	Council

JOINT WITNESS STATEMENT – GROUNDWATER QUALITY

Record of issues discussed, areas of agreement or disagreement, reasons. Witnesses should:

- **identify their position and reasons by their initials**
- **identify if any matter is not within their expertise**

The following records the positions during caucusing. The parties reviewed the record of the caucusing, and collaboratively prepared the table.

While the caucusing was done on a without prejudice basis, the witnesses have chosen to attach as an Appendix the records of the 'free and frank' version of their professional discourse to assist the Commissioner.

The witnesses confirm that they have read and followed the Code of conduct for expert witnesses (Environment Court 2023 practice note – Section 9.0, including 9.5 relating to Joint witness statements - link https://www.environmentcourt.govt.nz/about/practice-note/).

Groundwater levels			
1.	**Is there adequate information about groundwater levels at the site to inform excavation depths and processes for back filling, specifically:**		
a.	**Are there enough groundwater level monitoring bores?**		
HR and RN agree There are enough monitoring bores given the outlined approach to inform excavation depths.		**HR Disagree**	**RN Disagree**
b.	**Is there enough current groundwater level data?**		
HR and RN Agree		**HR Disagree**	**RN Disagree**

No agreement (on details)	Concern about the short-duration of existing groundwater level record and whether it captures occasional and significant events, that cause groundwater levels to rise rapidly close to ground level.	Sufficient data. There is enough groundwater level data to allow clean filling. Fluctuations in groundwater levels are managed by active groundwater level monitoring in the monitoring bores, confirmation of water levels from temporary test pits and having sufficient fill material to back fill excavations if groundwater levels show signs of rising.
c.	**Will there be enough groundwater level data (including proposed test pitting) to inform excavation depths for clean filling?**	
HR and RN Agree	**HR Disagree** Same response as comment 1b.	**RN Disagree** Same response as comment 1b.
d.	**Do the effects of climate change on fluctuating water levels and predictability add any further considerations not already covered?**	
HR and RN Agree Depth of excavations dictated by real-time groundwater level.	**HR Disagree** Increase in rainfall as a result of climate change may result in higher groundwater levels. More extreme events could result in more rapid groundwater level changes.	**RN Disagree** Variations in groundwater level including fluctuations as a result of climate change managed by: - Ongoing groundwater level monitoring in monitoring bores. - Generation of on-demand groundwater level contour maps. - Confirmation of groundwater levels from temporary test pits. - Only undertaking excavations to 0.3 and 1 m above groundwater if excavation control criteria allow – which captures effects of large weather events etc. - Having sufficient backfill available and capability to rapidly fill excavations.
2.	**Will the proposal to backfill if groundwater levels are rising be effective in preventing surface exposure of groundwater?**	
HR and RN Agree Partly an operational matter for rate of backfilling to be as fast/faster than groundwater level increase.	**HR Disagree** Concerns that groundwater levels will rise faster than excavations will be able to be backfilled, particularly from large/prolonged flood/rain events when it's not just a 24 hour period that needs to be assessed, but ongoing groundwater level rise over	**RN Disagree** Strong hydraulic connection between Peach Island groundwater levels and Motueka River. No long-term Peach Island specific rainfall data available but effect of rainfall on groundwater level fluctuations expected to be managed operationally via the measures noted in 1d above. Mr Corrie-Johnston confirmed there will

	two or more days. Rainfall events/groundwater level responses specific to Peach Island area don't appear to have been assessed in application such that the operator can understand which rainfall events/weather warnings are likely to trigger a response to stop quarrying/start filling.	be access to sufficient clean fill and machinery to backfill excavations in advance of rising groundwater levels.
Groundwater quality		
3.	**Groundwater is not considered to be an exposure pathway of concern for Class 5 Fill in WasteMINZ 2022 – are there reasons to differ from that guidance in this case?**	
HR and RN Agree No adverse effects on groundwater – provided that all clean fill material used as backfill at Peach Island meets the Class 5 requirements in WasteMINZ 2022	**HR Disagree** Even with best processes, accidents can happen. This proposal is unusual in that material will be paced into the zone of groundwater level fluctuation. If contaminated material was to be placed, then there is much higher potential for contaminants to migrate rapidly than if there was unsaturated material between the fill and groundwater.	**RN Disagree** No need to differ from the WasteMINZ guidance. If undetected contaminated material was to occur in the material for backfilling purposes, the waste acceptance criteria is expected to limit the quantity of contaminated material to small, localised zones of material (as opposed to gross contamination). If mobilised, elevated contaminant concentrations would be expected to be attenuated/diluted due to small volume.
4.	**The key controls proposed to reduce any water chemistry changes are the quality and testing of the clean fill material:**	
a.	**Are the clean fill parameters in Table 1 of the draft Groundwater and Clean Fill Management Plan ("GCMP") appropriate?**	
HR and RN Agree Clean fill parameters in Table 1 of draft GCMP are appropriate.	**HR Disagree**	**RN Disagree**
b.	**If the clean fill meets the requirements of Table 1 of the GCMP, are adverse effects on groundwater quality likely to arise?**	
HR and RN Agree If the requirements of the GCMP are always met, adverse effects are unlikely to arise.	**HR Disagree**	**RN Disagree**
c.	**If accidents occur despite following best practice, are adverse effects likely to occur?**	
HR and RN Agree	**HR Disagree**	**RN Disagree**

