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29<sup>th</sup> October 2024

Otago Regional Council  
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Attention: Shay McDonald  
Senior Consents Planner

**Memorandum: Technical Peer Review of the Assessment of Effects of Discharges to Air: Oceana Gold NZ Ltd Macraes Mine MP4 Expansion**

**Preliminary**

Oceana Gold NZ Ltd (**OGL**) operates a large existing open cast and underground gold mine at Macraes Flat, Otago. OGL is seeking a resource consent for the discharges to air from mine extensions as follows:

- at the Coronation Pit (Stage 6),
- backfilling Coronation North Pit to the north,
- backfilling in Golden Point Open Pit,
- extension of Innes Mills Pit (Stages 9-10),
- backfilling of Frasers and Innes Pits and development and operation of Frasers Tailings Storage Facility (**FTSF**) all in the main central mine area, and
- extension of Golden Bar Pit (Stage 2) and associated waste disposal to the south.

The proposed mine extensions and associated waste and tailings disposal features are predicted to increase the life of the mine by approximately three years and are collectively called the Macraes Phase 4 Stage 3 development project (**MP4**).

The project generally involves mining of waste rock and ore, the transportation of material and the disposal of waste rock in stacks or backfilling of retired and active pits. The mining operations will move around the site and the mining machinery will be redeployed in new locations as required. The application states that only one additional excavator is planned, therefore the level of mining activity from the whole site will remain of similar scale but occur in different locations.

Beca Ltd (**Beca**) has prepared an assessment of effects (**AEE**) of the discharge to air from the MP4 mine expansion. The initial review of the AEE resulted in a further information request being sent to the applicant. The applicant provided a response dated 4<sup>th</sup> October 2024 (the **Beca RFI response**).

The Otago Regional Council (**ORC**) has commissioned Specialist Environmental Services Limited (**SESL**) to undertake a technical review of the assessment of effects of the discharges to air from the proposal. This memorandum report reviews the assessment prepared by Beca, including the RFI response, and specifically responds to questions raised by the ORC processing planner. SESL's comments in relation to these ORC questions is detailed in the following sections.

The technical review has been undertaken by the author, John Iseli, on behalf of SESL. I have over 31 years of experience in the field of air quality in New Zealand and have undertaken numerous assessments and reviews relating to discharges to air, including from several mining and quarrying operations. I have acted as peer reviewer for a number of previous OGL applications at the Macraes mine site, including the Frasers West, Golden Point Underground and Deepdell applications. I confirm that the findings expressed in this report are my own conclusions and I have not delegated review work to any other party.

I visited the existing mine site on 11<sup>th</sup> June 2024, along with ORC staff and other peer reviewers. We were shown the various MP4 mining areas by OGL staff. I was also able to observe the locations of the nearest existing dwellings and other sensitive receptors to the proposed mine sites and haul roads.

***ORC Q1: Is description of the site, including meteorological conditions, sufficient to form an appropriate basis for the assessment of effects? Please explain.***

The proposed sites have been described in detail in the Beca AEE. The various mining activities included in the MP4 proposal are dispersed widely across the Macraes mine site. The activities generally occur within or adjacent to areas where mining has occurred or is still occurring.

The AEE has identified the separation distances from each of the proposed activity areas to the nearest sensitive receptors, primarily rural dwellings. I agree that these separation distances are approximately correct, noting my comments regarding receptors to the east of Macraes village discussed below.



Meteorological monitoring occurs at sites DG03 and DG15 close to the village. Beca has provided wind roses of the recorded data for 2018 to 2022, as shown in the figure below. The wind roses indicate that prevailing winds are from the southwest, northwest and northeast quarters. The strongest winds blow from the northwest and southwest quarters.

