

Before a joint hearing of the
Otago Regional Council and
Waitaki District Council

RM 20.024

Under the Resource Management Act 1991

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

Statement of evidence of Prue Harwood for Oceana Gold (New Zealand) Limited

4 August 2020

INTRODUCTION

- 1 My full name is Prudence Mary Harwood. I am a Senior Associate – Environmental Engineering at Beca Limited. I hold a Bachelor of Engineering (Chemical) from the University of Otago.
- 2 I am a Certified Environmental Professional and a Certified Air Quality Professional.
- 3 I have 27 years' experience in air quality resource management.
- 4 Some of my recent experience in assessing the effects of activities that discharge dust to air within New Zealand include:
 - Preparation of assessments of effects from various mining activities in North Otago and Waihi for Oceana Gold (New Zealand) Limited (OGNZL)
 - Preparation of an assessment of effects from an extension to a quarry near Cromwell for Winstones Limited
 - Preparation of an assessment of effects from mineral processing associated with gravel extraction at Maraekakaho near Hastings carried out for Russell Roads Limited
 - Preparation of an assessment of effects from a proposed sand extraction operation near Kaukapakapa carried out for James Hardie Limited
 - Preparation of an assessment of effects from a proposed quarry expansion near Clevedon for Fulton Hogan Limited
 - Preparation of an assessment of effects from a proposed quarry near Christchurch Airport for Frews Quarries Limited
 - Preparation of an assessment of effects from a proposed mine near Westport for Stevensen Mining Limited
 - Preparation of an assessment of effects from the discharges from the bulk handling facilities at Port of Timaru for Prime Port Limited.
 - Preparation of evidence to Environment Court on potential discharges associated with establishment of a quarry at Rolleston near Christchurch.

- 5 I have also been closely involved with the monitoring of ambient air quality at several quarries and mines, including the OGNZL mine at Macraes in North Otago and the Mintago open cast gold mine at Earnsclough near Alexandra.
- 6 I was the principal author of the report entitled "*Oceana Gold (New Zealand) Ltd – Deepdell North Stage III – Assessment of Effects of Discharges to Air*" dated 9 July 2019, (Beca AEE)
- 7 I was requested by OGNZL on 15 July 2020 to provide evidence for this hearing. I am familiar with the site and the area to which the consent application relates. I visited the Macraes mine and surrounding area on 20 February 2019.
- 8 I record that I have read and agree to abide by the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2014. This evidence is within my expertise, except where I state that I rely upon the evidence of other expert witnesses as presented to this hearing. I have not omitted to consider any material facts known to me that might alter or retract from the opinions expressed.

SCOPE OF EVIDENCE

- 9 My evidence will address the following:
 - Summary of proposed activity;
 - The aspects of the receiving environment that are of relevance to the proposed air discharge activity;
 - The types and sources of dust at the mine and the measures that OGNZL propose to use to avoid and mitigate the effects of these discharges;
 - The effects of existing mining activity as the basis for the assessment of the Deepdell project;
 - The potential effects of the discharge of dust from the Deepdell project;
 - Monitoring and consent conditions
 - Responses to public submissions and the Otago Regional Council's Officer's section 42A report; and
 - Conclusions on the overall effects of the proposed activity on air quality.

EXECUTIVE SUMMARY

- 10 OGNZL is proposing to re-mine and extend the current Deepdell North Pit, backfill the existing Deepdell South Pit and construct a new waste rock stack (WRS).
- 11 Mining of the Deepdell North Pit will take 1 year and will add an additional two years to the Macraes Gold Project's life.
- 12 The proposed Pit area will be mined using the same equipment and processes as currently used in other areas of the Macraes mining operation. No additional equipment will be used and overall, the level of activity at the Macraes Gold project will not increase.
- 13 The site is approximately 1.5 kilometres southwest of the nearest residence¹ and 7 kilometres from Macraes Village.
- 14 The closest residence to the site is owned by C & M Howard who have given their written approval to the application for resource consent to discharge contaminants to air. Therefore, the effects of dust on the Howard property cannot be considered.
- 15 OGNZL will use a suite of standard dust control measures to avoid and mitigate dust discharges from the site. I consider that these measures represent the best practicable option. These control methods are included in the Dust Management Plan prepared by OGNZL.
- 16 Due to the large separation distance between the site boundary and nearest residences and the proposed control methods, I consider the potential for adverse effects, as a result of dust generated at the site, including health and nuisance effects, to be no more than minor.
- 17 Two submissions were received that mentioned dust. Only one raised a concern, regarding the adequacy of site dust monitoring. In my opinion, the existing and ongoing site monitoring is appropriate such that the effects of the

¹ This party at 406 Horse Flat Road have provided written approval and effects on this party are no longer required to be considered.

proposed activity and compliance with consent conditions can be adequately assessed.

- 18 I have reviewed the sections of the Otago Regional Council's Officers Report (Officers Report) that relate to air quality and overall, I concur with the conclusions and recommendations of the report. I do, however, have some comments to make regarding the imposition of a 20 km/hr speed limit in sections of the haul road and the need for continuous Total Suspended Particulate (TSP) monitoring in the vicinity of the Howard residence.