Low probability for an accident to occur and a significant volume of contaminated material would be required to cause adverse effects.		Complex conditions can be difficult for consent holders to follow. Cites an example where an accident has occurred.	The requirements of the proposed waste acceptance criteria make the probability of an "accidental" use of a large volume of contaminated fill material low.
d.	**Are there potential adverse effects from groundwater interaction with topsoil and subsoil (material placed less than 1 m from surface)? Are controls on topsoil and subsoil suitable to avoid/minimise such effects?**		
HR and RN Agree Topsoil and subsoil imported from off site that will be placed less than 1 m below ground level (and subject to appropriate levels of control), then the proposed controls will avoid adverse effects from interactions with groundwater.		**HR Disagree** Original concern had been that soil was not going to be subject to the same rigorous controls as fill, and that soils would be inundated at times in parts of the site. Unaware of the SMP and thus on specifics and appropriateness of the proposed controls on quality of subsoil and topsoil.	**RN Disagree** Provisions in Soil Management Plan (SMP) to manage sub soil and topsoil properties, although the SMP will be updated to ensure consistency with the GCMP (defer to Mr Hill / evidence on soil productivity). Only difference expected to be organic content and type of organic material in the soil to be used as topsoil which is expected to be the case for the existing onsite topsoil.
e.	**Are the proposed processes for offsite screening and testing requirements for clean fill in Section 4.0 of the draft Groundwater and Clean Fill Management Plan appropriate?**		
HR and RN Agree Covered above in 4b.		**HR Disagree**	**RN Disagree**
5.	**Is *any change* in groundwater chemistry an adverse effect on water quality, or does there need to be a change beyond a certain level for this to be an adverse effect on water quality?**		
HR and RN Agree People using bores to abstract groundwater is the focus. Changes in downgradient water chemistry within the drinking water standards will not cause an adverse effect on water quality groundwater users.		**HR Disagree** Groundwater quality changes within the drinking-water standards is a negative change as it could impact other "users" (e.g. aquatic ecology) but it appears likely that contaminants would be diluted so unlikely to be an adverse effect. Linked to point 6 below.	**RN Disagree**
6.	**Is *any change* in groundwater chemistry consistent with upholding Te Mana o te Wai?**		
HR and RN Agree Complex question in relation to groundwater as there are no specific groundwater quality		**HR Disagree** Te Mana o te Wai about not causing a deterioration in water quality. Does not think drinking-water standards can	**RN Disagree** Unlike surface water, NPS-FM does not recommend groundwater specific bottom lines or water quality guidelines to assess if a change in water chemistry is having an effect.

guidelines documented in the NPS-FM/Te Mana o te Wai.	be applied as measure of deterioration.	Because the groundwater in the area is used for drinking-water, the drinking-water standards provide a relevant indicator for consistency with Te Mana o te Wai.
7.	**More generally, what trigger levels are consistent with maintaining water quality in terms of both drinking water quality and the quality of the environment / te mana o te wai?**	
HR and RN Agree In addition to trigger limits, assessing water chemistry trends and investigating causes of trends in groundwater chemistry data before concentrations get to trigger limits would be useful and practical for capturing water chemistry changes early.	**HR Disagree** Point of clarification – if say, copper, approached half MAV, then this would be a significant deterioration from current state and it would be unlikely that it would remain at half MAV. By assessing trends, it would be possible to identify a deterioration before half MAV is breached and address the cause.	**RN Disagree**
8.	**The applicant proposes to compare groundwater chemistry samples taken once the clean fill activity is underway with: (a) the proposed trigger levels in Table 3 of the GCMP; and (b) background water chemistry, being a moving year-to-year median concentration for each chemical parameter calculated from an upgradient monitoring bore. A groundwater chemistry exceedance will be deemed to have occurred if one of the following occurs:** • **Exceedance Criterion – A: The concentration in the downgradient bore exceeds the relevant trigger concentration in Table 3 of the GCMP and the year-to-year median concentration of the same parameter in the upgradient monitoring bore is below the respective trigger concentration; or** • **Exceedance Criterion – B: The year-to-year median concentration in the downgradient bore exceeds the year-to-year median concentration in the upgradient bore for the same parameter by more than 20%, and the year-to-year median concentration in the upgradient monitoring bore exceeds the trigger concentrations in Table 3 of the GCMP.** **In relation to that methodology:**	
a.	**Will the proposed one year of groundwater chemistry samples prior to commencement of clean filling activities provide suitable background data for determining the initial year-to-year median? How regularly should the background samples be taken?**	