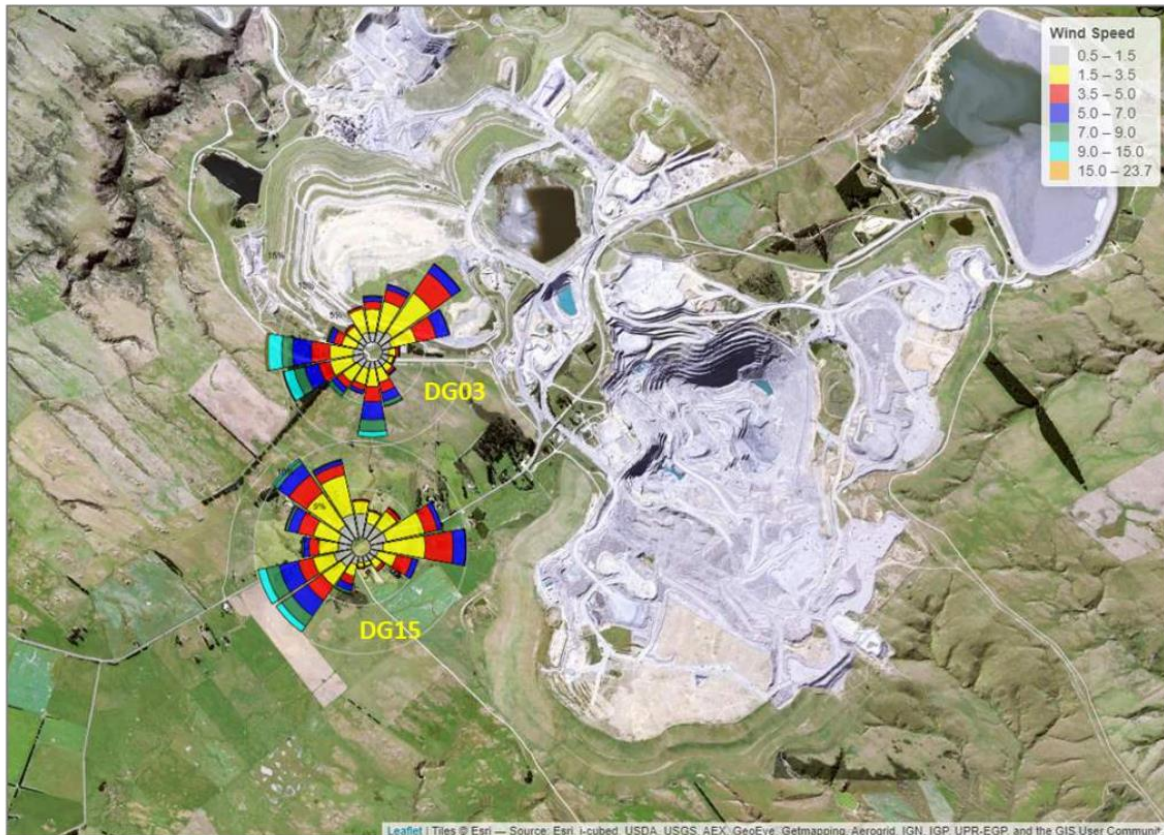


Figure 6-2. Sites DG03 and DG15 windroses (hourly averages) from 1 January 2018 – 31 December 2022 (Met data provided by OGNZL).

The analysis of local wind conditions indicates that light to moderate strength winds from the eastern quarter are common. These winds will blow from the large area of central mining activity (Fraser's and Innes Mills) towards Receptor R1 and the village for approximately 31% of the time, based on the DG15 (Macraes village) data.

Beca notes that winds from this direction have greatest potential to transport dust at wind speeds greater than 5m/s. Based on the DG15 data, these winds occur for approximately 2.7% of the time. The figure below, reproduced from the Beca AEE, shows the wind roses when only wind speeds greater than 5m/s are included.

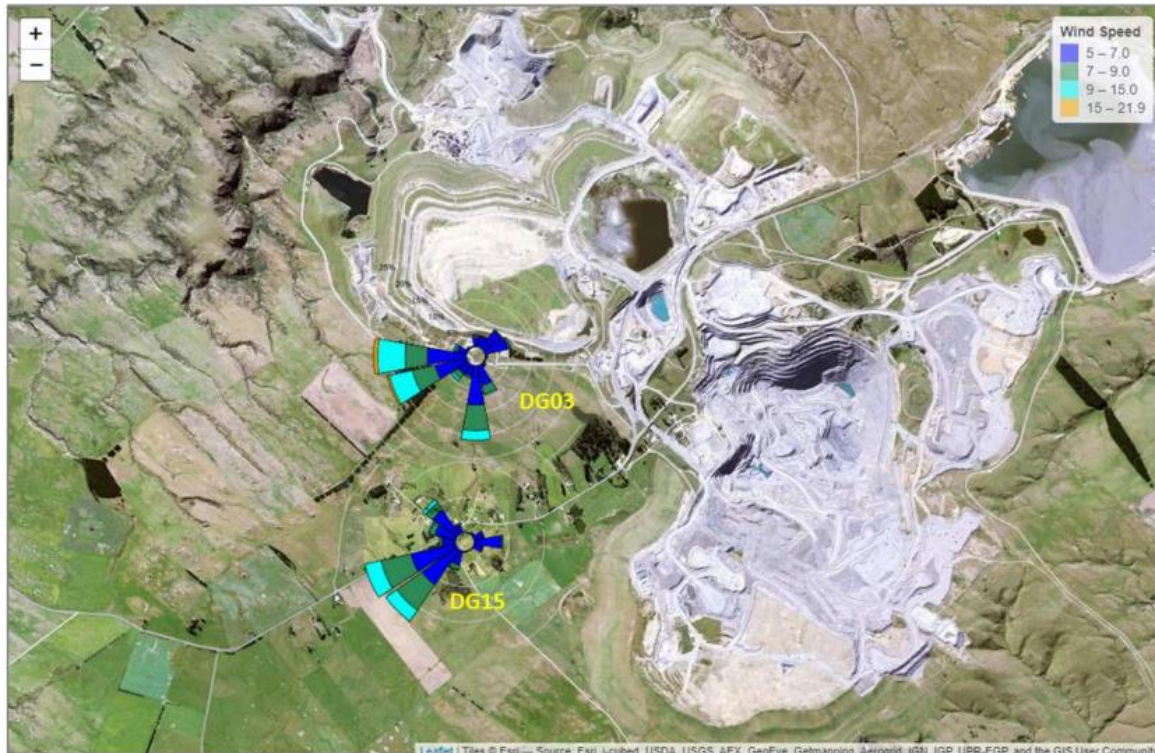


Figure 6-3. Sites DG03 and DG15 wind roses (hourly averages) of wind speeds >5m/s from 1 January 2018 – 31 December 2022(Met data provided by OGNZL).

In general terms I agree with Beca that wind speeds of greater than 5m/s have the greatest potential to transport dust for significant distances, particularly in relation to entrainment of dust from the large areas of exposed surfaces involved. However, I note that some activities undertaken will generate relatively fine particulate matter with potential to be transported significant distances, even at lower wind speeds, when dry conditions prevail. In relation to this application, the haul road serving the Innes Mills and Frasers pits is a potentially significant dust source that can generate finer particles subject to transport for substantial distances, even at lower wind speeds, if appropriate mitigation is not applied.

The Good Practice Guide for Assessing and Managing Dust<sup>1</sup> (**GPG Dust**) notes that vehicles travelling over paved or unpaved surfaces pulverise any surface particles. These particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents due to turbulent shear between the wheels and the surface. Dust particles are also sucked into the turbulent wake created behind the moving vehicles.

I note that the low annual rainfall and relatively high average wind speeds contribute to the dust generating potential of mining activities in this area. However, there are large separation distances to sensitive receptors that are downwind of the proposed sites during the prevalent strong westerly and southwesterly winds.

<sup>1</sup> Ministry for the Environment, 2016. Good Practice Guide for Assessing and Managing Dust. Wellington, 2016.



Overall, I am satisfied that the description of the activities, the site and meteorological conditions is appropriate for assessment purposes.