SUMMARY OF PROPOSED ACTIVITY

- 19 OGNZL operates an open pit gold mine at Macraes Flat in North Otago. OGNZL is proposing to re-mine and extend the current Deepdell North Pit, backfill the existing Deepdell South Pit and construct a new waste rock stack (WRS). The project elements are to be known as Deepdell North Stage III Pit, Deepdell South Backfill and Deepdell East WRS.
- 20 Mining of the Deepdell North Stage III Pit is expected to commence in October 2020 and will add an additional two years to the Macraes Gold Project's life.
- 21 The proposed North Stage III Pit area will be mined using the same equipment and processes as currently used in other areas of the Macraes mining operation. No additional equipment, such as trucks or excavators, will be used. The mining will use the existing fleet of diesel-powered mining equipment and will involve drilling and blasting. However, overall, the level of activity at the Macraes Gold Project will not increase.

ENVIRONMENTAL SETTING

- 22 The Macraes Gold Project is located in a rural area that is dominated by OGNZL's existing mining activity and low intensity pastoral farming. Macraes Village, located to the southwest of the Gold Project mining area, is a small settlement of approximately 20 houses and an historic hotel.
- 23 The existing Deepdell North Pit is located to the north of the main Macraes Gold Project, approximately 4.3km from the village. The Deepdell North Stage III Pit is located to the north of Deepdell Creek. Land in the vicinity of the Stage III Pit is similar in character to land around the overall Project area.

- 24 There are few houses in the area. The closest privately-owned houses to the Stage III Pit boundary will be:
- The Howard residence (approximately 1.5km and 1.1 km to southwest of the Pit boundary and haul road, respectively). I note that the Howards have provided their written approval to the application to discharge contaminants to air and therefore the effects of dust on their property cannot be considered by the Hearings Panel. However, I will include a general discussion of the potential effects on the Howard property in my evidence;
 - The O'Connell residence (approximately 3.6 km to the south of the Pit boundary)
 - The Vanderley residence at Deepdell Station (approximately 4.8 km to the southwest of the Pit boundary)
 - The Tisdall and Roy residences (approximately 5.5 km to the southwest of the Pit boundary).
- 25 Figure 1 in **Attachment A** (reproduced from Figure 2-5 of the Beca AEE) shows the location of the nearest residences and the proposed Pit and Waste Rock Stack.
- 26 The proposed mine is located in Airzone 3 (as defined in the Regional Plan: Air for Otago). Airzone 3 comprises the rural areas of Otago and includes all areas of Otago that are not located in Airzones 1 and 2. The airshed is not gazetted under the National Environmental Standard for Air Quality (NESAQ) and is not in an area defined as "polluted" by Regulation 17 of the NESAQ.
- 27 The predominant discharge from the project will be dust.
- 28 OGNZL measures meteorological parameters at a site on Golden Point Road (Site 3) approximately 5.5km south of the existing Project. A site windrose (showing wind speed and direction) for the years 2012-2018 is superimposed on attached Figure 1 in **Attachment A** (reproduced from the Beca report).
- 29 The windrose shows that winds blow mostly from the south westerly and north-westerly quarters. The strongest winds also come from these quarters. Winds

from the north east tend to be lighter and less frequent. Winds from the south-east are rare.

- 30 The average wind speed measured between 2012 and 2018 was 3.3 m/s. Winds greater than 5 m/s (the critical pick-up speed for dust from unconsolidated surfaces) occurred for 20.1% of the time.
- 31 The average annual rainfall measured at the site between 2012 and 2018 was 550 millimetres.
- 32 The relatively high frequency of strong winds and relatively low rainfall are climatic features that contribute to generation and transportation of dust.
- 33 OGNZL has also measured background air quality (deposited dust and total suspended particulate ((TSP)), concentrations) in the vicinity of the Gold Project since 1990. Deposited dust and respirable quartz were also measured for a period.
- 34 The locations of the current deposited dust and TSP monitoring sites are shown in Figure 2 in **Attachment B** (reproduced from the Beca AEE).
- 35 Deposited dust is currently measured at three background sites which are unaffected by mining activities. TSP is also measured at one site in Macraes Village (Site 15). The dustfall at these sites should be indicative of the typical deposited dust concentrations in the surrounding areas and the general area of the proposed Deepdell Stage III Pit.
- 36 Table 1 in **Attachment C** provides a summary of the deposited dust and TSP concentrations measured from 2016 to 2019.

TYPES AND SOURCES OF DUST AND PROPOSED MITIGATION MEASURES

- 37 The nature of emissions from the proposed Deepdell project will be the same as the emissions from other mining activities at the Gold Project.
- 38 Engine exhausts emissions (the major sources of fine particulates such as PM₁₀ and PM_{2.5}) will be generated from mobile equipment but these will be relatively minor and will be well-dispersed before reaching the site boundary.