HR and RN Agree A year of groundwater chemistry monitoring prior to commencement of clean fill activities suitable for determining initial year to year median.	**HR Disagree** Concerns if groundwater conditions are unusual during initial year of monitoring e.g. low recharge years will result in different groundwater quality to high recharge years. Point sampling is just a point in time, so monthly monitoring would be better for capturing range of groundwater conditions.	**RN Disagree** As the first year of monitoring is to establish the initial year to year median concentrations, quarterly monitoring targeted at seasonal changes is an appropriate balance between gathering sufficient data to calculate median concentrations without being prohibitive for the operator to collect the data. The year to year median data will continually be updated year to year and will allow for variations in different groundwater recharge.
b.	**Are the proposed trigger levels to be used as part of determining whether an exceedance has occurred appropriate?**	
HR and RN Agree Proposed trigger levels are adequate if trend analysis of data is included to capture changes in water chemistry so the change can be investigated before an exceedance occurs. Relies on all aspects of the waste acceptance criteria being met.	**HR Disagree** If all aspects of the waste acceptance criteria met, exceedances of trigger limits unlikely so trigger levels could be lower. Should consider whether trigger levels are based on current groundwater quality.	**RN Disagree** A change in groundwater chemistry is expected as part of clean filling, although the level of change in chemistry is expected to be within the proposed trigger limits such that it doesn't cause any adverse effects. The TRMP provides qualitative standards for discharges that enter groundwater and change groundwater chemistry in the nearby Motueka/Riwaka Plains area (Schedule 36A, Class G of the TRMP). The proposed water chemistry trigger limits are considered to be consistent with the qualitative standards in Schedule 36A, Class G.
c.	**Are the proposed trigger levels consistent with the groundwater chemistry limits from Schedule 8 of the Canterbury LWRP? Is it appropriate/ relevant to apply the Canterbury LWRP GW chemistry limits to this site, given that the measured background levels are much lower?**	
HR and RN Agree The proposed trigger limits are consistent with groundwater chemistry limits from the Schedule 8 of the Canterbury LWRP.	**HR Disagree** Groundwater chemistry from downgradient of Miners Road already shows chemical changes although concrete clean fill at Miners Road is a major contributor. Noted that groundwater quality at Peach Island appears to currently be very good, and possibly much better than some of the locations in Canterbury where these limits have been used.	**RN Disagree** Schedule 8 of the Canterbury LWRP apply to discharges to groundwater for the wider Canterbury region. Groundwater chemistry in areas of the Canterbury Plains where the Schedule 8 limits are applicable, have concentrations of a similar order of magnitude as those that currently occur measured at Peach Island. Therefore, Schedule 8 of the Canterbury LWRP is a relevant

		Also noted that the Miners Road consents are to quarry and fill to no less than one metre above highest groundwater level – at Peach Island it is into the zone of water table fluctuation. It is noted that no concrete or manmade materials proposed for Peach Island clean fill.	comparison for the trigger levels in the Peach Island groundwater setting.
d.	**Are the Exceedance Criteria appropriate to detect any potential adverse effect on groundwater users and groundwater quality?**		
HR and RN Agree If trigger limits not exceeded, then no adverse effects on downgradient groundwater users in terms of drinking water quality. The proposed water chemistry trend analysis to assist with identifying changes in water chemistry will allow potential adverse effects to be addressed before exceedances occur.		**HR Disagree** There could still be considered to be an adverse effect on groundwater quality, even if half MAV isn't exceeded.	**RN Disagree**
e.	**Will the methodology enable a distinction to be drawn between effects of unrelated land uses/natural variability and effects of clean fill?**		
HR and RN Agree The methodology will be useful in assessing natural variability compared to effect of clean fill.		**HR Disagree** It is difficult to separate out effects of filling from other potential drivers completely. Need to build evidence to show where contamination is coming from – this includes having "background" data that you can be confident covers all likely variability.	**RN Disagree** Assessing trends, the timing of trends, and comparing upgradient and downgradient groundwater chemistry will allow any significantly different effects to be distinguished between clean fill activities and unrelated land use activities.
f.	**To the extent that there are differences between this approach and the Miners Road, Canterbury conditions (described in paragraph 3.21 of Mr Nicol's third supplementary evidence of 19 December), are those differences appropriate?**		
HR and RN Agree The main change is the use of a 20% difference rather than 10%. A 20% difference is a small change in groundwater		**HR Disagree** Use of year-to-year median concentrations removes outliers. However, use of a 10% difference would be more conservative.	**RN Disagree** The exceedance criteria trigger additional actions, including additional monitoring and investigations into the source of the contamination and providing an alternative water supply to down-gradient groundwater users.