***Q2: Is it appropriate to base assessment on current monitoring and mitigation rather than modelling? Please explain.***

The assessment follows a similar approach to previous applications, undertaking a qualitative assessment based on analysis of monitoring and complaints data and the observed effectiveness of mitigation for the existing mining activities. A specific evaluation of **FIDOL** factors (frequency, intensity, duration, offensiveness and location) has been carried out in relation to the location of identified sensitive receptors.

This assessment approach is generally consistent with guidance provided in the GPG Dust. Dispersion modelling of particulate matter (**PM**) discharges has little value for this type of activity where the emission rate can be highly variable depending on the effectiveness of mitigation.

***Q3: Does the application adequately identify sensitive areas and receptors and correctly categorise their sensitivity? Please explain.***

Sensitive receptors are identified in Table 4-1, page 23 of the Beca AEE. Further information was sought in relation to identification of receptors east of the village. The Beca RFI response confirmed that the dwelling identified as Receptor R9 is a shed on land owned by OGL. Therefore, the closest habitable existing dwelling to mining activities east of the village is R1.

I consider that the potentially most impacted sensitive receptors (dwellings) are:

- R1 (1668 Macraes Road) approximately 650m west of the haul road and 1km west of the Innes Mills MP4 area;
- R5 (406 Horse Flat Road) approximately 1km west of the haul road and 2.2km south of Coronation Pit.

Other sensitive receptors in the vicinity of Macraes Village are at greater distance from mining activities than R1. The Macraes Moonlight School is approximately 1.8km from the proposed sites.

Beca has classified the school as high sensitivity and the dwellings as medium-high sensitivity. I agree that the school has high sensitivity to PM discharges from mining. I also agree that isolated rural dwellings will have moderate to high sensitivity to dust from mining activities, as indicated at page 24 of the GPG Dust.

The location of receptors in the Macraes village area is shown in the image below, taken from the Beca AEE. Note that R9 (shed) is no longer classified as a sensitive receptor and the correct address for R1 has been confirmed by Beca as 1668 Macraes Road.



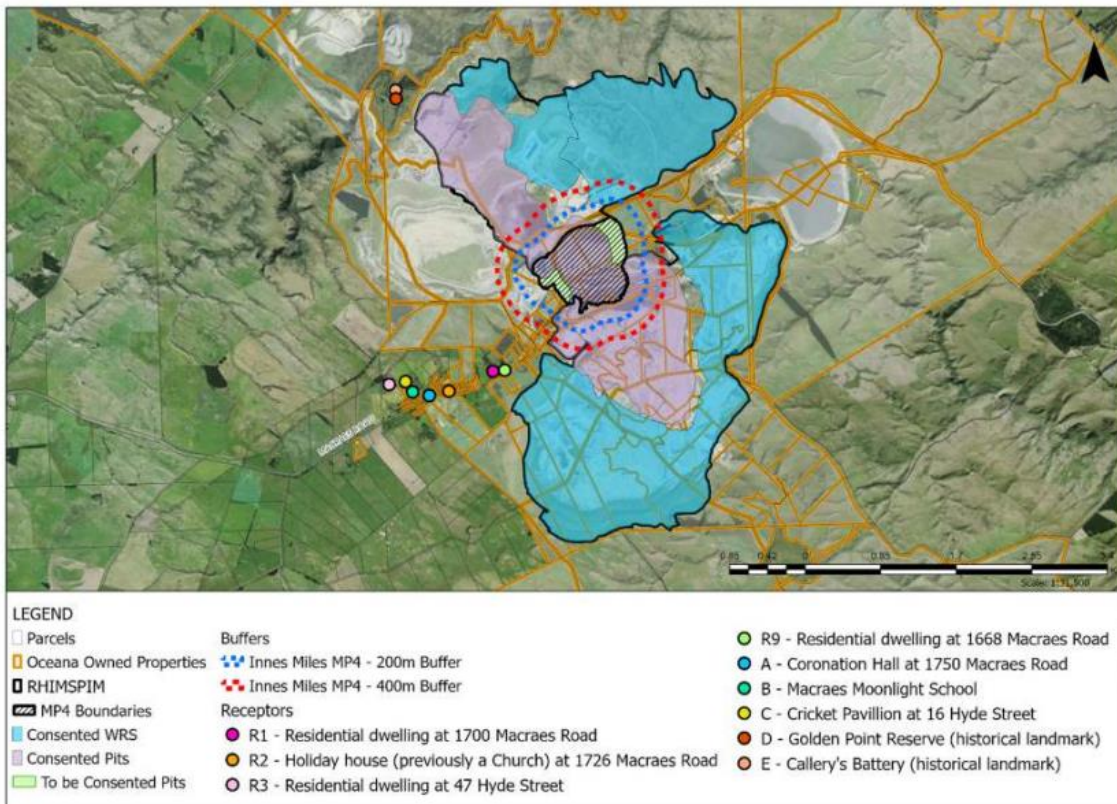


Figure 3-4. IM and Frasers Pit sensitive receptors

A more detailed view of the village receptors is shown below.

