

Before a joint hearing of the

Dunedin City Council
Otago Regional Council
Waitaki District Council

**LUC-2016-230 and LUC-2013-225/A
RM16.138
201.2016.779 and 201.2013.360-1**

Under the Resource Management Act 1991

In the matter of applications by Oceana Gold (New Zealand) Limited for
resource consents for the Coronation North Project

Statement of evidence of Nevil Hegley for Oceana Gold (New Zealand) Limited

14 October 2016

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**anderson
lloyd.**

Qualifications and experience

- 1 My name is Nevil Ian Hegley.
- 2 I am the Principal of Hegley Acoustic Consultants.
- 3 I have more than 40 years' experience in civil engineering and for the last 39 years I have specialised in acoustics. I have an MSc from Southampton University (1975) where I undertook research in acoustics. I am a Chartered Professional Engineer (member no 58104), a Member of the Institution of Professional Engineers New Zealand, the Institution of Civil Engineers United Kingdom and the Acoustical Society of America. I have appeared on the majority of the Standards sub-committees dealing with sound issues since 1977 and I was the Chairman of both the 1984 and 1999 versions of the Construction Noise Standard NZS6803.
- 4 I have been involved with more than 80 mines and quarries throughout the country including mines such as OceanaGold's Waihi Gold Mine in the North Island and Stockton Coal Mine in the South Island.
- 5 I have been involved with the noise evaluation of the Macraes mine since its original assessment in 1988 and am familiar with both the mine and the general area around the mine.
- 6 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it.

Background

- 7 I have been extensively involved with OceanaGold's Macraes Mine since it began, including providing noise advice and expert evidence for the 2011 Macraes Phase III (**MP3**) expansion which extended the mine life to 2020 and also the 2013 Coronation Project.
- 8 I have been involved in the following work for the Coronation North Project:
 - (a) Preparing an assessment of noise effects associated with the Coronation North Project, which was included in Appendix 13 of the Assessment of Environmental Effects (**AEE**) submitted in support of the resource consent applications.
- 9 In preparing this evidence I have reviewed:
 - (a) Existing resource consents for OceanaGold's Coronation Project including Waitaki District Council (**WDC**) land use consent 201.2013.360 and

Dunedin City Council (**DCC**) land use consent LUC-2013-225 (the Coronation consent conditions);

- (b) The AEE lodged as part of the application for the Coronation North Project;
- (c) The planning requirements of the Waitaki District Plan, Dunedin City District Plan and DCC's second Generation District Plan (**2GP**);
- (d) Submissions relevant to my area of expertise;
- (e) The WDC/DCC Recommending Report; and
- (f) The reports and statements of evidence of other experts giving evidence relevant to my area of expertise.

Scope of evidence

10 I have been asked by OceanaGold to prepare evidence on the noise effects of the Coronation North Project. In my evidence I:

- (a) Identify the appropriate noise assessment criteria;
- (b) Explain how I developed a model to predict noise that will be generated from the Coronation North Project, using field measurements of the noise generated by machinery that will be used during the different phases of work;
- (c) Assess the significance of the predicted noise levels;
- (d) Consider methods to manage work to ensure that noise is controlled to within a reasonable level at all times;
- (e) Consider the submissions that raise noise matters; and
- (f) Consider the WDC/DCC Recommending Report in so far as it relates to noise.

Introduction

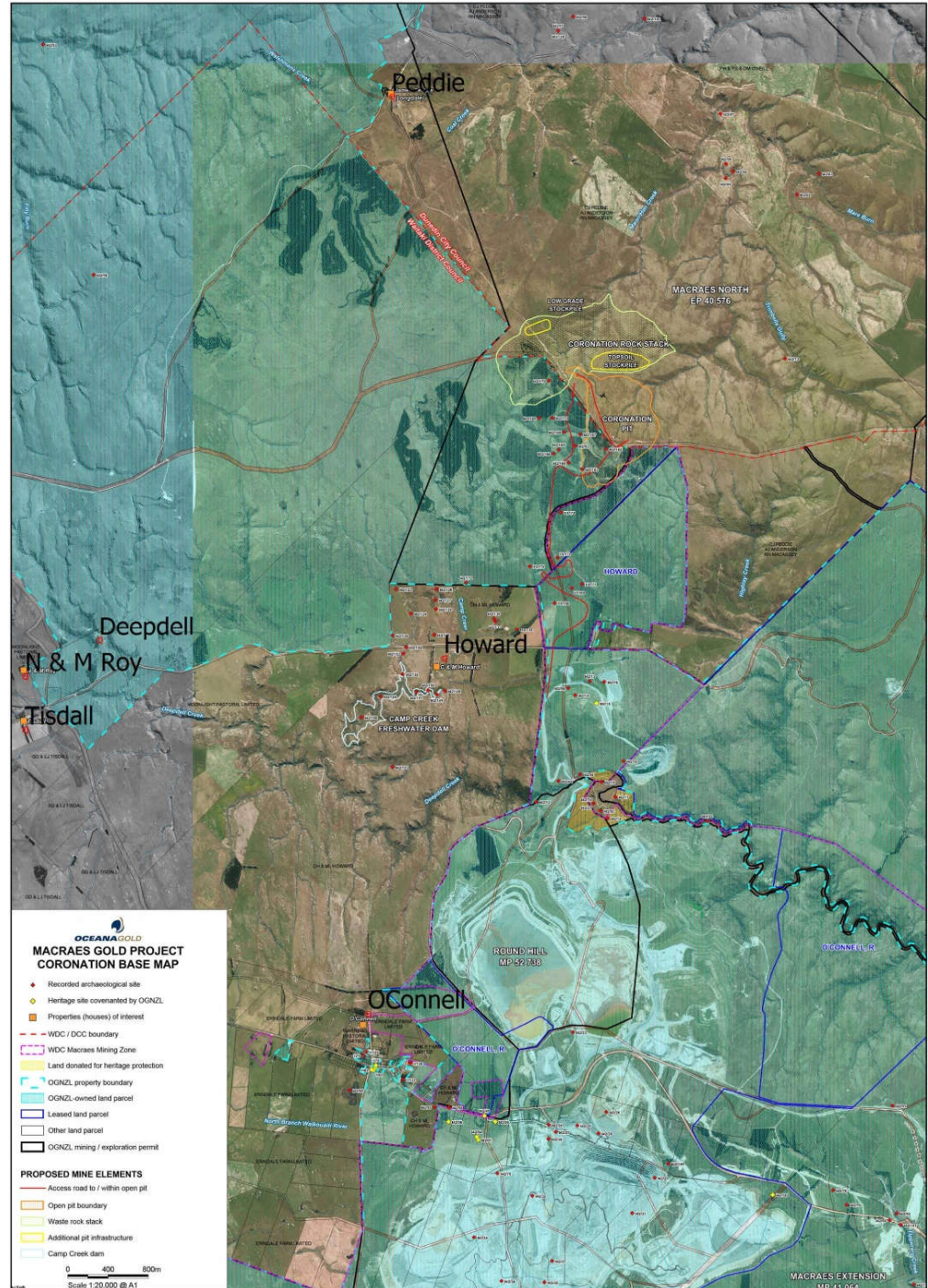
11 In my evidence I consider the noise effects of this project on the nearest residential neighbours (in homes not owned by OceanaGold), and how the project activities will be managed to ensure that noise is controlled to within a reasonable level at all times.

