31st August 2017

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

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Memorandum response to deputation around air and water quality by the Yaldhurst Rural Residents Association. Presented by Dr Kelvin Duncan for air quality, and by Mr Dennis Thomson for water quality, on 20th July 2017

The Emissions from the Yaldhurst Quarries - Dr Kelvin Duncan

'Effective mitigation is what residents are pressing for…. Effective being a complete review of how the quarries are being managed.'

1. Environment Canterbury has advised the quarry owners that no visible dust is to go beyond the boundaries of the quarries and this would be enforced by regular monitoring of the area.
2. The quarry operators have established a working group forum to discuss ongoing changes and to further develop best practice guidelines. The first of these meetings was held in early August.

'Other countries manage this; why can't we?'

3. There are no prescribed separation distances in New Zealand regulations relating to quarry activities and residential areas.

Activities undertaken by Environment Canterbury/Christchurch City Council/Canterbury District Health Board:
Yaldhurst Air Quality Monitoring Programme:

4. Environment Canterbury, Christchurch City Council and the Canterbury District Health Board are continuing to work together on an air quality monitoring programme in response to concerns about the health effects of dust coming from quarries in the Yaldhurst area. A guideline for health, yet to be supplied by the CDHB, will be used to compare the results of the study.
5. Environment Canterbury have selected Air Quality Limited (trading as Mote) in partnership with Emission Impossible Limited to deliver the air quality monitoring programme and they are in the process of finalising a design. This is a 12 month monitoring programme, which we expect to have in place within the next month. It is important that this runs for a year as the standard is based on an annual average to ensure all seasonal variances are included.

Our ref: Response to YRRA deputation of 20th July 2017
Your ref:
Contact:

6. The intent of the monitoring programme is to gather sufficient data that can be used to determine if levels of dust and respirable crystalline silica from quarrying activities poses a health risk to residents.
7. Mote is currently working through the design phase of this programme, which they will then have peer reviewed. An independent review of the design will then be completed.
8. The design will then be presented to the residents, the quarrying industry and the general public.

Personal Monitoring:

9. We are also working with a group of residents to participate in personal monitoring. The participants will wear a meter for 8 hours. As well as residents along Old West Coast Road, some comparative readings will be taken from residents along Conservators Road, Miners Road, and Guys Road. These results will then be supplied to the participants and a summary presented publicly.

Water Quality – Mr Dennis Thomson

Do the residents receive a copy of the outcomes of these well reports?

10. Whenever Environment Canterbury Groundwater staff sample a private well, it is our policy for the field officers to provide a copy of the laboratory results to the well owner, either by letter or by email. If the well is part of an ongoing investigation, the reports are provided at the end of the investigation.
11. We also have an alert system set up with the microbiological testing facility to inform the sample submitter of any detections of total coliforms or E. coli indicator bacteria. These alerts are passed on to the well owners when they are received.
12. All our data is imported into the water quality database and are available through our online data services or on request from Customer Services.
13. We generally do not send the results from private wells to persons other than the well owner.

Mr Thomson quoted that "foreign elements that are not upstream must therefore be coming from the quarries."

14. We have not found any contaminants in groundwater with potential health-based effects that can be directly related to the quarrying activities.
15. Based on several years of consent monitoring results and a sampling investigation by Environment Canterbury's groundwater scientists in 2015/2016, we do see some effects of the combined quarry and fill activities on groundwater quality. The effects are a slight degradation of the aesthetic properties of the groundwater, which could be noticed as a change in taste, discolouration or scaling potential of the water from the background water quality.
16. Most of the effects are localised to within the quarry sites themselves. The magnitude of the effects decreases with distance from the sites, but dissolved

concentrations of some soluble ions (such as hardness, chloride, sulphate) may still be above background levels within about a kilometre downgradient.

Water hardness:

17. The residents' wells we have tested do not exceed the NZ drinking-water standard guideline values for hardness.

18. The excavation part of quarry work should not cause hardness. Hardness is a measure of the dissolved calcium plus magnesium in the water and give an indication of how likely the water is to produce limescale.

19. Some of the materials allowed for cleanfill (e.g. concrete or limestone) may contain calcium and if this calcium is dissolved by rainwater and leached to groundwater, then the hardness concentrations would increase slightly. But cured concrete or limestone are not very soluble when the pH of the water is near neutral. The most likely source of increased hardness would be from any uncured concrete or concrete washwater that contains higher concentrations of dissolved calcium which is not bound up in solid form.

Iron and aluminium:

20. Most of the private wells we have tested around the quarries do not have elevated iron or aluminium. The wells are constructed with good well screens and flushed by regular use so the samples are clear of silt or clay. But some of the quarry monitoring wells have accumulated sediment in them and give cloudy samples that still contain fine clay after we filter them. These samples are the ones that typically had higher iron or aluminium.

21. Elevated concentrations of metals such as iron and aluminium could be a sampling artefact. Iron and aluminium occur naturally in rocks and sediment. If the water samples taken from the monitoring wells are turbid (contain fine suspended clay or silt), this can cause artificially high concentrations of iron or aluminium. To run these analyses, the laboratory must add a strong acid to the water which dissolves all the sediment. The results are reported as "dissolved iron" or "dissolved aluminium" even though they are more likely to be there as very fine solids.