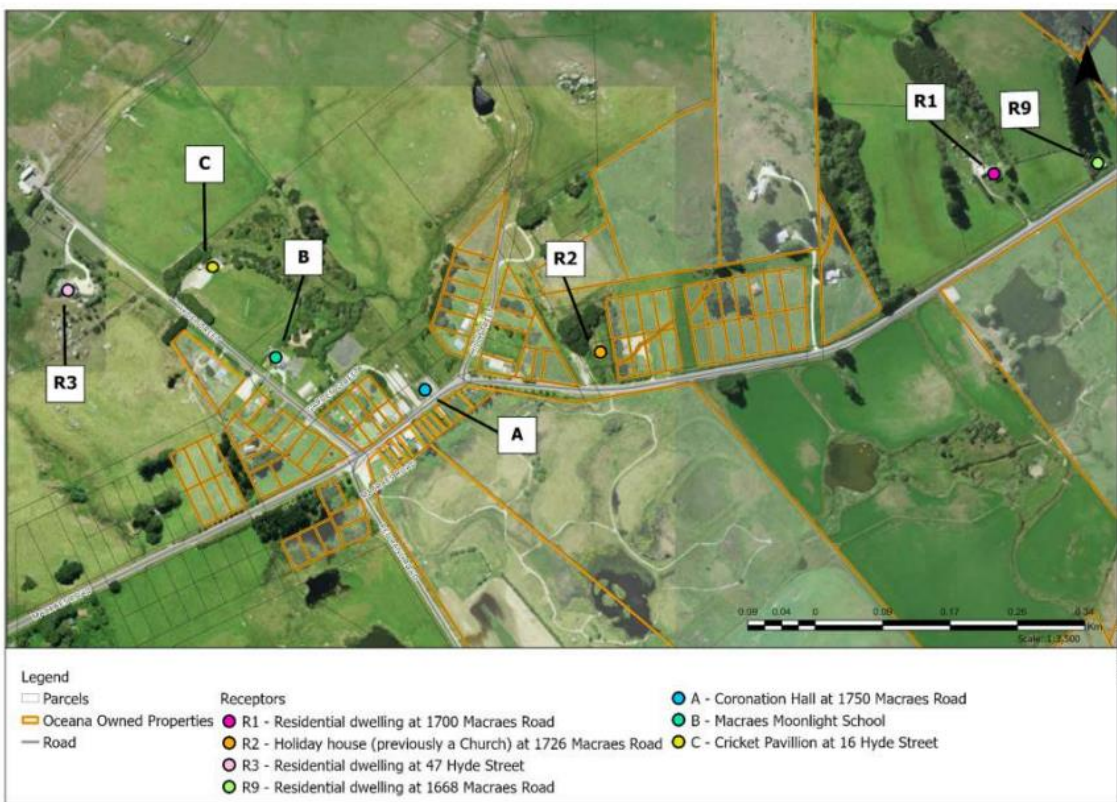


Figure 3-5. Location of Macraes township sensitive receptors



The location of receptor R5 at Horse Flat Road is shown in the image below, taken from the Beca AEE. The location of the haul road is visible.

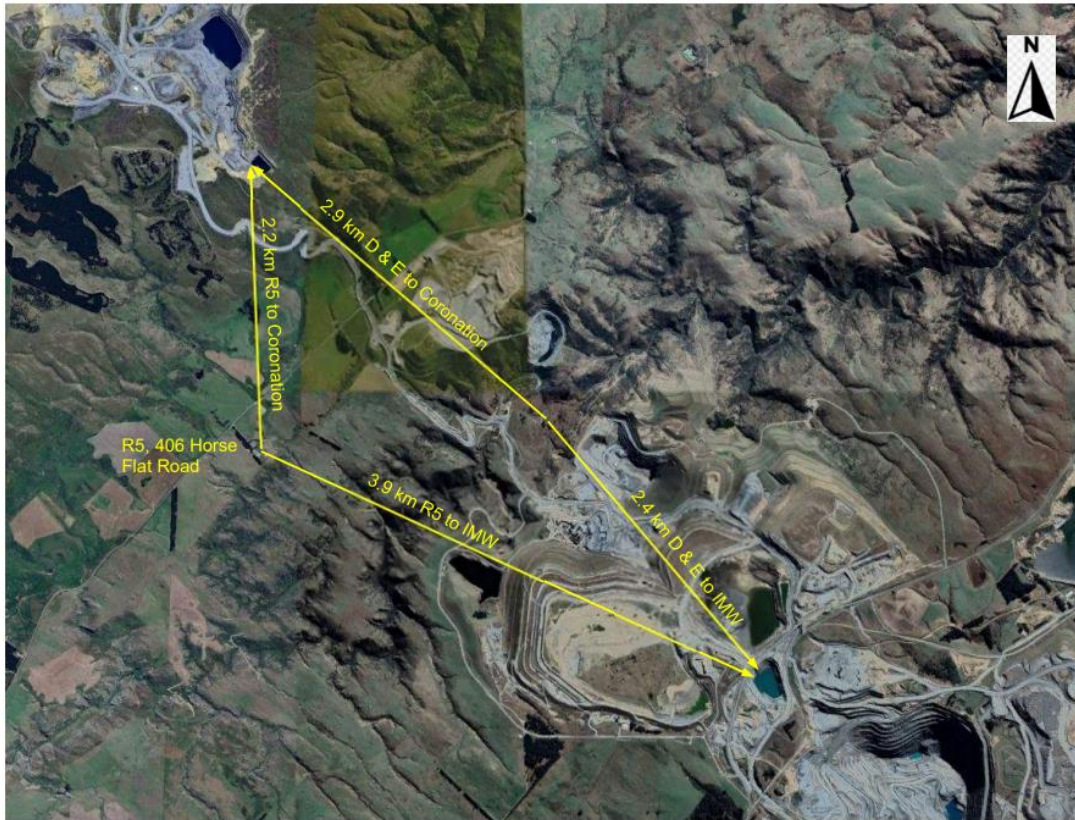


Figure 3-3. Receptor R5, D & E separation distances

Two dwellings are shown on aerial photographs that are located on land owned by OGL to the east of R1. These dwellings are shown on the image below, provided by OGL in response to my enquiry. OGL has provided evidence that the dwelling at 1644 Macraes Road is a derelict house. I am satisfied that this dwelling is unlikely to be occupied.

The other dwelling is the Gay Tan Historic Cottage. The cottage has historic value but is unlikely to be occupied based on the interior photographs provided.

I consider that the location of sensitive receptors has been appropriately identified by Beca for assessment purposes.



***Q4: Beca assessment says it excludes dwellings on land owned by OGL. It is not clear if these dwellings are leased to someone else i.e. the occupier is not the OGL company. Once this is clarified, have the effects on these occupying persons been adequately assessed? Please explain.***

Further information has been sought on this matter. My response to the previous questions clarifies the status of the existing dwellings east of R1.