12 The nearest residential neighbours to the Coronation North project site are identified in Figure 1 below. The Howard house is approximately 2km away,

O'Neil house 3.5km and the Roy, Tisdale and farm house all just over 5km from the Coronation North Project. The Peddie property is owned by OceanaGold.

Run 2 Coronation North 2016
14 Oct 2016, 10:43

Hegley Acoustics, New Zealand



Industrial noise - ISO 9613.1/2, [9480 Coronation - Run 2 Coronation North 2016], Predictor V11.10

Figure 1: Location of closer neighbours

Noise assessment design criteria

Consent conditions

- 13 To establish if noise from the Project will be within a reasonable level it first needs to be determined what levels should be adopted. One of the factors I considered in my noise assessment (at section 2) was the existing noise conditions from the Coronation consent conditions which set noise levels which must be complied with.

Plan provisions

- 14 My noise assessment also considered the relevant noise provisions of each of the Waitaki and Dunedin City District Plans. That assessment is set out in sections 2.1 to 2.3 of my report and I do not intend to repeat it in this evidence.
- 15 There is a difference between the existing Coronation consent conditions and the two District Plan requirements, with the Waitaki District Plan adopting the boundary of the Macraes Mining Project Mineral Zone and the consent conditions adopting the notional boundary of any dwelling in the Rural Scenic Zone with the notional boundary set at 20m from a dwelling. The Operative Dunedin District Plan also adopts the notional boundary, which is set as the line 50m from the facade of any dwelling, except that, if the dwelling is located closer than 50m to the site boundary the notional boundary is the site boundary. However, the 2GP adopts the notional boundary with an additional control using an increased level at the site boundary.
- 16 In summary:
- (a) The Coronation consent conditions adopt 55dB/40dB L_{Aeq} for the day/night limits; the Waitaki District Plan and Dunedin 2GP adopt 55dB/40dB L_{Aeq} for the day/night limits - i.e. the same as the Coronation consent conditions; the Operative Dunedin District Plan adopts 50dBA/40dBA L_{10} within 50m of a residence;
 - (b) The 2GP also sets a site boundary level of 60dB L_{Aeq} 24 hours of the day; and
 - (c) All conditions include a night time L_{Amax} level, although in every case if the L_{10} or L_{Aeq} level is complied with the relevant night time L_{Amax} will also be complied with. As mining is a 24 hours a day operation the lower night time limit will control the noise levels.
- 17 I considered each of these criteria in my assessment.

Noise modelling

18 When undertaking noise modelling I considered the following operating scenarios:

- (a) The stripping of topsoil and transporting the material to the Topsoil Stockpiles;
- (b) Mining early in the life of the mine when there is the minimum screening of the mining plant and transporting waste rock to the Coronation North Waste Rock Stack (**WRS**);
- (c) Transferring low grade material to the Low Grade Stockpile; and
- (d) Transporting ore along the haul road to Horse Flat Road.

The mining and disposal areas are shown on Figure 2.

