In the matter of the Resource Management Act 1991

And

In the matter of an application for Resource Consents by Road Metals Company Limited to extend quarry operations onto adjoining land and operate an aggregate processing activity.

STATEMENT OF EVIDENCE OF ERIC ROLAND VAN NIEUWKERK FOR ROAD METALS COMPANY LIMITED

15 March 2018

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INTRODUCTION

1 My full name is Eric Roland van Nieuwkerk. I hold the position of Senior Hydrogeologist at Golder Associates (NZ) Limited (Golder), a ground engineering and environmental consultancy firm. I have been employed by Golder since January 2016. I am responsible for providing groundwater, environmental science and project management services to clients throughout New Zealand.

2 Before moving to New Zealand in 2010, I worked for Deltares, a research institute dedicated to surface water, groundwater and geotechnical research in The Netherlands. Between 2010 and 2013, I worked for CPG New Zealand Ltd (currently Calibre Consulting Ltd). From 2013 to 2016, I worked for Beca Ltd.

3 I have a Master of Science degree in Hydrogeology from the Free University of Amsterdam, The Netherlands, which I obtained in 1998.

4 I have 19 years' experience as a Hydrogeologist working in local government and consultancy in The Netherlands and New Zealand. I have been involved as technical specialist and project manager in various environmental risk assessments, water resource investigations and civil engineering projects in both urban and rural areas.

5 Relevant areas of my expertise and recent work experience include: analysis and modelling of water quality and water ponding effects for stormwater discharge to ground effects assessment for the proposed Kartsport Canterbury relocation to a former quarry site at Conservators Rd, Christchurch; review of well interference effects assessment and provide expert witness services of the Gartys Rd (Balcairn, North Canterbury) quarry resource consent application by Ready Mix, on behalf of Canterbury Regional Council (CRC); aquifer testing, water quality and quantity effects assessment and expert witness services for Christchurch City Council's (CCC) Little River water supply well resource consent application; project management and analysis for a Monitored Natural Attenuation research project in the Port of Rotterdam, The Netherlands; and providing technical input into environmental effects assessments for backfilling of a quarry at Leggett Rd, Canterbury.

6 I provided technical input into the groundwater and surface water aspects of this proposal and AEE. I have visited the site and am familiar with the surrounding area. I have visited various existing quarry operations in Canterbury.

CODE OF CONDUCT

7 While this is a Council Hearing, I acknowledge that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014, and agree to comply with it. I confirm that this evidence is within my area of expertise, except where I state that this evidence is given in reliance on another person's evidence. I have considered all material facts that are known to me that might alter or detract from the opinions I express in this evidence.

SCOPE OF EVIDENCE

8 The scope of my evidence covers the following:

a) Effects on the groundwater environment pertinent to the proposed quarry operations and subsequent rehabilitation.

b) The determination of the appropriate quarry floor level to which the excavation can be taken whilst maintaining a separation of at least one metre to the recorded seasonal high water table near the site.

c) Effects on the surface water environment pertinent to the proposed quarry operations and subsequent rehabilitation.

EXECUTIVE SUMMARY

9 My key observations and conclusions are:

a) The seasonal high water table[1] is expected to generally be 11.8 metres (m) below current ground elevation at the RM4 site, but this depth could locally be less. The proposed quarry can be excavated to a maximum depth of 10.1 m to maintain the required distance of one metre above the seasonal high water table across the site.

b) The quarry extension area lies in a zone of high aquifer vulnerability and within Christchurch Groundwater Protection Zone, as identified by the Land

[1] Seasonal high water table means, at the time the activity is established, the highest elevation that the water table has reached between the months of June and August inclusive.

and Water Regional Plan (LWRP). Groundwater varies in depth throughout the zone.

c) Groundwater will not be intercepted during the quarry operation and a minimum one metre separation will be maintained between the quarry floor and the seasonal high water table established for the site. Any adverse effects on groundwater quality are considered to be less than minor given the nature of the proposed quarry operation, operational controls such as securing the site and maintenance of machinery, and proposed mitigation measures. From soil expert Victor Mthamo, I understand that post-rehabilitation future permitted land uses will have less than minor effects on groundwater quality if appropriate land management practices are applied.

d) The Waimakariri River is the closest natural water body to the site and is a significant recharge source to the regional groundwater system. Due to the significant flow volumes from the river to the groundwater system and the quarry operation occurring above the groundwater table, onsite extraction will not have any influence on the Waimakariri River.

e) Due to the absence of natural surface water bodies on or in close proximity to the site and given that there will be no adverse effects on groundwater, no adverse effects on surface water are considered to result from the proposed quarry operation.

f) No stormwater from neighbouring properties will flow into the quarry pit as the current stormwater management in the area will be unaffected by the proposed quarry operations.