In the RFI response, Beca stated that the assessment applies to Macraes village generally, including interspersed dwellings owned by OGL. I note that R1 (not owned by OGL) is the closest sensitive receptor to the proposed MP4 mining activities. My technical review has considered effects on all occupied dwellings in the village area.

***Q5: Is the assessment that air shed 5 is not a polluted airshed correct? Please explain.***

Various polluted airsheds have been gazetted in Otago that focus on township areas that are affected by PM<sub>10</sub> emissions from domestic fires. The mine location and Macraes Village fall well outside those polluted airsheds. I am satisfied that background concentrations of primary contaminants will be small in this rural area.

***Q6: Is the description of background air quality sufficient and is it based on appropriate data and/or reasonable assumptions? Please explain.***

The description of background air quality has relied on dust deposit gauge monitoring and total suspended particulate (TSP) monitoring that has occurred at various locations adjacent to the exiting mining areas over an extended period of time. Updated TSP



monitoring data for 2022 and 2023 have been provided. I am not aware of other recent relevant monitoring data that has been excluded.

Deposition gauges DG02, DG11 and DG15 have been identified as most relevant to the MP4 activities. Monitoring indicates that for the majority of the time during 2019 to 2022 deposition has been within the consent limit of  $3\text{g}/\text{m}^2/30$  days above background. Infrequent exceedances were described as due to fertiliser spreading and bird droppings in the gauge. Dust deposition monitoring has limited value and is primarily used to indicate long term trends. More useful information is generally provided by TSP and  $\text{PM}_{10}$  monitoring.

TSP monitoring data (24-hour average) for sites DG15 (Macraes Village), DG11 (south of R1) and DG07 (Horse Flat Road near R5) during 2022 and 2023 has been provided in the Beca RFI response. Occasional exceedances of the existing consent limit ( $120\mu\text{g}/\text{m}^3$  TSP, 24-hour average) occurred during this period. Beca notes that there were several times where the monitor indicated the limit was exceeded when the humidity was 100%, indicating that the optical monitoring method (nephelometer) was likely measuring water aerosols. Beca further states that review of days where the TSP concentration measured at DG15 was over  $120\mu\text{g}/\text{m}^3$  has shown that none of the exceedances related to mining activities.

The GPG Dust suggests TSP trigger levels for moderate sensitivity receiving environments of  $80\mu\text{g}/\text{m}^3$  (24-hour average) and  $250\mu\text{g}/\text{m}^3$  (1-hour average). These trigger values have been applied to monitoring at DG07 and DG11 under other OGL consents. Beca accepts in the RFI response that these trigger values are also appropriate for monitoring at DG15 near the village.

Excluding the limit exceedances not due to mining activities, Beca stated that there would have been 12 trigger events above  $80\mu\text{g}/\text{m}^3$  (24-hour average) during 2022-2023 at DG15. Beca considers that some of these events are likely to relate to non-mining activities in the area or humidity effects as has been found with the consent limit exceedances. Analysis of TSP trigger events above  $250\mu\text{g}/\text{m}^3$  (1-hour average) has not been provided.

In the RFI response, Beca states:

*“The TSP concentrations presented in the Dust GPG are trigger values and are not intended to be compliance limits. The GPG states “These triggers are intended to be used for the proactive management of dust on site. They are not intended to be used for enforcement because exceedance of trigger levels does not necessarily infer an adverse effect offsite.” As discussed above, the current dust management practices are complying well with consent limits and also maintain low occurrences of exceedances of the TSP trigger level of  $80\mu\text{g}/\text{m}^3$ . Therefore, whilst it is not necessary to suggest a compliance limit related to the Dust GPG trigger values, having this trigger limit will mean the site will operate in keeping with good practice in so far as managing potential mining related exceedances.”*



Overall, I agree that the TSP monitoring data indicate that PM emissions from mining activities have generally been within acceptable levels to prevent dust nuisance effects. The complaints record supports this view. However, I note that 1-hour average TSP data have not been provided. This would provide useful information regarding short-term dust events. I also agree that TSP trigger levels should be applied to the monitoring sites to require OGL to respond to detected dust events.

OGL undertook monitoring of PM<sub>10</sub>, PM<sub>2.5</sub> and Respirable Crystalline Silica (**RCS**) in accordance with Consent 96785 at four sites around the Macraes mine during the summers of 1998-2000. The 24-hour average RCS concentrations reported indicate that annual average RCS concentrations at sensitive receptors are unlikely to exceed the long-term reference exposure level of 3µg/m<sup>3</sup> (annual average).

The PM<sub>10</sub> monitoring around the existing mine for the summers of 1999 and 2000 observed concentrations of up to 17µg/m<sup>3</sup> (24-hour average). This value is well within the National Environmental Standard for Air Quality (**NESAQ**) for PM<sub>10</sub> of 50µg/m<sup>3</sup> (24-hour average). PM<sub>10</sub> has also been previously monitored at Site 15 at Macraes Village and the results showed concentrations that are well below the NESAQ.

It is recognised that the monitoring data for PM<sub>10</sub>, PM<sub>2.5</sub> and RCS presented by OGL are now somewhat dated. Nevertheless, they are in line with expectations and generally consistent with monitoring results I have reviewed for a 2018 study undertaken adjacent to a large area of aggregate quarries at Yaldhurst, Christchurch.<sup>2</sup>

Taking into account the separation distances from the proposed MP4 activities to neighbouring dwellings and other sensitive receptors, I consider that the monitoring indicates that the discharge of fine PM and RCS from mining and associated activities is not likely to cause any significant adverse health effects.

***Q7: Does the Beca assessment identify all relevant contaminants? Please explain.***

I agree with Beca that the primary contaminant discharged from mining and associated activities is TSP, including inhalable fine particles PM<sub>10</sub> and to a lesser degree PM<sub>2.5</sub> and RCS. Larger PM particles have potential to cause nuisance dust effects, whereas PM<sub>10</sub>, PM<sub>2.5</sub> and RCS have potential to cause adverse health effects.