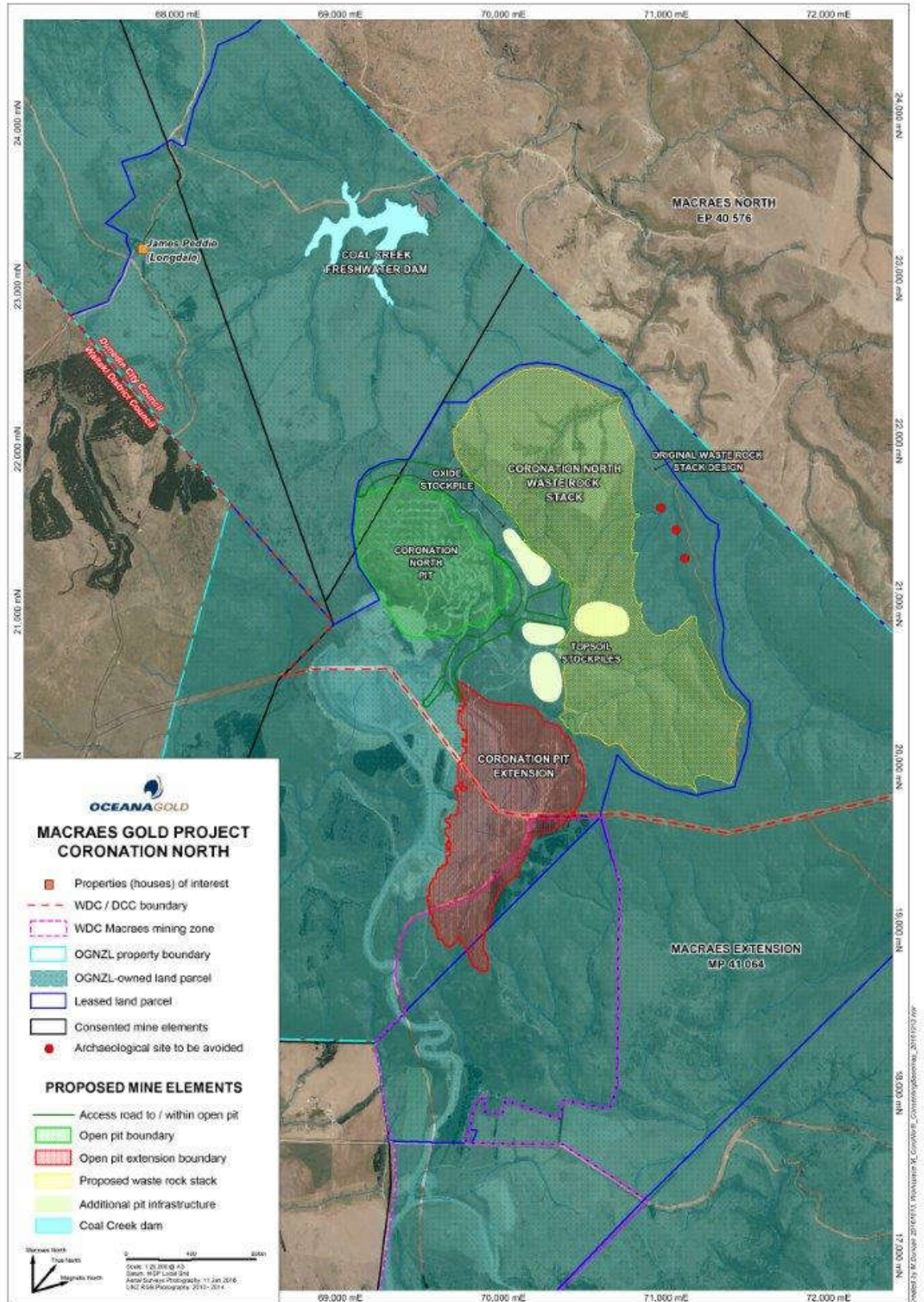


Figure 2: Coronation mining and disposal areas

- 19 Noise from the Coronation North Project was predicted based on all activities occurring at the original ground surface plus the Waste Rock Stack at half the height of the final fill. As the Coronation North Pit is excavated and the mining surface goes lower the noise exposure for neighbours will reduce by 10 - 12dBA, the exact reduction being dependent on how the plant is operating within the pit. At the same time the WRS height will increase, exposing the equipment working this area. However, cumulative noise from equipment on the increased height of the WRS and reduced noise from the equipment lower in the Pit will be less than with equipment working at original ground level.

Equipment noise levels

- 20 In order to predict noise from the various mining stages field measurements were taken of the main plant operating at the existing Mine, which will be used for the Coronation North Project, including the noise level of:
- (a) A Cat 52308 excavator loading a Cat 789C dump truck - 78dBA L10 when measured at 70m from the excavator;
 - (b) A Hitachi EX3600 excavator loading a Cat 789C dump truck - 68dBA L10 when measured at 130m from the excavator; and
 - (c) A Cat 789C dump truck - 79dBA L10 when measured at 26m from the truck¹.
- 21 The Coronation North Project will likely use a rock drill. However, this drill was not operating when I visited so the noise from this equipment could not be measured. The noise predictions were therefore conservatively based on a larger rock drill as measured at a hard rock quarry at a different site, which had a sound power level of 116dBA.
- 22 The noise from the various items of equipment was measured at different distances. In each case the location selected was such that the equipment operating controlled the measured level, was representative of the work being undertaken and far enough away from the equipment that the noise was representative of a point source. From these measurements the sound is converted to a sound power level, which is a dimensionless figure used to calculate the noise at any distance in the subsequent calculations.
- 23 I confirm that the approach taken to the field measurement of operating plant and the conversion of that information to a sound power level is a standard technique

¹ Photographs of this equipment and figures showing noise levels can be found in Appendix 13 of the AEE, section 4, pages 17 - 20.

and is frequently used in situations like this where we are trying to understand the likely noise to be generated by activities which do not yet exist.

Predicted noise levels

- 24 In order to predict the noise from the proposed Coronation North Project the above noise sources were located on a digital terrain model with mobile mining equipment currently being used (as outlined earlier) located at the most exposed positions to the notional boundary of the closer houses to the project area (as earlier identified on Figure 1).
- 25 The noise was then predicted using the Brüel & Kjær Predictor v11.0 computer model, which is an advanced noise prediction programme that adopts advanced algorithms that will predict the noise levels to satisfy the requirements of ISO 9613-1/2 *Acoustics – Attenuation of Sound during Propagation Outdoors*. This computer model is used extensively to predict noise levels both here in New Zealand and internationally, and it is regarded by noise experts as a robust and reliable model, appropriate for use in situations like the present one.
- 26 For the Coronation North project, a grid varying between 30 - 120m was adopted in a digital terrain model with the ground contours varying between 2.5m and 20m intervals. The noise was calculated at each grid point from which the noise contours were determined. All calculations were undertaken assuming a slightly positive meteorological effect² at the receiver position. Ground absorption of 0.7 has been used, which is representative of rural land. A receiver height of 1.5m was adopted for the analysis. In summary, basing the predictions on slightly positive meteorological conditions, taking into account the requirements of NZS6802 and existing ground contours and the screening effects of the terrain are all recognised and appropriate methods of noise assessment.
- 27 Where a sound has a special audible characteristic, such as tonality or impulsiveness, it attracts a 5dBA penalty in the assessment of that sound. Similarly, if the sound is of limited duration then the sound may be averaged by up to 5dBA. Averaging is not permitted at night time. From field measurements the only equipment on site that has the potential to attract an adjustment due to the type of sound is from the rock drill and this effect was included in the analysis.