EVIDENCE

10 Golder was engaged by Road Metals Company Limited (Road Metals) in 2017 to prepare the resource consent applications and assessment of effects on the environment for an expansion of their existing Yaldhurst quarry covering three adjacent land parcels located at 581, 619 and 635 Buchannans Road, Yaldhurst. The expansion, known as RM4, occupies an area of approximately 8 hectares neighbouring the previous quarry expansion, RM3. The location is shown in Figure 1. Road Metals have asked that I present this evidence to assist the decision makers

at the joint Canterbury Regional Council (CRC) and Christchurch City Council (CCC) hearing.

11 In preparing my evidence I have reviewed:

a) Resource Consent Application for the Road Metals Company Limited Quarry Expansion[2].

b) Readily available information, including CRC's Wells Database and Canterbury Maps.

12 I note the following key features of the groundwater setting for the proposed quarry extension:

a) The extension area is located over an unconfined aquifer within the Springston Formation, which overlies Aquifer 1 formed by the Riccarton Gravels. The site is located within the Christchurch Groundwater Protection Zone.

b) According to the LWRP, the Christchurch Groundwater Protection Zone is of high hydrogeological vulnerability and groundwater varies in depth throughout the zone. Substantial areas of this zone have very thin soils over generally highly permeable gravel, and there is a general downward hydraulic gradient. As such, contaminants can move downwards into the groundwater system relatively quickly with limited potential for natural attenuation within the soil profile and the unsaturated zone.

c) LiDAR data on the Canterbury Map website shows the site has an elevation of approximately 55 metres above mean sea level (m amsl). Piezometric contours developed by CRC indicate an expected shallow groundwater level of approximately 37 m amsl in the middle of the site, as shown in Figure 1. This equates to a depth to average groundwater level of approximately 18 m.

d) Frequent water level records over a considerable length of time are available from two CRC owned monitoring bores (M35/1080 and M35/6550) both screened in the shallow uppermost aquifer near the site. The location of

[2] Golder Associates Report Number 1778513, August 2017

these monitoring bores is shown in Figure 1. These records allow the estimation of the long-term maximum groundwater level (and hence the minimum depth to groundwater). The groundwater level graphs for M35/1080 and M35/6550 are shown in Figure 2. Stronger groundwater fluctuations are recorded in M35/1080 than in M35/6550. Groundwater level records are also available for monitoring bore M35/10581, which is closer to the RM4 site than the other two monitoring bores, but only has records since 2015.

e) By adding the maximum 95th percentile deviation from the mean level of 2.90 m to the regional piezometric level applicable to the site of 37 m amsl, the maximum groundwater level for the site is determined to be 39.90 m amsl. This correlates to the groundwater table having a minimum depth of 15.10 m bgl, which would correspond to a maximum excavation depth of 14.10 m if 1 m distance from the seasonal high water table is to be maintained. The minimum depth to groundwater recorded in M35/10581 was 15.13 m at 24 July 2017, which is close to derived minimum depth.

f) However, I note investigations undertaken by Dr Lisa Scott from CRC in 2015, would suggest the depth to groundwater has been less than 12 m in the past. Dr Scott used a more conservative approach to establish the seasonal high water table, in which groundwater piezometric contours from June 1989 are projected to the highest recorded water table in M35/1080. Groundwater contours from Dr Scott's analysis in 2015 indicate the seasonal high water table at RM4 are between 43.9 m amsl on the western boundary of RM4 and 40.5 m amsl on the eastern boundary of RM4. Ground elevations reported by Dr Scott (2015) are 55.7 m amsl on the western boundary and 52.3 m amsl on the eastern boundary. This would indicate a to water of 11.8 m across the RM4 site, which would suggest a maximum excavation depth of 10.8 m if 1 m separation between pit floor and seasonal high water table is to be maintained.

g) Dr Scott also notes local differences in current ground elevation across the site, and concludes the depth to the seasonal high water table could locally be less than 11.8 m. Dr Scott indicates the maximum excavation depth should be no more than 10.1 m.