22. The aggregate extraction and washing could have some effect on the turbidity of the actual groundwater at these sites if not all the fines are filtered out from the aggregate washing infiltration basins or after heavy rainfall, for example. The fine sediment should still be filtered out as it travels through the aquifer and wouldn't be expected to travel very far in groundwater. If a downgradient well was not too far away and it didn't have an adequate filter, it might produce cloudy water after rainfall.

Mr Thomson quoted that E-coli was a problem and that "my studies and other technical people" have found this to start from the quarries.

23. We have not been presented with this information for review.

24. The memorandum by Lisa Scott from 19th May 2017, was sent to residents, and there was a subsequent meeting with residents (Dennis Thompson was unable to attend). As a result of the meeting ECan agreed to do another round of sampling after a heavy rain event, over a wider geographical area than last time. This was done on Monday the 24th July, 2017 after a very wet weekend. 19 wells were sampled around the Yaldhurst quarries and in the wider area.
25. The results from this sampling briefly:
    a. Seven of the wells had low detections of *E. coli* (1 or 2 microorganisms per 100 ml).
    b. The bacteria detected were both on the upgradient and downgradient sides of the quarries.

26. The 2015/16 science investigation did find *E.coli* in monitoring wells at the quarries and faecal coliforms or *E. coli* have been detected from time to time by the consent holders. Faecal source tracking tests in March 2016 showed that these came from an aged source and were not from recent faecal contamination. E.coli were not detected in nearby resident's well's until one of the wells was sampled after the very high rainfall event in early April 2017.

27. Groundwater in unconfined alluvial aquifers is very vulnerable to contamination by faecal bacteria (of which the species *Echerichia coli* or E. coli is used as an indicator). These bacteria come from humans and animals and are commonly discharged to groundwater from onsite wastewater systems (septic tanks), animal effluent disposal to land, leaching of waste from grazing animals or infiltration of stormwater runoff that has been in contact with animal faeces from roofs, roads and paddocks. It is not unusual to find *E. coli* present in samples from private wells that draw groundwater near the water table throughout Canterbury.

28. Since 1998, ECan has been testing water quality in around 200 to 300 wells across the Canterbury region each year in the springtime. Every year between 7 and 19% of the samples tested have had *E. coli* present. The majority of the samples containing *E. coli* come from shallow domestic wells in rural areas. Concentrations tend to be higher after periods of heavy rain or snowfall that can cause rapid groundwater recharge and flush contamination through the unsaturated zone.

New Zealand E-coli standards for drinking water?

29. According to the Drinking-water Standards for New Zealand 2005 (DWSNZ, revised 2008) the Maximum Acceptable Value for *E. coli* is less than 1 microorganism per 100 ml.
30. There are no specific regulations about *E. coli* in groundwater. The DWSNZ contain information for owners and operators to assist in the management of public and private drinking-water suppliers. In the case of a private well, the

owner or operator of the well is the drinking-water supplier and it is their responsibility to ensure the water is safe to drink.

31. We encourage households with private wells to test their water supply for *E. coli* every three months and after heavy rain.

What are the Environment Canterbury requirements for monitoring the wells at quarries?

32. The details of what is required, is dependent on the individual consents and are therefore monitored as part of normal compliance enforcement. There is no requirement for ECan to monitor private wells.

Who owns the consent for the house demolition debris at the Blackstone quarry? Who's going to get rid of it?

33. Blackstone currently have consents with ECan and CCC for their site. ECan are working with Blackstone to ensure it is removed by the time the ECan consent expires in April 2018.

Query that he has already requested this information from Environment Canterbury, with no response?

34. 27th June 2017 received a query into the YAQM mailbox querying the protection of water in private wells that are adjacent to the Winstone and Blakeley quarries, as some testing by ECan had done testing and found 5 private bores were contaminated with E-coli. It was noted that a test also confirmed E-coli was found in a swale sample from the resident believed this was a source of contamination. It was also noted that there was a meeting on the 29th June and this may not be enough time for ECan to provide a statement.
35. A response to Dennis Thomson was provided on the 29th June confirming the following:

"On further investigation ECan's understanding of the surface water swale is that it is not a source of contamination for any of the shallow private water supply wells along Old West Coast Road.

With respect to the e-coli count from the sample of 20cfu/100ml ECan would consider this as very low for urban surface water within New Zealand, particularly for a body of water that has been exposed to the elements for a sustained period of time. Currently our monitoring and consents officer is working closely with the quarry owners and is on site on a monthly basis checking and sampling water bores."

36. 29th June the YAQM mailbox received another response from Dennis Thomson that he did not accept this response and the other reasons given around increased amounts of iron, aluminium, and water hardness. He advised he wished to have a meeting with someone from ECan who is responsible for ensuring that the quarries do not contaminate the ground water. We have provided this detail from our scientists around these details above.

37. Our Zone Delivery Lead (Steve Firth) called Mr Thomson in response to his disagreement on the response and he discussed with Mr Thomson the agreement to return to do further testing after the next lot of heavy rain and this would provide further information before any decisions were made as to any other actions. As the results have provided no further evidence of contamination Environment Canterbury consider this water quality matter with potential environmental impact to be closed.

The Environment Canterbury reports are publicly available on the following website: https://www.Environment Canterbury.govt.nz/about-us/your-council/information-requests/

Yours sincerely