² Defined in NZS6801:2008 *Acoustics – Measurement of Environmental Sound* as Pasquill Stability Category 5 and using the prediction techniques as set out in ISO9613.1 /2. That is, the predictions include conditions with a light positive wind (a wind from the noise source toward the receiver position) and/or a temperature inversion so reflecting conditions where there is a positive effect on the received noise level, compared to neutral meteorological conditions.

- 28 The noise from the mining was predicted at the commencement of the mining phase, which is when the equipment is at its highest position and therefore provides the maximum exposure to the neighbours.
- 29 In addition, spot levels were calculated at 1.2m above the ground level at the most exposed notional boundary of each of the closer houses (as shown on Figure 1) around the mine to provide a higher level of accuracy than would be achieved from the contours, which is a smoothing of the levels determined by the selected grid.
- 30 Using the noisiest stage of mining (with mining plant at the surface of the area being worked plus the maximum number of trucks on the haul roads) and the noise levels of existing mining equipment, the model predicted noise levels at each of the closer houses not owned by OceanaGold. The results were:
- (a) Howard - 29dBA L_{10} (this is identical to the noise prediction previously made for Coronation project);
 - (b) O'Neil 24dBA L_{10} (this is identical to the noise prediction previously made for Coronation project);
 - (c) Deepdell Station 21dBA L_{10} ; and
 - (d) Roy, Tisdale, O'Connell – 19dBA L_{10} .
- 31 The highest predicted noise level experienced at the notional boundary of the closer houses with a light temperature inversion present is 29dBA L_{10} at the Howard residence, which is the closest dwelling to the haul road and so this predicted noise level included the noise effects of trucks along the haul road. This is well within the lower night time noise limit of 40dBA L_{10} as set out in the existing Coronation consent conditions and relevant District Plan provisions. This is the same noise level that was predicted for the Coronation Project and OceanaGold has since installed double glazing and a mechanical ventilation system at the Howard residence, which will assist with overall noise management. I address the Howard's submission regarding noise later in my evidence.
- 32 In my assessment I also considered effect of Coronation North project on the noise environment that existed before any mining commenced in the area. From measurements undertaken in 1988 around the Macraes Flat township of the then existing noise environment we know:
- (a) The background sound (L_{95}) in calm conditions dropped to a low of 27dBA in the afternoon with the lowest L_{10} level during the day at a measured 37dBA;

- (b) At night time the background sound dropped to a low of 25dBA with the L₁₀ down to 28dBA in calm weather conditions; and
- (c) There was less than 1% calm conditions and as the wind increases the noise environment would quickly increase by 5 - 10dBA or more³.

I therefore concluded that the predicted noise from the Coronation North Project will be at or below the original noise environment for the majority of the time. I do note the submitters are concerned about the calm and close to calm conditions when I would expect there to be a temperature inversion present. These conditions include what I have undertaken the noise predictions for. For most other conditions the noise will be less than predicted.

- 33 This does not mean the noise will not be heard. It means that the periods when the mine and haul road are heard are limited to specific weather conditions. With calm and light winds (up to approximately 3m/s) or with a strong temperature inversion the noise will be heard. The Meteorological Service Report I referenced suggests this is a relatively uncommon condition. This noise appears to me to be what is being experienced at night time by neighbours like the Howards who have submitted on the topic. However, the noise level will be well within the noise limits as set out in the District Plans and as such the noise is considered to be within a reasonable limit.

Response to submissions

Craig and Erin Howard

- 34 These submitters raise concerns about noise due to their proximity to the haul road and experience they have had of noise from trucks on the haul road on cold and frosty nights. They describe the noise as “exceedingly loud” but acknowledge that during windy conditions the noise reduces to a low drone. They also acknowledge that trucks seldom operate at night. They ask that OceanaGold be considerate when weather conditions make the noise from the mine louder and travel further, especially at night and when it is very still or foggy.
- 35 My noise predictions demonstrate that night time noise levels at the notional boundary of the Howard’s residence are well below the compliance levels proposed in the Coronation North conditions of consent. My predictions are conservative so actual noise levels could be even lower.
- 36 OceanaGold engaged me to undertake a Coronation truck noise study (required by Coronation consent condition 9.5) measured from the Howard’s residence on

³ The New Zealand Meteorological Service report, 'The Climate of the Macraes Flat Area with Respect to Gold Mining at Round Hill', Ron McGann, May 1987.

Horse Flat Road. The study was undertaken from 16 to 29 March 2016, using an unattended data logger with a current calibration certificate that took measurements at 15 minute intervals. Annexed at Appendix A is a copy of the report I produced on 25 August 2016.