- 39 The predominant site air discharge will be particulate matter comprised of a wide variety of size fractions. The larger sized settleable material (greater than 50 microns in diameter) can cause a nuisance by soiling surfaces and irritating the eyes and nose. The distance a particle will travel in the air depends on the discharge height above ground, its size and wind speed (critical wind speed to mobilise dust is greater than 5 m/s). Because particulate generated from mining activities such as at the Deepdell North Stage III Pit will be relatively large (>10 microns),² it is expected to fall out of the air within 100 - 200 m from the source.
- 40 I have summarized the expected major sources of particulates from the North Stage III Pit and proposed mitigation in the following paragraphs. OGNZL's operations are based on the requirements of an operational Dust Management Plan (see **Appendix A** of the Beca AEE) which provides effective mitigation methods that are currently used at the Gold Project (and will be used at the proposed North Stage III Pit).
- 41 **Earthworks** – the control of dust from the stripping and spreading of overburden, soils and rock as well as construction of roads, dams and stockpiles by:
- Minimising exposed surfaces and revegetating as soon as practical
 - Carrying out potentially dusty activities when weather conditions are most favourable (ie light winds)
 - Using water as dust suppressant on unvegetated areas and haul roads.
- 42 **Roads** - the control of dust from traffic movements on haul roads, around the proposed WRS and general North Stage III Pit:
- Limiting vehicle speeds
 - Minimising haul distances where practical
 - Using water as a dust suppressant (dust carts and/or fixed sprinklers when required)

² Ministry for the Environment (2016) *Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions (GPG Dust)*

- Maintaining haul roads by grading and fresh gravel
- 43 **Loading and unloading materials** – control of dust from the base of the Pit and construction areas by requiring operators to minimise drop heights.
- 44 **Exposed Surfaces** – control of dust on stockpiles, the WRS and Pit walls by dampening surfaces and progressive revegetation.
- 45 **Blasting** – will occur intermittently and within restricted hours within the Pit. No other specific controls are required as large buffer distances to site boundaries will effectively mitigate any dust that disperses beyond the Pit.

METHOD OF ASSESSMENT OF EFFECTS

- 46 The effects of dust emissions from the proposed activity cannot be practically quantitatively modelled. Consequently, I have used a qualitative method where I have analysed the effects using available monitoring data, historic complaints records and the likely changes to the scale and location of the proposed Deepdell project.
- 47 Dust deposition is the settling of dust onto surfaces. These effects can be subjective and are dependent on the sensitivity of the receiving environment. For example, while dust deposition onto a residence or school would likely be perceived as objectionable, dust fallout in rural areas may not be viewed as a nuisance even at relatively high deposition rates³.
- 48 The Ministry for the Environment’s Good Practice Guide for Assessing and Managing Dust (GPG Dust)⁴ notes that the potential for dust to cause an objectionable or offensive effect depends on the following characteristics of the dust fallout (the FIDOL factors):
- The frequency of dust nuisance events
 - The intensity of the events (dust quantity and degree of nuisance)
 - The duration of each dust nuisance event

³ Institute of Air Quality Management (2016) “*Guidance on the Assessment of Mineral Dust Impacts for Planning*”.

⁴ Supra at Note 1.

- The offensiveness of the discharge having regard to the nature of the dust
 - The location of the dust nuisance having regard to the sensitivity of the receiving environment.
- 49 There are no New Zealand standards or guidelines for deposited dust or Total Suspended Particulates (TSP). However, the GPG Dust recommends a “trigger” level for deposited dust of not more than 4 grams/square metre over 30 days above background levels in sparsely populated areas. Noting however, that deposition of 2 grams/square meter over 30 days above background levels may cause nuisance in sensitive residential areas.
- 50 The GPG Dust suggests trigger levels for TSP of 60 micrograms per cubic metre (24-hour average) for sensitive areas with significant residential development, 80 micrograms per cubic metre for areas with moderate sensitivity and 100 micrograms per cubic metre for areas of low sensitivity, such as sparsely populated rural areas similar to Macraes Flat.
- 51 The current air discharge consents for the Macraes Gold Project, of which there are five, sets limit for deposited dust and TSP as shown below:

Contaminant		RM16.138.19
Deposited dust	Not to exceed 3 g/m ² /30 days insoluble dust above background more than twice in any calendar year at Sites 7, 20, 21, 22 and 25. Not to exceed 3 g/m ² /30 days insoluble dust above background at Sites 2 and 15.	
TSP	Not to exceed 120 µg/m ³ at Site 15.	

RESULTS OF SITE MONITORING

- 52 OGNZL has monitored deposited dust and TSP concentrations in the area of the mine since 1989 (see plan of monitoring sites in **Attachment B**). For most of the time, the deposited dust levels measured beyond the site boundary have remained within consent limits. Dust levels measured in proximity to Macraes Village have exceeded 3 grams per cubic metre/30 days only five times between 2004 and March 2020 (at Sites 2 and 15). Dust levels within the mine have also remained below 3 grams per cubic metre/30 days for most of the time. Where occasional problems have been identified (e.g Mixed Tail Impoundment in 2006 and 2007), OGNZL implemented additional mitigation that reduced dust levels below the limit.