13 The groundwater table follows the topographic gradient from northwest to southeast across the site and depth to groundwater is constant. The proposed quarry can be excavated to a maximum depth of 10.1 m bgl, while still maintaining a distance of 1 m above the seasonal high water table.

14 The closest natural water body to the site is the Waimakariri River, located approximately 7 km north of the proposed quarry. The river is a significant recharge source that is known to lose water to the regional groundwater system. However, the river is considered to have a minimal influence on groundwater fluctuations below the site.

15 Due to the significant flow volumes from the river to the groundwater system and the quarry operation occurring above the groundwater table, onsite extraction will not have any influence on the Waimakariri River.

16 There is a network of water races and stormwater channels in the area surrounding the proposed quarry site. The shallow groundwater levels are much lower (some 18 m deep on average) than the base of these water races and channels, and therefore no hydraulic connection exists. The water races are 'perched'. Water will infiltrate from the water races and channels to replenish groundwater, but no groundwater will flow towards them.

17 Due to the absence of natural surface water bodies on or in close proximity to the site and given that there will be no adverse effects on groundwater, no adverse effects on surface water are considered to result from the proposed quarry operation.

18 Potential effects on groundwater quality from the proposed extraction operation are associated with the excavation process, specifically the presence of vehicles on site, and the potential presence of contaminants in material used to backfill the site. A range of mitigation measures have been incorporated into the proposal that will ensure that these potential effects are avoided, remedied or mitigated. From soil expert Victor Mthamo, I understand that post-rehabilitation future permitted land uses will have less than minor effects on groundwater quality if appropriate land management practices are applied.

19 I understand no fuel is to be stored on the site and spillage from stored fuel would not occur. Machinery will be well maintained to limit the potential for any hydraulic fluid

spills and machinery operators and site staff will be trained in spill avoidance techniques. Vehicle access and movement on site will be limited to minimise the chance of contaminant spills. However, in the event of a hydraulic oil or fuel leak, appropriate contingency measures including spill kits, a Spill Management Plan and staff training will be in place to manage such an event. All spill events will be recorded, including the volume of spill and the clean-up action taken. Any contaminated soil will be appropriately disposed of to an authorised off-site facility.

20 A search of CRC's LLUR for the proposed quarry site at Conservators Road revealed that the site is not listed on the Hazardous Activities and Industries List (HAIL). On this basis, no further technical investigation of contaminated land has been undertaken.

21 As noted previously, groundwater will not be intercepted during the quarry operation and a minimum one metre separation will be maintained between the quarry floor and the maximum recorded groundwater levels established for the site. This separation will be significantly larger for average groundwater conditions and provides additional protection over the aquifer.

22 No stormwater from neighbouring properties will flow into the quarry pit as the current stormwater system in the area will be unaffected by the proposed quarry operations. Direct rainfall will fall into the pit, however is not considered to have any real consequence as this will continue to infiltrate to the groundwater system as it does currently.

23 Any adverse effects on groundwater quality are considered to be less than minor given the nature of the proposed quarry operation, operational controls such as securing the site and maintenance of machinery, and proposed mitigation measures.

24 The rehabilitation of the site will occur progressively once areas of extraction have been completed, primarily involving the re-spreading and contouring of stored overburden materials, stabilisation of quarry faces and grassing of completed and restored extraction areas to create a free draining and stable landform. If the volume of stored overburden materials is insufficient, clean top soil may be brought in from offsite. The batter slope on completion of rehabilitation will be no steeper than 1 vertical (v):3 horizontal (h).

25 Road Metals expects that the entire RM4 site would be rehabilitated 12 months after the final extraction of resource has occurred. On completion of quarrying and rehabilitation activities, all mobile machinery will be removed from the site, and the site made suitable for its ongoing use. The final rehabilitated ground level is yet to be determined but is likely to be at the finished floor level plus topsoil.

SUMMARY AND CONCLUSION

26 I conclude that the proposed quarry activities at 581, 619 and 635 Buchannans Road by Road Metals should have less than minor effect on groundwater if the quarry is properly managed.

27 I accept investigations undertaken by Dr Lisa Scott from CRC in 2015, would suggest the depth to groundwater has been less than 12 m in the past. To maintain one metre of separation, the maximum excavation depth would then be 10.1 m.

28 Unforeseen circumstances, such as (but not limited to) spills during refuelling could adversely affect groundwater quality and I conclude it is appropriate to include conditions to specifically manage such events should they occur.

29 Groundwater level and quality monitoring during the lifetime of the quarry activities would be appropriate and I am willing to provide comment on draft conditions when the officer's report for this aspect of the proposal is available.