Beca's assessment has focussed on dust nuisance effects. Based on my conclusions noted in response to the previous question regarding potential health effects of PM<sub>10</sub>, PM<sub>2.5</sub> and RCS, I consider that this approach is appropriate.

Diesel combustion in trucks and other vehicles will result in discharge of combustion products, including PM, SO<sub>2</sub>, NO<sub>2</sub> and CO. Taking into account the large separation

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<sup>2</sup> Mote (2018): [Yaldhurst Air Quality Monitoring - Summary Report: 22 December - 21 April 2018](https://www.ecan.govt.nz). Report prepared for Environment Canterbury by Mote Limited. Available online at: <https://www.ecan.govt.nz>



distance to sensitive receptors from mining activities and haul roads, I concur with the assessment that any adverse effects of combustion products will be less than minor.

The AEE includes an assessment of Greenhouse Gas (**GHG**) emissions from the proposal. GHG emissions are discussed further in response to Question 11.

***Q8: Does the Beca report consider all relevant sources of contaminants in their assessment? Please explain.***

Beca states that the key sources of dust discharges from the project activities include the following:

- Loading and unloading of mined waste rock and ore,
- Vehicle movements on unpaved haulage roads and site areas,
- Wind action on dry exposed surfaces.

I agree that these are the primary sources of TSP emissions from the mine site. Dust emissions from vehicles on haul roads can be significant if mitigation is not diligently applied, given the relatively high vehicle speed limit of 60kph proposed. In terms of the scale of mining activities, there are large areas of exposed surfaces subject to wind action. Dust discharges from these areas can be significant during strong winds. Tailings storage facilities such as the proposed FTSF can generate substantial dust emissions if surfaces become dry and therefore diligent management is required.

I consider that the GHG and combustion products emission sources (primarily heavy vehicles and machinery) have been appropriately described.

***Q9: Is past monitoring sufficient to understand the current level of effects (pre-MP4)? Please explain.***

Monitoring at the mine site has been discussed in response to Question 6. I consider that this monitoring is sufficient to understand the effects of the existing activities.

***Q10: Are the effects of dust discharges on the environment including persons adequately described for the specific site areas (Coronation, Innes Mills, Golden Bar) and cumulatively? Do you agree or disagree with the assessment?***

Beca has assessed the potential effects of dust on the closest residences to the project activities using a combination of the FIDOL factors and the Institute of Air Quality Management (**IAQM**) risk assessment methods<sup>3</sup>. Assessment was undertaken for the individual project areas with reference to separation distance and wind direction to the nearest sensitive receptors. A qualitative assessment of this type is common practice for area source dust discharges from mines and quarries.

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<sup>3</sup> Institute of Air Quality Management "Guidance on the Assessment of Mineral Dust Impacts for Planning" May 2016.



The assessment has not specifically considered the cumulative effects of concurrent discharges from MP4 and existing consented dust emission sources that are adjacent to the proposed MP4 activities. Even if the mining focus has largely shifted to MP4, there is potential for ongoing dust emissions for a time from the large open areas associated with existing activities. Consequently, I consider that the frequency of winds when each receptor is downwind of dust sources is understated in terms of a cumulative effects assessment. Given the relatively large separation distances to sensitive receptors, I do not consider this omission to be critical to the assessment. I have considered potential cumulative effects in my evaluation of the proposal.

The IAQM assessment matrix is a somewhat coarse tool with broad risk categories. In my view a degree of caution should be applied to its use for assessing very large and complex dust emission sources in dry climatic conditions, particularly given the potential for cumulative effects noted earlier. The IAQM assessment assumes that dust mitigation will occur. My experience is that the effectiveness of dust control measures is strongly related to the extent of off-site effects for this type of activity. Continuous monitoring of TSP with short-term (1-hour or 5-minute average) trigger levels is an effective means of assessing the ongoing effectiveness of such mitigation.

The dust assessment undertaken by Beca states the following:

*“As a rule, based on the discussion regarding particles size in the GPG Dust and the results of research into dust entrainment, dust deposition is unlikely to occur to any significant degree beyond a distance of approximately 100 - 200 m from significant dust sources in most circumstances. Dust nuisance is more likely to occur within such proximity of a significant dust source. IAQM considers receptors located more than 200m to 400m from a dust source as being “Distant” (which is the farthest separation distance category).*

*The terrain in the area surrounding the project site is predominantly flat, which may increase the potential for some dust deposition to occur at greater distances. However, dust impacts will occur mainly within 200-400 m of sources, even at the dustiest sites.*

*The closest sensitive receptor (dwelling) in the vicinity of the project is more than 1 km from Innes Mills (refer Figure 3-6). Sensitive receptors in other areas are more than 2.2 km from the Coronation Pit and Golden Bar Pit. Therefore, provided the dust mitigation methods specified in the site DMP are implemented, any dust emitted from the proposed activities project is expected to be well dispersed before reaching these receptors.”*

Provided good mitigation is diligently applied, particularly in relation to the haul roads and proposed tailings storage facility, I agree significant dust effects are not expected to typically occur at receptors over 400m from the source. However, the analysis of complaints relating to the existing mining activities indicates that dust effects can extend well beyond this distance on occasion. I note that dust complaints have occurred from receptor R5 at a distance of approximately 1km from the haul road.



With regard to complaints of dust from haul roads, the Beca RFI response states:

*“Three complaints (listed in Table 7-7 of Beca’s AEE) related to Coronation haul road (R5) between 2018 - 2019. Weather conditions played a part in two of the complaints. None of these complaints have related to the haul road near receptors R1 and R9 near Frasers Pit. The corrective actions undertaken for Coronation haul road indicate that provided water trucks are routinely watering the road as per the Dust Management Plan, dust is effectively controlled.”*

Receptor R1 is approximately 650m west of the Innes Mills haul road and is the most potentially affected by emissions from this source. The AEE states that 192 truck movements per day will occur on this haul road. Winds will blow from the large, combined area of central mining activity (Frasers and Innes Mills) towards R1 and the village for approximately 31% of the time (2.7% > 5m/s), based on the DG15 (Macraes village) data. Wind speed is less critical for the transport of PM (particularly finer PM) generated by heavy vehicles movements, relative to entrainment from exposed surfaces.