- 53 The two most recent exceedances of the deposited dust consent limit occurred in February and March 2020. The exceedance in February occurred at Site 15. The cause of the exceedance could not be definitively determined; however, it was considered to be most likely due to activities taking place in close proximity to the gauge in Macraes Flat township.⁵
- 54 The cause of the March exceedance at Site 2 was found to be most likely due to contamination of the deposit gauge with bird droppings.⁶
- 55 All five current consents for discharges to air from the mine require that OGNZL monitor TSP concentrations at Site 15. There was one exceedance of the 120 micrograms per cubic metre limit recorded at the site in 2016. An investigation showed that this was most likely due to the instrument recording moisture or localised dust sources. Two exceedances in 2017 were attributed to fog. There were no exceedances in 2018 or 2019.
- 56 The fine fractions of particulate (PM₁₀ and PM_{2.5}) within dust can adversely affect human health. Respirable quartz contains silica which can cause the lung disease silicosis over long periods of exposure. Monitoring at the Macraes Village, three TSP monitoring sites, (which included the Howard property) and an additional site at Golden Point (north of Golden Point Pit) between 1998 and 2000 showed respirable quartz concentrations were well below consent limits and national and regional guideline values. The Otago Regional Council subsequently authorized the cessation of this monitoring.

COMPLAINTS

- 57 OGNZL records complaints received from the public regarding dust discharges from the Macraes Gold Project site. Most historic complaints relate to dust from the Mixed Tailings Impoundment during high winds. OGNZL has implemented control procedures to control dust from the edges of the facility which have remedied the issue.

⁵ Beca Ltd "*Depositional Dustfall Exceedance Report – OceanaGold Macraes Mine*" letter dated 18 May 2020.

⁶ Beca Ltd "*Depositional Dustfall Exceedance Report – OceanaGold Macraes Mine*" letter dated 18 May 2020.

58 Only one dust-related complaint was received between 2014 and 2019. This complaint (received 15 September 2018) involved dust in the vicinity of Coronation affecting a residence on Horse Flat Road. OGNZL found that the cause of the dust was a malfunctioning water truck - which was immediately repaired.

SUMMARY OF CURRENT MINING DUST EFFECTS

59 From the results of monitoring and the complaints records, I have summarised the effects of the current mining operation as follows:

- While deposited dust levels have increased compared to background levels, at most monitoring locations consent limits have not been exceeded. Levels are consistently below consent limits where people live (e.g Macraes Village).
- TSP concentrations are generally below the consent limit. Where higher concentrations have been recorded, these have been due to causes other than mining (mainly the instrument measuring moisture as particulate).
- PM₁₀ and respirable quartz concentrations are low.
- Dust related complaints are infrequent and relate mainly to the Mixed Tailings Impoundment. Only one complaint has been recorded since 2014.

POTENTIAL RANGE OF DUST DEPOSITION EFFECTS

60 In general, mining dust emissions are comprised of larger particles. The larger the particle, the less distance it is likely to travel from the source. Based on research, dust deposition is unlikely to occur to any significant degree beyond approximately 100- 200 m from the source.

61 However, local environmental conditions can influence the range of potential dust deposition. Areas with high winds or complex topography may increase the range over which dust deposition can occur. The Macraes site is subject to high winds with large open cast mining and elevated dust sources. Therefore, I consider that areas within 1 - 2 km of mining may be affected by dust under worst case conditions, if appropriate mitigation measures such as those employed by OGNZL are not implemented.

EFFECTS OF CONSTRUCTION OF PROPOSED DEEPELL PROJECT

- 62 The proposed Deepdell project will be located to the southeast of the existing Coronation Pit, approximately 1.1 km to the northeast of the Howard residence and 4.8 km northeast of the Vanderley residence. These residences will be downwind from the proposed development during northeast winds. Winds from this direction occur approximately 12% of the time with wind speeds from the northeast that can entrain dust (greater than 5 m/s) occurring for 0.8% of all hours. Due to the large distance from the mine, the nature of the topography between the mine and the houses and the low percent of wind speeds that are able to blow dust towards the Howard and Vanderley residences, I consider it is unlikely that these residences will be adversely affected by dust arising from the construction and operation of the proposed Deepdell project, providing the mitigation measures currently carried out by OGNZL continue to be used.
- 63 The proposed project is located approximately 3.6 km to the north of the O'Connell residence. Winds blowing towards the O'Connell residence from the project area occur approximately 12% of the time, with high wind speeds from the north occurring approximately 0.3% of the time. Due to the large distance from the mine and the low percentage of wind speeds that are able to blow dust towards the O'Connell residence, I consider it is unlikely that the O'Connell residence will be adversely affected by dust arising from the construction of the proposed Deepdell project.
- 64 The predominant westerly quarter winds will blow dust generated from the proposed Deepdell project towards rural farmland which is leased by OGNZL to B. O'Connell (approximately 150 m to the east of the pit) and R. O'Connell (approximately 750 m to the south east of the pit). I consider that if dust is not controlled, there is a potential for this farmland in close proximity to the Deepdell WRS to be affected by dust. I discuss the potential effects of dust on vegetation in Paragraph 67.
- 65 The sides of the Deepdell East WRS will be progressively re-vegetated as it is constructed during the life of the mine. I consider that this should minimise the discharge of dust from the WRS.