- 37 The report shows that as wind speed increases noise levels also increase, which is a result of noise being generated in the foliage in the area – i.e. there is a lot of ‘natural’ noise that is not attributable to Coronation mining activities. In practice, it is impractical to differentiate the difference between environmental noise and mining activities from these measurements.
- 38 The report concludes:
- (a) Once the effects of high wind speeds are excluded, a noise level of 50dBA L_{Aeq} is achieved during the daytime period on all days;
 - (b) Once the effects of high wind speeds are excluded, a noise level of 40dBA L_{Aeq} is achieved during the night time period on all nights; and
 - (c) The noise requirements of the Coronation consent conditions are being complied with.
- 39 I expect the noise the Howards are concerned about arises in very calm conditions that occur less than 1% of the time (according to the 1987 Meteorological report). The noise that the Howards are experiencing might be considered by them to be “exceedingly loud” but what that means is really a subjective assessment. My work objectively demonstrates that the noise levels generated by the Coronation North project will comply with the district plan limits with a large factor of safety. Those noise limits have been set by the Councils to take into account the need to protect the health and amenity of neighbours, and OceanaGold will be operating below the levels as set out in the District Plans. The levels set in the District Plan are also 5dBA below that adopted in the WHO⁴ Guidelines to protect the health and wellbeing of neighbours. OceanaGold is already doing more than it is required to do with the noise bunding that has been placed adjacent to the haul road. On this basis I see no reason to alter the proposed conditions of consent or restrict night time mining or truck haulage on the haul road.

⁴ Guidelines For Community Noise prepared for the World Health Organization 1999 edited by Birgitta Berglund Thomas Lindvall Dietrich H Schwela

- 40 The Kinneys submit that they are already affected by noise from the Coronation pit, particularly at night, and are concerned about increased noise from the closer Coronation North site.
- 41 The Kinney property was not included in my original report because the residence is approximately 10km from the Coronation North project where the predicted noise would be in the order of 15dBA for the design conditions. The Kinney property is shown in red on the Figure 3 below and the Kinney residence is located on the top left landholding. It appears this dwelling will be screened from any mining activity although even if they do have a line of sight to part of the mining area it will not change the noise predictions as at this distance any screening effects are minimised by the design meteorological effects. The noise effects at this site will be less than minor.

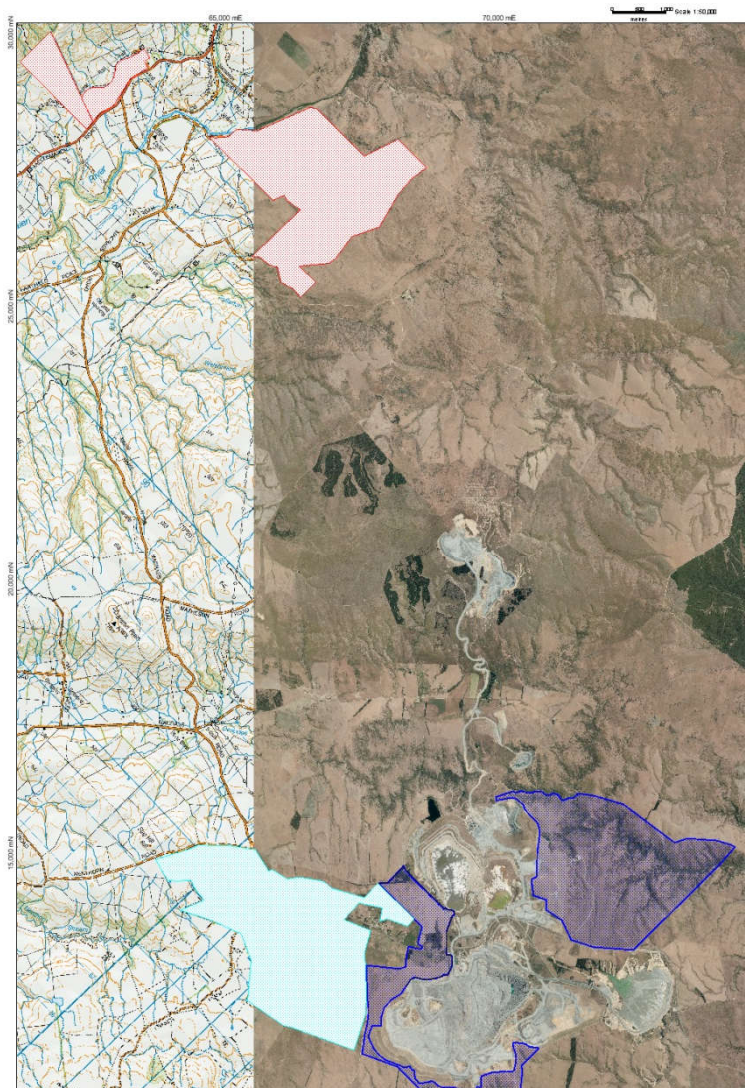


Figure 3: Location of Kinney property

Matt and Kate O'Connell

- 42 The O'Connell property is identified in light blue on Figure 3 above. The O'Connell's submit that they are experiencing "substantial" noise from the Coronation project at their home located in Macraes Village. They seek noise controls that address adverse effects.
- 43 I am aware of daytime noise monitoring undertaken by OceanaGold near to the O'Connell residence which Debbie Clarke will outline in her evidence. A noise level of under 50dB L_{Aeq} was achieved for all measurements. This means noise levels the O'Connell's are experiencing are below compliance levels that have been set by the Councils to take into account the need to protect the O'Connell's health and amenity. I see no reason to alter the proposed conditions of consent or to impose alternative noise controls.
- 44 The noise model predicts levels at the O'Connell residence of 19dBA L_{10} . At this level the effects of any noise will be less than minor. There may be some line of sight to the mining operations from this dwelling although checking various cross sections from the dwelling to the mine shows there is generally good screening of the various activities at the mine. The computer modelling takes all of the screening variables into account as each noise source is calculated along the specific cross section between the source and receiver position.