A 2017 study undertaken for Waka Kotahi (NZTA)<sup>4</sup> monitored PM adjacent to an unsealed road in Northland. PM<sub>10</sub> was found to comprise approximately 30% of TSP measured at locations where people were most likely to be affected. Measurements showed that the effect of the PM<sub>10</sub> dust plume extended beyond 80m from the roadside. It is important to note that the distance of PM travel recorded in the Northland example is not directly comparable to haul roads at the Macraes mine. These haul roads involve a significant volume of very large trucks in a climate where dry conditions are prevalent. The Horse Flat Road complaints from 2019 indicate that dust can travel over 1km if vigilant watering of haul roads is not undertaken.

Taking into account the above information sources, I consider that adverse dust effects at R1, R5 and other receptors at greater distance from the dust emission sources are likely to be minor, provided good practice mitigation is applied. The complaints record and TSP monitoring for recent years indicates a good level of compliance with conditions of the existing consents. No dust complaints were received during the past three years. The frequency of strong winds blowing from the eastern quarter is small. This reduces the risk of dust impacts at the receptors closest to emission sources, dwellings R1 and R5.

Beca concludes that the likely magnitude of dust effects at the most impacted receptor will be a “slight adverse effect” in terms of the IAQM definition. The IAQM considers “slight adverse effects” to be “not significant”. The AEE states that provided appropriate dust control procedures are implemented, potential impacts are considered to be appropriately mitigated and therefore less than minor. Overall, I consider that cumulative adverse dust effects at the nearest dwellings are likely to be minor. I agree

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<sup>4</sup> Golder Associates. 2017. Impacts of exposure to dust from unsealed roads. NZ Transport Agency Research Report 590, April 2017.



that good dust control and monitoring will need to be implemented via the Dust Management Plan (DMP) to achieve this outcome.

**Q11: Are the greenhouse gas effects adequately described for the specific site areas (Coronation, Innes Mills, Golden Bar) and cumulatively? Do you agree or disagree with the assessment?**

The AEE states that the activities at the Macraes site have involved the operation of diesel vehicles and machinery for a long period. As there is a small level of variation in mining fleet numbers as the wider mining activities progress, Beca considers that the application will not significantly increase the overall vehicle emissions from the site. OGL is also proposing the introduction of an electrical excavator which is part of a site emissions reduction plan.

CO<sub>2</sub> equivalent GHG emissions from vehicles and machinery for the Macraes site are predicted to remain approximately the same as current operations in the near term, due to the mining machinery moving from one active area to another as the site operations progress. Beca notes that OGL has implemented a GHG mitigation plan aimed at minimising emissions from the overall site.

The AEE states that a proposed GHG mitigation plan has been formulated by OGL to balance economic and environmental outcomes. Table 7-8 below (from page 65 of the Beca AEE) provides a consolidated view of the projects to be undertaken at the Macraes site as part of this plan at an expected capital cost of \$3.204M and increased operational costs of \$0.198M per annum. The Beca AEE states that OGL have purchased, and are planning to commission, the planned electric shovel (prime mover for overburden) in the near future.

Table 7-8. Feasible greenhouse gas reduction options at Macraes site

Primary activities	GHG emissions reduction (annual tonnes)	Capital Investment (\$M)	Operational cost impact per annum, (E\$M)	Marginal abatement cost (\$/tonne CO <sub>2</sub> e)
Purchase of certified renewable electricity	23,430	0.000	0.300	16
Electrification of one overburden excavator	3,000	2.560	-1.500	-192
Electric water heating of the processing plant	890	0.390	-0.080	-5
Plant heat recovery	440	0.034	-0.140	-178
<b>Totals / Weighted average marginal abatement cost</b>	<b>27,760</b>		<b>-1.455</b>	

The AEE states that the baseline scenario involves none of these initiatives and sees annual CO<sub>2</sub> equivalent emissions rising from 92,520 t in 2019 to about 113,000 t by 2027 and continuing to 2030 due to deeper pits and longer hauls. The planned reduction of 27,760 t represents a 14% reduction in cumulative CO<sub>2</sub> equivalent emissions (based on the 2019 baseline) and 20% reduction in cumulative emissions (based on the business-



as-usual scenario). Beca states that further secondary options are being considered including a second electrical excavator, based on economic viability.

GHG emissions have been described cumulatively across the OGL site. I consider this approach is appropriate. The assessment of GHG effects adequately addresses the requirements of the Resource Management Act in my view. However, it should be noted that I do not have specific expertise in the assessment of mitigation effectiveness and preparation of emissions reduction plans. While the assessment indicates an overall reduction in GHG emissions due to mitigation, the application is not clear on which specific reduction measures are proposed as conditions of consent. It is expected that this will be addressed in the proffered conditions set.

***Q12: Is the existing dust management plan fit for purpose? Do you have any suggested changes? Please explain.***

An updated 2023 DMP has been provided in response to the RFI request. I have reviewed the DMP and consider it to be generally fit for purpose. The DMP will need to be updated to respond to additional monitoring and mitigation required by conditions of consents for the proposed MP4 activities, if granted.

Key aspects of the DMP are:

- A separate dust control manual is included for tailings storage facilities, with appropriate mitigation included.
- Continuous TSP monitoring at sites DG15 and DG07 is described (monitoring at DG11 was required by the Frasers consent for at least one year but has now ceased). TSP trigger levels of  $80\mu\text{g}/\text{m}^3$  (24-hour average) and  $250\mu\text{g}/\text{m}^3$  (1-hour average) are proposed for this application, consistent with the Deepdell and Frasers consent requirements.
- Generally appropriate mitigation measures are described. However, a high vehicle speed limit of 60kph is specified, relative to recommendations in the GPG Dust. Given the large separation to sensitive receptors and the results of monitoring to date, this may be acceptable in this case. However, good practice mitigation will be required, including ongoing watering of the haul roads.