EFFECTS OF EMISSIONS FROM HAUL ROAD

66 The existing haul road will be located approximately 1.1 km to the northeast of the Howard residence. As the frequency of winds blowing towards the Howard residence, with a wind speed of over 5 m/s, is approximately 0.8% and the residence is located well beyond the distance that dust would be expected to travel from the haul road, if appropriate mitigation measures are carried out, I do not consider nuisance effects will occur. OGNZL proposes to continue to use the standard mitigation methods for dust suppression on the haul road such as keeping the road surface damp and limiting vehicle speeds, but not to 20 km/hr as suggested in the Section 42 A Report and Mr Iseli's evidence. I discuss this later in my evidence.

EFFECTS OF EMISSIONS FROM BLASTING

67 Immediately after blasting, there will be a discharge of combustion contaminants and dust from the fractured rock. These emissions will dissipate quickly, and I consider it is unlikely that they will have any measurable effect on air quality beyond the boundary of the site.

EFFECTS ON VEGETATION AND FARM ANIMALS

68 High levels of dust deposition can adversely affect vegetation by interfering with plant photosynthesis, promoting weeds and disease and reducing the efficacy of fertilizer or pesticide applications. Excessive dust may also promote disease or health problems in farm animals. The proposed Deepdell mine area will be bounded by properties leased by the Peddies, Howards and O'Connells. The proposed mining activities will be the same in nature and scale as those carried out in the existing Coronation Project area. OGNZL owns and farms all of the land around the existing Macraes Gold Project area and has not experienced any adverse effects from dust on vegetation or animals to date. On this basis, I do not expect any significant adverse effects from the proposed Deepdell project.

EFFECTS ON HUMAN HEALTH

69 The finer fractions of dust emissions from mining (such as PM_{10} and $PM_{2.5}$) can potentially cause adverse human health effects. Dust from earthworks and mining are typically comprised of the larger particle sizes which have minimal

impact on human health as they have only limited penetration into the respiratory tract.

- 70 The major sources of fine particulates at the mine are from vehicle exhausts. The results of PM₁₀ and PM_{2.5} monitoring by OGNZL show that concentrations in the area of the Macraes Gold Project were low and below national standard and regional guideline values. The emissions from vehicles will occur from locations spread over a large area and will be widely dispersed before they reach the boundary of the site. Beyond the boundary, these emissions will be dispersed further before the contaminants reach any residences downwind of the mine. I do not consider that the concentrations of fine particulate in the vicinity of the proposed Deepdell project will change significantly and I anticipate no significant adverse effects on public health as a result.

POTENTIAL CUMULATIVE EFFECTS

- 71 There is potential under northwesterly and southeasterly wind conditions for the discharges of dust from the proposed Deepdell project to combine with the discharges to air from the existing Coronation North Project, Coronation Project and Macraes Gold Project mining activity to create cumulative effects. However, the mining areas are approximately 1 km apart and the dust plumes are not expected to combine to any substantial degree.
- 72 During the predominant westerly quarter winds, the dust from the mining areas will not combine at all.
- 73 OGNZL proposes to continue to use the dust control methods that have been successful to date at the site. Providing these measures are diligently carried out, I consider that any cumulative increases in dust discharges at the site will be minimised and effectively mitigated.

PROPOSED MONITORING AND CONSENT CONDITIONS

- 74 The current ambient air monitoring programme for the Coronation, Coronation North and Macraes projects includes three sites that are also in the vicinity of the proposed Deepdell project, one of which (Site 24) is a background site. Site 7 is located to the southwest of the proposed project and Site 17 is located to

the northwest. I do not consider any additional monitoring sites are necessary for the proposed activity.

75 I consider that the conditions of Consent RM16.138.19 granted for the Coronation North Project are appropriate conditions for the proposed Deepdell Project. I do not consider that any changes to the monitoring conditions and performance standards in the existing consent are necessary in the Deepdell consent. I will discuss the additional conditions that are recommended in the Section 42A report and Mr Iseli's evidence later in my evidence.

OVERALL CONCLUSIONS ON POTENTIAL EFFECTS FROM THE DEEPELL PROJECT

76 I have drawn the following overall conclusions from my assessment of the potential effects of the proposed Deepdell project:

- The proposed mining activity is of a relatively small scale compared to the activities currently taking place at the Coronation, Coronation North and Macraes Gold Projects.
- The nature of the proposed activities will be the same as the activities currently taking place at the Coronation, Coronation North and Macraes Gold Projects.
- The results of site monitoring and audits, as well as the very low number of recent complaints, demonstrate that measured dust levels resulting from existing mining activities are within the limits set by the current resource consents and the existing effects of the mine are no more than minor.

77 OGNZL intends to continue to use the dust mitigation techniques that have been used successfully to date at the Coronation and Macraes Gold projects. Given the scale of the proposed additional mining activities associated with the Deepdell project, relative to the scale of existing activities, I consider that any increase in the nature and scale of effects of dust emissions from the extension of the current activities will be minimal.