Macraes Community Inc (MCI)

- 45 MCI express concern "about the amount of noise that the trucks carting ore from the Coronation site to the mine site at night will generate. Recently bulldozers working on the road at night awoke residents in nearby houses." MCI ask that cartage at night be limited and road maintenance only be allowed during the day.
- 46 Mine trucks travelling downhill do not use engine brakes to control truck speed (which is a relatively noisy braking system) so the noise for mine trucks travelling downhill is not significantly different to trucks travelling uphill. I measured both of these aspects of mine truck noise for the model and these noise effects from the actual activity are included in the noise modelling. I remain confident that the noise levels generated by trucks will not exceed consented noise limits during day or night time.
- 47 Exactly the same method was adopted for all noise sources on site. I measured the noise on site undertaking the type of work proposed and have adopted that measurement in the noise prediction model.

Response to WDC/DCC Recommending Report

- 48 Annexure A of the WDC/DCC Recommending Report proposes draft conditions for the Coronation North project, including Conditions 7.1 to 7.5 regarding Blasting and Vibration, Conditions 8.1 to 8.3 regarding Noise and conditions 9.1 to 9.4 regarding Monitoring of Noise, Airblast and Vibration. All of these conditions mirror the existing Coronation consent conditions on these topics. Noise measurements are to be measured in accordance with the provisions of NZS6801:2008 Acoustics: Measurement of Environmental Sound, and are to be assessed in accordance with the provisions of NZS6802:2008 Acoustics: Environmental Noise.
- 49 Paragraph 124 of the report recommends some minor changes to condition 9.1 and a new Condition 9.2 which assist to make the conditions workable.
- 50 I support these conditions as being appropriate limits, monitoring methods, measures and assessments to control noise and vibration. I approve of a consistent approach which aligns the Coronation North project conditions with existing consent conditions.

Proposed conditions

- 51 I support the proposed Coronation North conditions of consent as they relate to noise.

Conclusion

- 52 An advanced computer based noise prediction model that includes the effects of the topography, distance, meteorological influence and the sound spectrum of mechanical plant used at the mine has been used to predict the noise contours around the mine site and spot levels at each of the closer dwellings that OceanaGold does not own.
- 53 Noise contours for representative mining stages have been predicted as well as the noise at each of the closer existing (non OceanaGold owned) dwellings in the area. The predictions demonstrate compliance with both the existing Coronation conditions of consent and proposed Coronation North conditions of consent, and District Plan noise limits, with what I consider to be a good factor of safety.
- 54 During busy mining periods of each stage, the noise level at all of the closer houses is predicted to remain well within the existing Coronation consent conditions by a minimum of 11dBA L_{10} (and L_{Aeq}) at all existing dwellings in the area. As a guide, a reduction of 10dBA is a perceived halving of the noise level.

- 55 As the same activities occur during the daytime as adopted in the above analysis, compliance with the night time noise criteria will ensure the daytime levels are complied with by a minimum of a 21dBA L₁₀ factor of safety.
- 56 The mining of the Coronation North Project will continue at the same rate and intensity as presently exists for the Coronation project, i.e. there will not be an increased number of truck movements on the haul road, rather a continuation of existing activity. Accordingly there will not be any cumulative effects of combined noise from Coronation and Coronation North projects.
- 57 Although the noise environment without any effects of mining is relatively low around the Macraes Mine, the predicted noise level with the effects of mining is also low. Thus, while mining from the Coronation North Project may be heard at night when the background sound is lowest and there are assisting meteorological effects, even under these conditions there will be no adverse noise effects for the neighbours. For the majority of the time with winds above approximately 2m/s the noise from the Coronation North project will be below the noise environment if all mining noise is excluded from the analysis. For the less than 1% of the time when conditions are very calm the noise levels will still be well below District Plan noise limits.
- 58 For these reasons, and in terms of the requirements of the Resource Management Act, my view is that the noise effects of the proposed Coronation North Project will be less than minor.



Nevil Hegley

14 October 2016

Appendix A – OceanaGold Truck Noise Report 26/8/16



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25 August 2016

Scott Mossman
Environmental Officer
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Dear Scott

OCEANA GOLD TRUCK NOISE

Condition 9.5 of the Land Use Consent for the Coronation Project states:

In addition to conditions 9.1 to 9.4, noise monitoring shall be conducted by a suitably qualified and experienced acoustic expert to verify that the trucking activities associated with the mining operations comply with the noise limits set out Condition 8 at the notional boundary of the dwelling shown on "Coronation Project October 2013 WDC/DCC LUC Consents Map 1" annexed are complied with. The monitoring is to be carried out within one month of the haul trucks carrying ore to the processing plant and once 12 months later, and at any other time requested by the Waitaki District Council. The results are to be provided to the Councils within one week of undertaking the measurements.

The noise conditions that are relevant to condition 9.5 are:

- 8 Noise
Noise limits
- 8.1 The consent holder shall ensure that all construction and operation activities associated with the mining operations are designed and conducted so that the following noise limits are not exceeded at the locations specified in condition 8.2:
 - (a) On any day between 7am and 9pm (daytime): 50dBA L_{Aeq} ; and
 - (b) On any day between 9.00pm and 7.00am the following day (night-time): 40dBA L_{Aeq} ; and/or 70dBA L_{Amax}

Measurement Locations

- 8.2 Noise measurements shall be taken at the notional boundary of any dwelling not owned by the consent holder.

Note: The notional boundary is defined as a line 20 meters from the exterior wall of any rural dwelling or the legal boundary where this is closer to the dwelling.

Measurement and Assessment

- 8.3 All noise measurements referred to in conditions 8.1 and 8.2 above shall be measured in accordance with the provisions of NZS 6801:2008 Acoustics: Measurement of Environmental Sound, and shall be assessed in accordance with the provisions of NZS 6802:2008 Acoustics: Environmental Noise.

The closest dwelling to the trucking activities associated with the mining operations is the C & M Howard property, which is located to the west of the haul road as shown on Figure 1 below. This map is a copy of the LUC Consents Map 1 referred to in condition 9.5.