Eric van Nieuwkerk
Senior Hydrogeologist

15 March 2018

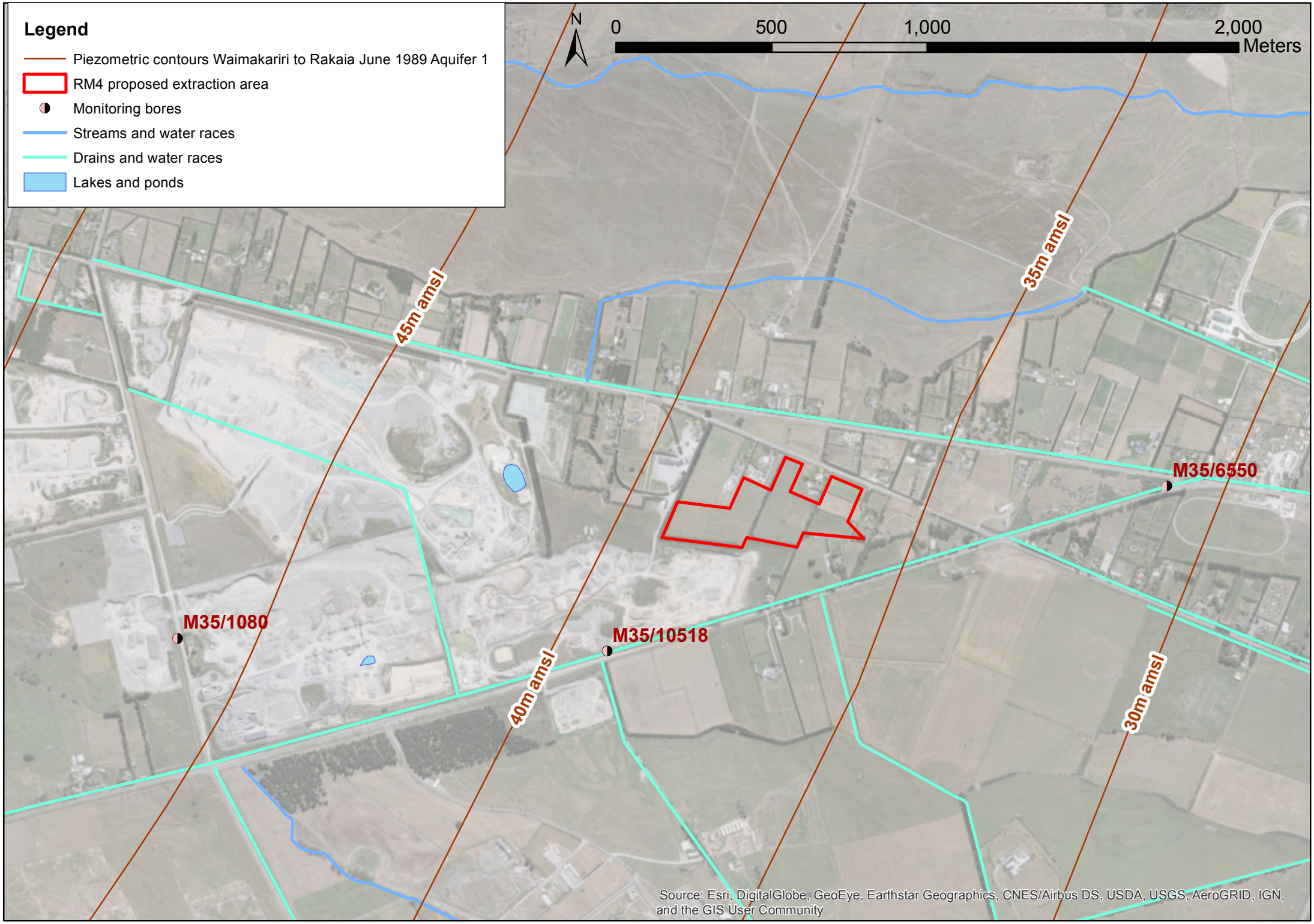
Legend
Piezometric contours Waimakariri to Rakaia June 1989 Aquifer 1
RM4 proposed extraction area
Monitoring bores
Streams and water races
Drains and water races
Lakes and ponds
N
0
500
1,000
2,000
Meters
45m amsl
40m amsl
35m amsl
30m amsl
M35/1080
M35/10518
M35/6550
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2: Depth to water near Road Metals