78 Provided the proposed mitigation measures and monitoring are undertaken diligently during the construction and operation phases of the project, it is my

opinion that any adverse effects from the proposed activities will be no more than minor.

RESPONSE TO SUBMISSIONS

- 79 Two submissions were received regarding the potential adverse effects of dust from the proposed activities.
- 80 The submission from Macraes Community Incorporated opposes the application and mentions dust as one of a number of issues of concern. This submission notes ongoing concerns about the lack of past and present monitoring and the failure of OGNZL to meet past consent conditions.
- 81 I have discussed the results of site dust monitoring and compliance with consent limits in my evidence. Overall, I consider that the current and proposed monitoring to be appropriate for the existing and proposed mining activity and note the very good compliance record of OGNZL in this regard. I therefore disagree with the concerns expressed in the Macraes Community Incorporated submission but wish to reiterate the importance of ongoing monitoring of dust at the site to ensure mitigation measures are effective.
- 82 The submission from Mr Neil Roy raises the issue of dust but notes that the probability of dust effects from the mine has been reduced so that there is no effect on permanent residents. I concur with Mr Roy's conclusion in this regard.

RESPONSE TO SECTION 42A REPORT AND MR ISELIS EVIDENCE

- 83 I have read the review of the application carried out by Mr Iseli of Specialist Environmental Services (SES) on behalf of the Otago Regional Council and the Section 42A Report. I concur with the majority of the conclusions in Mr Iseli's evidence and the Section 42A Report but wish to comment on the additional conditions that are recommended.
- 84 Mr Iseli and the Section 42A Report recommend that continuous TSP monitoring is carried out in the vicinity of the Howard residence at least for the initial period of development. Mr Iseli was concerned that dust from vehicle movements on the haul road, construction of the bund and overburden stripping may cause finer particulate matter to cause adverse effects at the Howard property.

- 85 I acknowledge that Mr Iseli's evidence and the Section 42A Report were both prepared prior to the Howards providing their written approval to the consent application and that the authors of those reports were not aware that the effects on the Howard property cannot now be considered.
- 86 It is my opinion, that due to the separation distance between the Howard residence and all of the other nearby residences and the Deepdell Project area, the infrequency of winds that have the potential to blow dust towards neighboring properties and the proven effectiveness of the dust control methods currently carried out by OGNZL, that TSP discharges due to the Deepdell Project are very unlikely to cause any adverse effects on neighboring properties and monitoring of TSP at the Howard residence during the initial stages of the Project is unnecessary. I do note however that OceanaGold is willing to accept this recommendation for monitoring TSP to address concerns of the community that may remain.⁷
- 87 Mr Iseli and the Section 42A Report also recommend that a vehicle speed limit of 20 km/hr is imposed on the section of the haul road to the east of the Howard residence in order to minimise the potential for dust from the site to adversely affect the Howard property. OGNZL has informed me that this would cause a significant disruption to the efficient flow of vehicles on the haul road. It is also, in my opinion, unnecessary to impose a blanket low speed restriction on a section of road which is upwind of neighbouring properties infrequently. OGNZL has a Dust Management Plan which includes methods for reviewing dust emissions and for implementing additional controls when necessary. OGNZL will continue to proactively employ additional dust mitigation methods to reduce dust discharges from roads and other sources of dust at the mine, such as increasing the quantity of water used as a dust suppressant, resurfacing the road or reducing vehicle speeds for a limited period until conditions change. These measures should be effective at minimising the potential for any adverse effects due to dust generated by vehicles on the haul road. I therefore do not support the inclusion of a condition which imposes a speed limit of 20 km/hr on the haul road in the vicinity of the Howard property.

⁷ The submission by MCI.

88 Finally, Mr Iseli and the Section 42A Report recommend that overburden stripping and bund construction activities are restricted when winds from the northeasterly quarter exceed 5 m/s. My opinion on this proposed condition is similar to my opinion on the proposal to limit vehicle speeds. If OGNZL identifies that overburden stripping and bund construction activities are creating excessive dust, OGNZL will make a decision on the best way to mitigate the effect in accordance with the site Dust Management Plan. This may include ceasing the operation in full or in part or taking other dust control measures such as watering exposed surfaces. I therefore do not support the inclusion of a restriction on all overburden stripping and bund construction activities in strong northeasterly quarter winds as proposed by Mr Iseli and the Section 42A Report.

CONCLUSIONS

- 89 OGNZL is proposing to re-mine and extend the current Deepdell North Pit, backfill the existing Deepdell South Pit and construct a new waste rock stack (WRS).
- 90 Mining of the Deepdell North Pit is expected to commence in October 2020 and will add an additional two years to the Macraes Gold Project's life.
- 91 The proposed Pit area will be mined using the same equipment and processes currently used in other areas of the Macraes Gold Project. No additional equipment will be used and overall, the level of mining activity will not increase.
- 92 The site is approximately 1.1 km southwest of the nearest residence and 7 kilometres from Macraes Village.
- 93 OGNZL will continue to use a suite of standard dust control measures to avoid and mitigate dust discharges from the site that have proven to be effective at other areas of the Macraes Gold Project. I consider that these measures represent the best practicable option. These control methods are included in Dust Management Plan prepared by OGNZL.
- 94 I do not support the recommendation to monitor TSP concentrations in the vicinity of the Howard residence or the inclusion of conditions which limit vehicle speeds on the haul road to a maximum of 20 km/hr in the vicinity of the

Howard property or the restriction of stripping of overburden or the construction of bunds in strong northeasterly quarter winds.