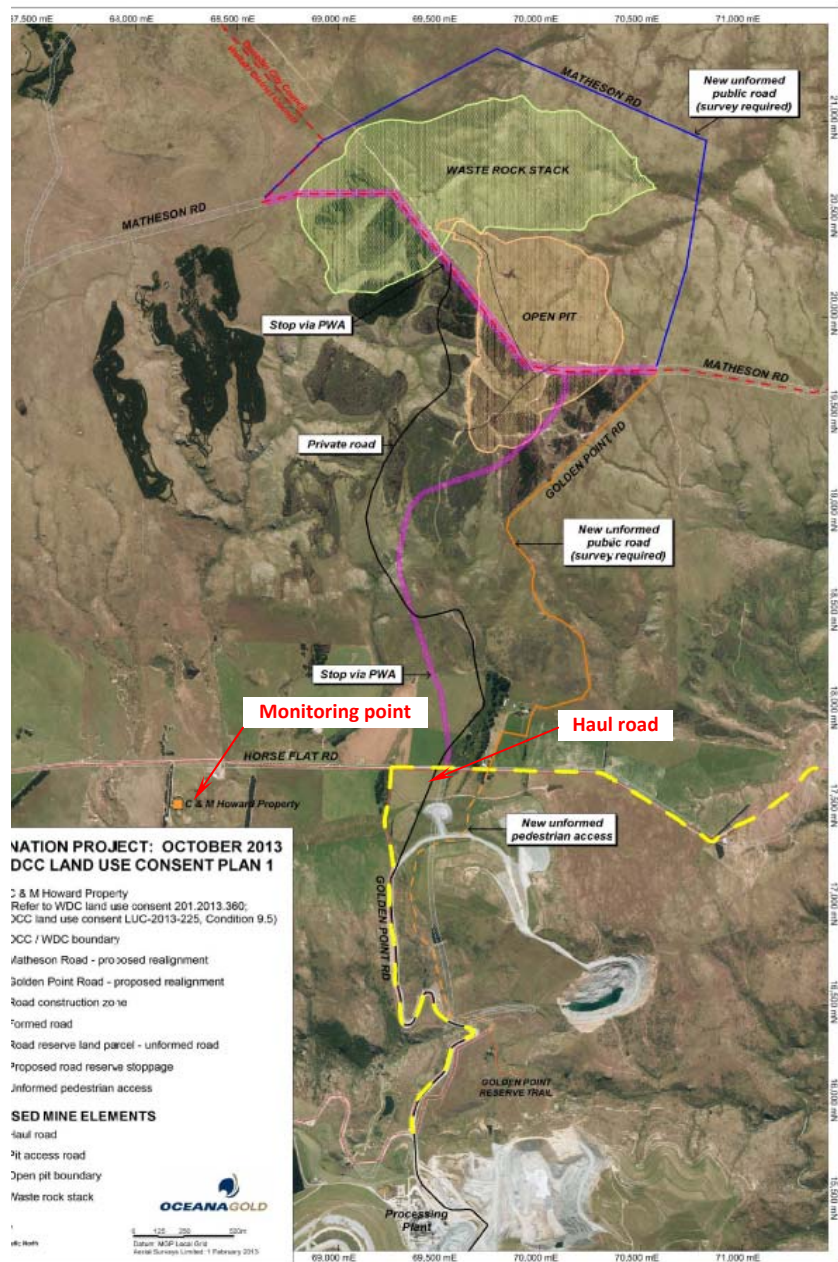


Figure 1. Noise Monitoring Position

Map Source: LUC Consents Map 1

As shown on Figure 2, noise monitoring was undertaken at 15 minute intervals from 9:00am on Wednesday 16 March to 7:00pm on Tuesday 29 March 2016 (battery went flat) using an unattended ARL 315 Data Logger. The logger has a current calibration certificate and the next calibration is due in September 2017.

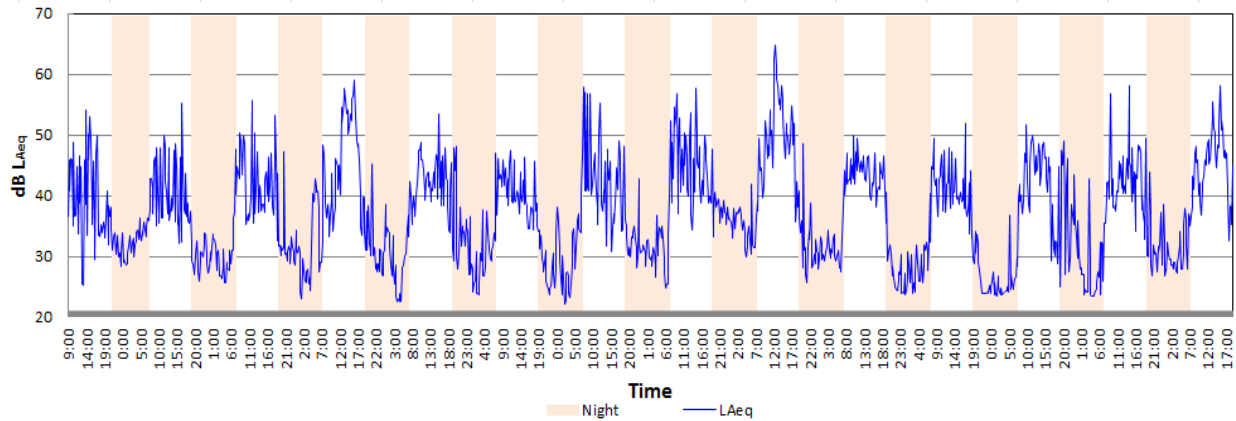


Figure 2. Measured Noise Levels at Howard Property, dB L_{Aeq}

Figure 3 shows the wind speed and direction during the monitoring period.