chemistry compared to the range of natural fluctuations in groundwater quality. Exceedance Criteria B is not the only exceedance criteria and only be used when there is a significant contaminant source upgradient of the clean fill area.	Notes that the provision of an alternative water supply is only when samples from the private wells fail to comply with half MAV.	If contamination is from an upgradient source, exceedance of Criteria B may require the operator to investigate a problem caused by another land use activity and provide an alternative water supply as a result of the effect of the other land use activity. Therefore, the use of a 20% difference is a more appropriate threshold for assessing contribution that clean filling activities have on groundwater chemistry changes at the downgradient boundary of the clean fill area.
9.	**The applicant proposes to install an additional monitoring bore at the downgradient (northern) end of the proposed quarry boundary, upgradient of bore 24135 at 131 Peach Island Road. In relation to that bore:**	
a.	**Are the bore specifications (8 m deep, screened between 1 m bgl and the base of the bore) appropriate to capture the full range of groundwater level fluctuations?**	
HR and RN Agree The proposed bore specifications are appropriate.	**HR Disagree**	**RN Disagree**
b.	**Will the monthly monitoring at the proposed bore enable unanticipated changes in groundwater chemistry to be picked up before there is any change in water chemistry in bore 24135 or any other downgradient bore?**	
HR and RN Agree There is a good probability that the proposed monitoring bore will detect changes in water chemistry before changes detected in bore 24135.	**HR Disagree** Can never be 100% certain that the proposed bore will capture everything. Even monthly monitoring means a discharge could get through without detection if it was a pulse.	**RN Disagree** From the available information, the proposed bore is located upgradient and as close as possible to the closest private downgradient bore used for drinking-water supply. It is the best practicable option for achieving this monitoring objective.
10.	**In addition to monthly testing of the additional monitoring bore, the applicant proposes three monthly testing of the existing downgradient monitoring bores (24542 and 24545) and at least one upgradient monitoring bore (24544 and 24546). Is this appropriate?**	
HR and RN Agree Quarterly monitoring sufficient as unlike the proposed monitoring bore, the other existing monitoring bores are not located immediately upgradient of a drinking water supply bore. Cost prohibitive	**HR Disagree** Additional data is always better as noted previously.	**RN Disagree** Purpose of the existing monitoring bores is to capture seasonal fluctuations, trends in water chemistry from land use activities and calculate year to year median concentrations. Quarterly monitoring is sufficient to collect enough data for these assessments.

to operator to sample existing monitoring bores monthly.		
11.	**Are the actions outlined in the GCMP for responding to an exceedance appropriate?**	
HR and RN Agree In principle the actions of repeat sampling, sampling downgradient drinking-water supply bores, undertaking an investigation of the source/cause of the exceedance and ultimately providing an alternative drinking-water supply is appropriate – though refer HR comments.	**HR Disagree** The overall response to an exceedance should occur faster and be more pro-active than what has been proposed particularly given the fact that exceedance of the proposed triggers would be a significant change in water quality. Repeat sampling should occur faster than the proposed 72 hours. Notification of council and downgradient bore owners should occur immediately if an exceedance of trigger values occurs. Provision of an alternative water supply should be prepared for as soon as possible if half MAV exceedances occur in downgradient drinking-water supply bores, rather than waiting until after an investigation, knowing that investigations could take months or longer, potentially leaving bore owners with unsafe drinking water.	**RN Disagree** The water chemistry trigger limits have been proposed at a level that won't cause adverse effects on downgradient groundwater users (i.e. GV and half MAV). The proposed trigger limits apply to the dedicated monitoring bores at the downgradient boundary of the clean fill site as well as the more distant, down gradient drinking-water supply bores. Unanticipated changes in groundwater chemistry would be expected to occur in the dedicated monitoring bores prior to changes occurring in downgradient drinking water supply bores. Furthermore, unanticipated changes in water chemistry within the dedicated monitoring bores would be expected to be larger in magnitude than the more distant downgradient drinking-water supply bores. Therefore, the proposed response times are a reasonable and appropriate response to an exceedance in the dedicated monitoring bores.

More detailed notes of the caucusing are attached as an Appendix to this summary joint statement

Signed: (digitally via email confirmation to facilitator, final for release).

Witness	Signature	Date
Mr Nicol		3 March 2023
Dr Rutter		3 March 2023