- 95 I consider that providing the proposed mitigation methods are diligently carried out any adverse effects of discharges of dust from the proposed Deepdell North Stage III Project should be adequately avoided, remedied or mitigated to the extent that any adverse effects on the environment including health and nuisance effects, to be no more than minor.

Prue Harwood

Date: 4 August 2020

Attachment A

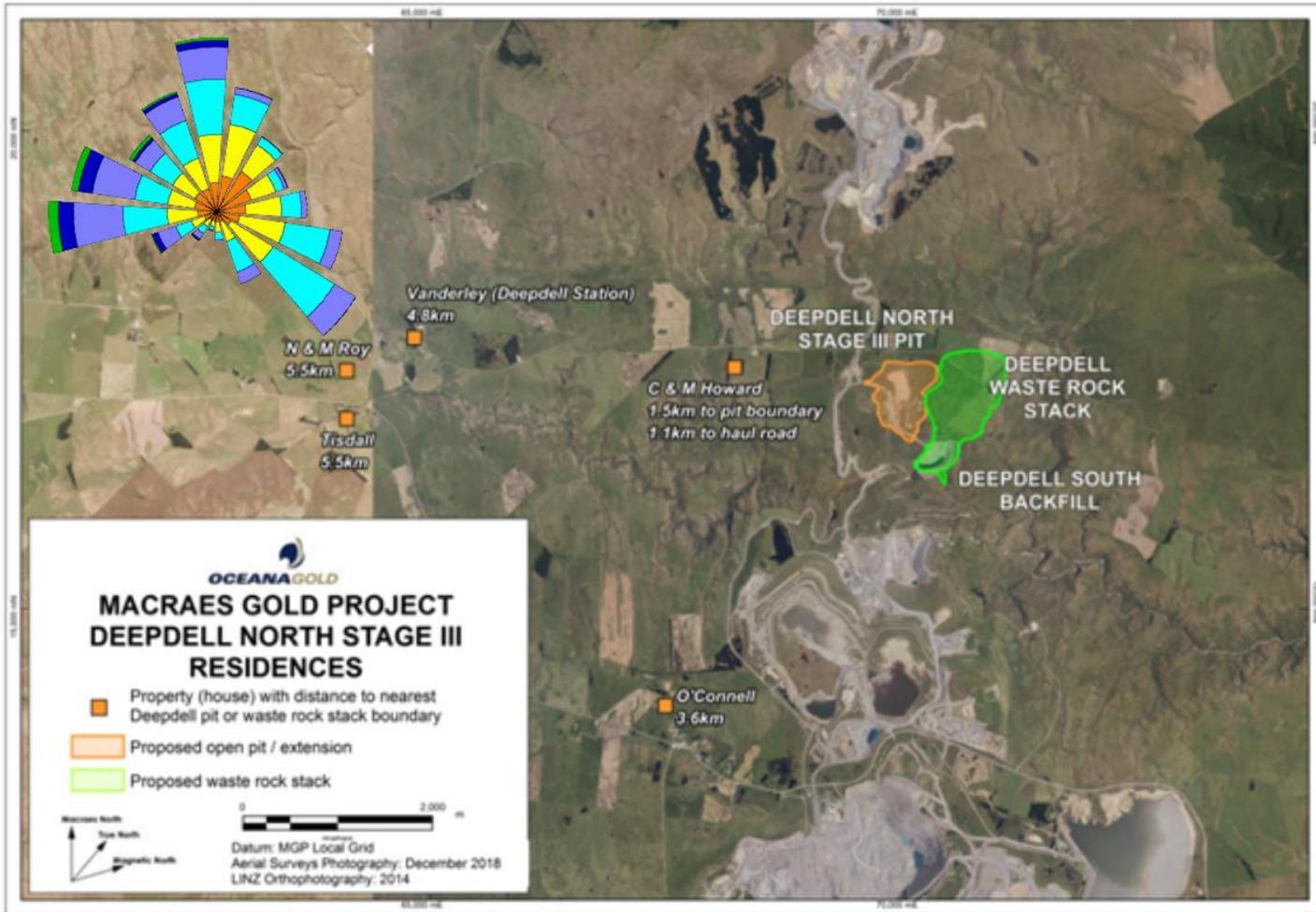


Figure 1: Aerial photograph of proposed project area, showing the locations of the closest houses overlaid with the site windrose for 2012 – 2018 (oriented to Macraes north) (background image provided by OGNZL) (reproduced from Figure 2-5 of the Beca AEE)