The Beca RFI response notes that: *“TSP monitoring at Site DG11 (closer to the mine than DG15 in Macraes village) was decommissioned in 2023 as allowed for by Condition 6(a)(e) of consent RM10.351.52.V3 (Frasers). This request was made and approved on the basis that monitoring results at DG11 were very similar to those for DG15 (as can be seen in Figure 1)”*.

I have reviewed the 24-hour average monitoring results provided and agree that they are similar for DG15 and DG11. Elevated short-term TSP concentrations associated with nuisance effects can be obscured by the 24-hour averaging period. Unfortunately, the 1-hour average data was not provided. It is this short-term TSP monitoring data that is more useful in terms of setting a trigger level for additional mitigation if spikes occur.



From a site management perspective, I consider there is value in ongoing TSP monitoring either in the vicinity of DG11 (near R1 as previously occurred) or alternatively further east in the general vicinity of the Gay Tan historic cottage. Such monitoring using a nephelometer is cost-effective and alerts can be sent to OGL, allowing prompt response (such as watering haul roads) if TSP spikes exceed short-term trigger levels. The monitoring site would be upwind of the village during easterlies and therefore well sited to allow reaction to dust emissions from the major area sources in proximity to sensitive receptors in the village.

I recommend that such monitoring be included in the updated DMP. A TSP trigger level of  $250\mu\text{g}/\text{m}^3$  (5-minute average) would be appropriate to allow prompt management response. I note that this is not a compliance limit but a useful tool to optimise dust control and site management.

***Q13: Are there any statements made within the AEE about air quality effects at any impacted site that are not supported by the technical reports? Please explain.***

I am satisfied that the Beca AEE is sufficiently robust and the statements are appropriately supported by the technical information.

***Q14: Are there any recommendations relating to air quality at any impacted site (that you consider to be of importance) made in the technical reports that are not included within the AEE? Please explain.***

In general, I consider that the Beca AEE makes appropriate recommendations in relation to air quality impacts at sensitive receptors. The only area of disagreement relates to ongoing TSP monitoring in the general vicinity of dwelling R1. As discussed in response to Question 12, I consider that including such monitoring in the DMP would provide a cost-effective and useful site management tool to ensure that dust from the haul road and other sources is diligently controlled. This type of monitoring using nephelometers is not onerous and is routinely undertaken around quarries and mines to ensure ongoing good site management practices.

### **Concluding Comments**

The proposed OGL MP4 mine extensions and associated waste and tailings disposal features are predicted to increase the life of the mine by approximately three years. SESL has peer reviewed the air quality AEE and further information response prepared by Beca.

I agree with Beca that the most significant contaminant discharged from mining and associated activities is TSP, with potential to cause dust nuisance effects. The TSP will include a component of finer particles ( $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$  and RCS).





The proposed mining activities are well separated from sensitive receptors, particularly during the prevalent strong westerly and southwesterly winds. The potentially most impacted sensitive receptors (dwellings) are:

- R1 (1668 Macraes Road) approximately 650m west of the haul road and 1km west of the Innes Mills MP4 area;
- R5 (406 Horse Flat Road) approximately 1km west of the haul road and 2.2km south of Coronation Pit.

These dwellings have potential to be affected during winds from the eastern quarter, particularly in relation to haul road dust if appropriate mitigation (such as regular watering) is not applied.

Overall, I agree that the 24-hour average TSP monitoring data indicate that PM emissions from mining activities have generally been within acceptable levels to prevent dust nuisance effects. The complaints record supports this view. However, I note that 1-hour average TSP data have not been provided to indicate the nature of short-term dust events. I agree with Beca that TSP trigger levels should be applied to the monitoring sites to require OGL to respond promptly to detected dust events.

Taking into account the separation distances from the proposed MP4 activities to neighbouring dwellings and other sensitive receptors, I consider that the earlier monitoring indicates that the discharge of fine PM<sub>10</sub>, PM<sub>2.5</sub> and RCS from mining and associated activities is not likely to cause any significant adverse health effects. I also concur with the assessment of Beca that any adverse effects of combustion products from heavy vehicles and machinery will be less than minor.

GHG emissions have been described cumulatively across the OGL site. While the assessment indicates an overall reduction in GHG emissions due to mitigation, the application is not clear on which specific reduction measures are proposed as conditions of consent. It is expected that this will be addressed in the proffered conditions set.

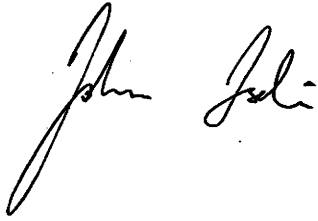
The complaints record and TSP monitoring for recent years indicates a good level of compliance with conditions of the existing OGL consents. No dust complaints were received during the past three years. The frequency of strong winds blowing from the eastern quarter is small. This reduces the risk of dust impacts at the receptors closest to emission sources, dwellings R1 and R5. I consider that adverse dust effects at R1, R5 and other receptors at greater distance from the dust emission sources are likely to be minor, provided good practice mitigation is applied. Comprehensive dust control and monitoring will need to be implemented via an updated DMP to achieve this outcome.

From a site management perspective, I consider there is value in ongoing TSP monitoring in the vicinity of receptor R1 or slightly further east. Such monitoring using a nephelometer is cost-effective and alerts can be sent to OGL, allowing prompt response (such as watering haul roads) if TSP spikes exceed short-term trigger levels. I consider that including such monitoring in the DMP would provide a useful site management tool to ensure that dust from the haul road and other sources continues to be diligently controlled.



Please contact me if you require any clarification of the above matters.

Regards

A handwritten signature in black ink, appearing to read "John Iseli". The signature is written in a cursive style with a large, sweeping initial "J".

John Iseli  
Director, Principal Air Quality Consultant