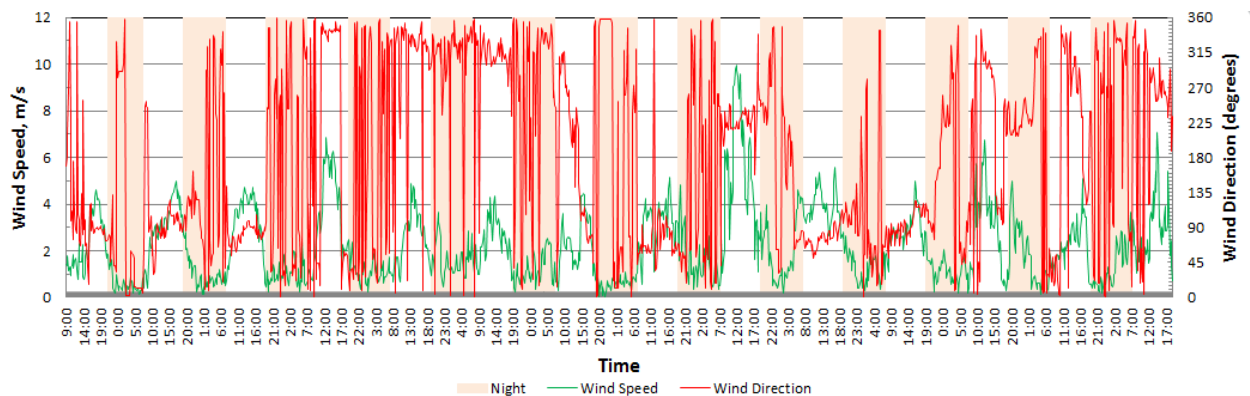


Figure 3. Wind Speed and Direction

Figure 4 shows the measured noise level and wind speed during the monitoring period.

Inspection of Figure 2 shows there is a large variation in the measured noise on some days. In order to better understand the reason for this the noise level and wind speed have been plotted on the same figure as shown on Figure 4. From this figure it is apparent that as the wind speed increased the noise level also increased, which is a result of noise being generated in the foliage in the area.

If the effects of the higher wind speeds are excluded from the assessment a noise level of 50dB L_{Aeq} is achieved during the daytime period (7am – 7pm) on all days.

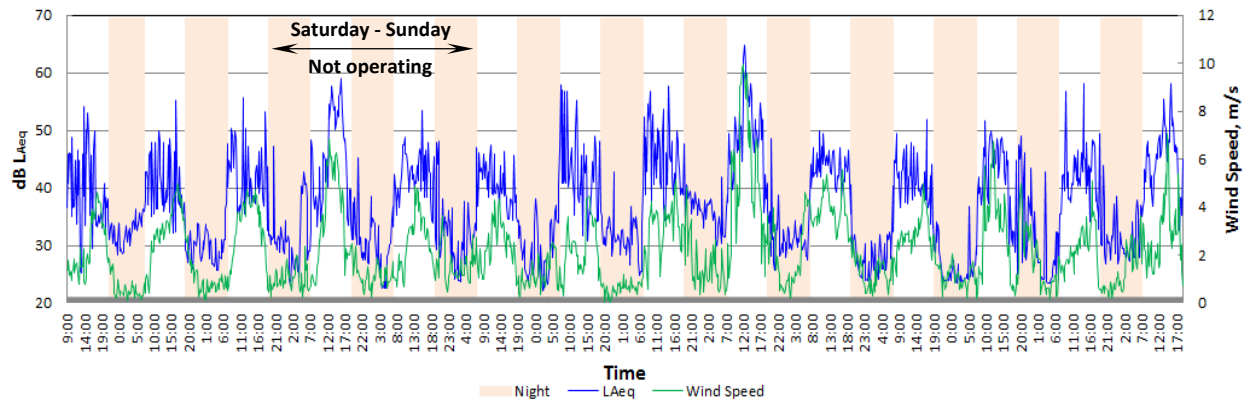


Figure 4. Noise Level and Wind Speed

Trucks movements along the haul road during the noise monitoring period were:

Date	Trucks, day	Truck, night
Wednesday 16 March		49
Thursday 17 March	73	22
Friday 18 March	112	-
Saturday 19 March	-	-
Sunday 20 March	-	-
Monday 21 March	132	-
Tuesday 22 March	90	-
Wednesday 23 March	77	71
Thursday 24 March	73	66
Friday 25 March	128	44
Saturday 26 March	120	43
Sunday 27 March	109	6
Monday 28 March	131	55
Tuesday 29 March	82	113

Table 1. Truck Movements

Inspection of Figures 2 and 4 shows that when taking into account the effects of the higher wind speed the noise level from all other activities in the area (ie truck noise and any farm noise that may occur) comply with the consent conditions. That is, the noise does not exceed 50dB L_{Aeq} during the daytime and 40dB L_{Aeq} at night time. Inspection of Figure 2 shows there is, in fact, little difference in the noise level from Friday night (18th) through to Monday morning (21st), excluding wind effects, when the trucks were not operating.

If the effects of the higher wind speeds are excluded from the assessment a noise level of 50dB L_{Aeq} is achieved during the daytime period (7am – 7pm) and 40dB L_{Aeq} for the night time period.

Based on the above, the noise requirements of the resource consent are being complied with when measured in accordance with the provisions of NZS 6801:2008 Acoustics: Measurement of Environmental Sound, and assessed in accordance with the provisions of NZS 6802:2008 Acoustics: Environmental Noise.

Should you have any questions regarding the above please do not hesitate to contact me.

Yours faithfully
Hegley Acoustic Consultants


Nevil Hegley