Attachment B

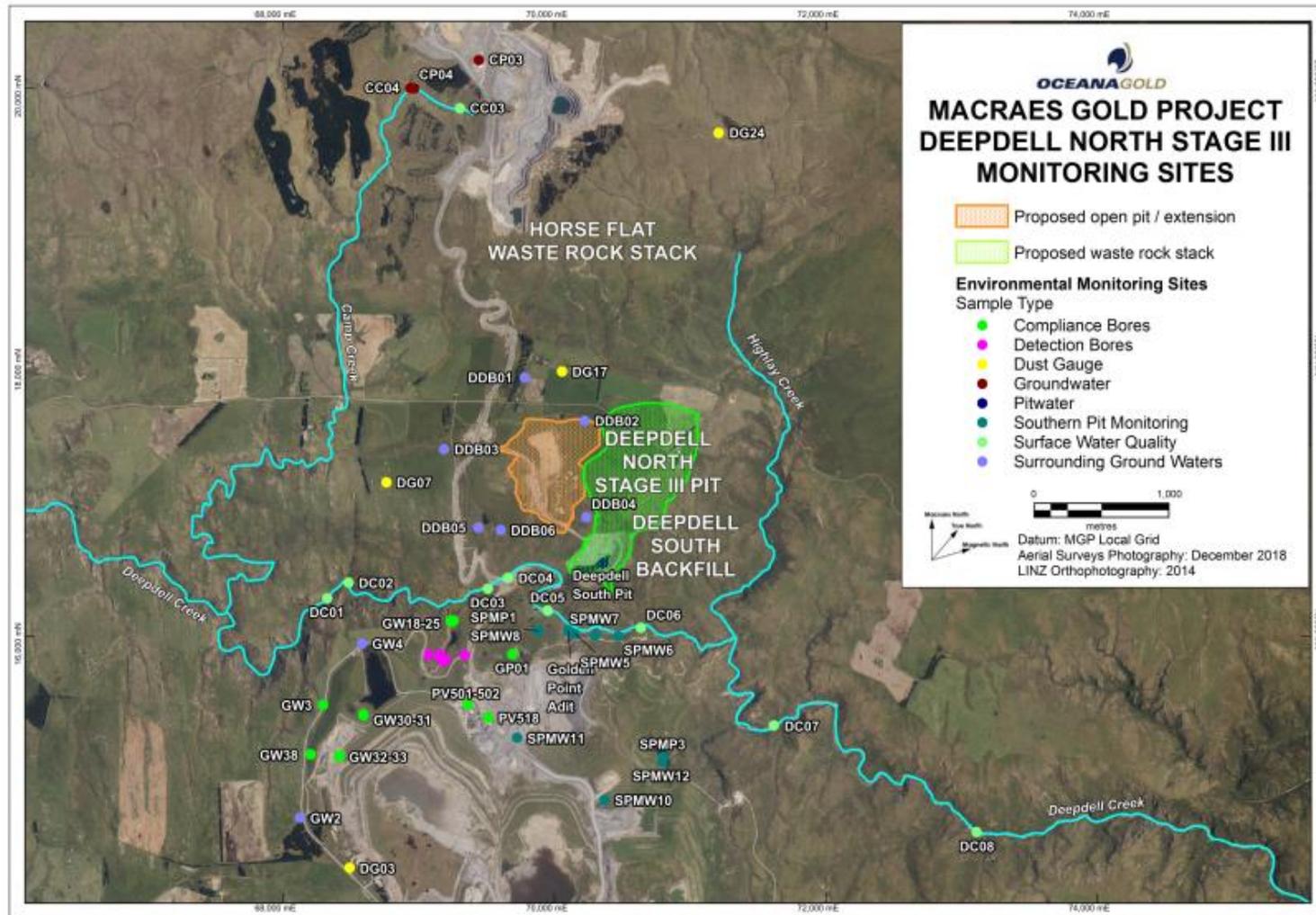


Figure 2: Aerial photograph showing locations of deposited dust and TSP monitoring sites in the vicinity of Deepdell North Stage III (figure supplied by OGNZL) (reproduced from Figure 6-1 of the Beca AEE)

Attachment C

Table 1: Summary of background insoluble deposited dust values and TSP concentrations for 2016 to 2019

	2019 ⁸	2018 ⁹	2017 ¹⁰	2016 ¹¹	2019	2018 ⁹	2017 ¹⁰	2016 ⁴
Minimum	0.2	0.1	0.2	0.2	4.3	1.6	0.0	0.0
Average	0.6	1.0	0.9	0.4	19.6	12.3	10.1	8.3
Maximum	1.4	3.6	2.3	0.7	371.1	100.1	156.1	191.3

⁸ Beca Ltd “*Macraes Mine – Summary of Ambient Air Monitoring Results for 2019*” prepared for Oceana Gold (New Zealand) Limited, May 2020.

⁹ Beca Ltd “*Macraes Mine – Summary of Ambient Air Monitoring Results for 2018*” prepared for Oceana Gold (New Zealand) Limited, April 2019.

¹⁰ Beca Ltd “*Macraes Mine – Summary of Ambient Air Monitoring Results for 2017*” prepared for Oceana Gold (New Zealand) Limited, April 2018.

¹¹ Beca Ltd “*Macraes Mine – Summary of Ambient Air Monitoring Results for 2016*” prepared for Oceana Gold (New Zealand) Limited, 2017.