Before the Expert Panel appointed under the Fast-track Approvals Act 2024

Under	the Fast-track Approvals Act 2024 (**Act**)
And	
In the Matter of	an application for approvals by Matakanui Gold Limited to establish, operate, rehabilitate and ultimately close an open pit and underground gold mining operation known as the Bendigo-Ophir Gold Project

Statement of Evidence of **Jeffrey George Bluett** on behalf of **Matakanui Gold Limited** in response to Section 53 Feedback

Air Quality

Dated: 17 April 2026

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INTRODUCTION

1. My name is Jeffrey George Bluett.

2. I have a BSc in Chemistry (Otago University 1984) and a MSc (First Class Hons) in meteorology (Lincoln University 1997). I am currently employed by Pattle Delamore Partners Limited as a Technical Director – Air Quality and have held that position since 2019. I am a life member and Fellow of the Clean Air Society of Australia and New Zealand (CASANZ). Within CASANZ, I currently hold or have held the following positions: Society Vice President (2019 to present) and Dust Special Interest Group chair (2025 to present). I was awarded CASANZ's distinguished service medal in 2013. I have over 25 years' experience in the field of air quality and have authored, or co-authored, over 100 reports and peer reviewed papers in respect of transport, industrial, quarry and mine emissions to air. In relation to monitoring and assessing the impacts of quarry dust, my recent projects have included leading:

   (a) Environment Canterbury's review of the Management of Dust Discharged from Quarries;

   (b) The construction dust section of CASANZ's Good Practice Guide for the Assessment and Management of Air Pollution from Road Transport Projects;

   (c) The review of five quarry air discharge consent applications for Canterbury Regional Council (**CRC**);

   (d) The air quality assessments and air quality monitoring programmes for three quarry developments in Yaldhurst, Rangiora and Motueka; and,

   (e) The assessment of the impacts of dust discharged from two large and adjacent North Island limestone quarries.

PURPOSE AND CONTENT OF EVIDENCE

3. In my evidence I respond to comments on air quality issues from:

   (a) Administrating Authorities and Relevant Local Authorities:

      (i) Otago Regional Council.

   (b) Environmental Groups:

      (i) Sustainable Tarras; and

      (ii) Environmental Defence Society Incorporated.

   (c) Owners and Occupiers of the Land:

      (i) Bruce and Sandra Calder;

      (ii) Simon Gibbard and Nicola Mulvena;

      (iii) David and Juliet Towers;

      (iv) Folding Hill Wine Limited; and

      (v) Gibbston Valley Wines Limited.

   (d) Owners and Occupiers of Adjacent Land:

      (i) Sharon Brodie;

      (ii) Bruce Lambie; and

      (iii) Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn.

   (e) Other Interested Parties:

      (i) Business South Incorporated;

      (ii) Central Otago Winegrowers Association; and,

      (iii) The Chinamans Terrace Services Company Ltd.

DOCUMENTS PREPARED AND PARTICIPATION IN THE FAST TRACK PROCESS

4. My original findings are provided in full in the Fast Track Application Part B – Technical Reports: B.33 Pattle Delamore Partners - Assessment of Environmental Effects from the Discharge of Contaminants into Air (PDP 2025) and Part G – Management Plans: G.23 Air Quality Management Plan.

5. Following the Otago Regional Council (**ORC**) review of the AQA (Document B33) and Management Plan three memoranda were produced and the Air Quality Management Plan was updated to address questions raised by the ORC reviewer. These memoranda were:

   (a) Bendigo-Ophir Gold Project Air Quality Assessment: Response to Otago Regional Council information request, dated 29 January 2026 (Appendix A to Mr Crimmins' Evidence in response to the Panels RFI dated 17 April 2026);

   (b) Bendigo-Ophir Gold Project AQA (Document B33) Addendum: Cement and Concrete Batching, dated 4 February 2026 (Appendix B to Mr Crimmins' Evidence in response to the Panels RFI dated 17 April 2026);

   (c) Bendigo-Ophir Gold Project AQA (Document B33) Addendum: Visual Dust Monitoring and Instrumental Arsenic Dust Monitoring, dated 4 March 2026 (Appendix A to this evidence); and

   (d) Updated Air Quality Management Plan, which incorporates the changes agreed to with ORC, dated 14 April 2026 (Appendix B to this evidence).

6. The first two memoranda listed above (5(a) and 5(b)) were written by my colleague Paul Crimmins as I was on long term sick leave when this information was required. Mr Crimmins is a certified air quality practitioner with 20 years' experience in Air Quality. Mr Crimmins was my peer reviewer for the AQA (Document B33) and Air Quality Management Plan, therefore he was in an ideal position to take on the authorship of the first two responses to the ORC review.

7. The three memoranda and updated Air Quality Management Plan should be read in conjunction with the ORC Air Quality Officer's evidence for this hearing. The three memoranda and updated Air Quality Management Plan align with the previous evidence provided as part of the original application but provide additional information.

Specifically the three memoranda respond to ORC questions on the effect of dust emissions from site construction and dust from the concrete batching plant, windspeed dust mitigation trigger criteria, dust travel distance ambient monitoring of gaseous emissions from the processing plant how the boundaries of the site will be visually identified when monitoring dust plumes and an arsenic dust monitoring programme that was proposed by MGL following the submission of the original air quality application material.

8. I have prepared this statement in the limited time available for MGL to respond to comments under the Act. If the Panel requires elaboration on any of the matters raised in this statement, I am available to provide further information on request.

9. Although this is not an Environment Court proceeding my confirmation of compliance with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 is included in Substantive Application Document A0.2B.

SPECIFIC RESPONSE TO COMMENTS

10. The comments received on air quality issues fell into six broad categories. To efficiently reply to the comments, I address the specific comments received under the category within which they fell. At the beginning of each section, I note the names of the groups or people from which the comments came from.

METEOROLOGY

11. The comments received on meteorology came from:

    (a) Sustainable Tarras;

    (b) Bruce and Sandra Calder; and,

    (c) Sharon Brodie.

12. Sustainable Tarras (ST-15) suggested that the assessment did not consider wind conditions during the windiest period from October to January. This suggestion by Sustainable Tarras is incorrect wind data from February 2023 to November 2024 a period of 21 months in total, which included the months October 2023 to January 2024. I have obtained and reviewed the full data set (February 2023 to March 2026) which is an additional 16 months or over 3 years in total. The extended data set shows some minor variations in wind speed and wind direction over the initial period, but nothing of a significance which would change the conclusions reached on the February 2023 to November 2024 data.

Having undertaken this comparison I am confident that the dust assessment based on February 2023 to November 2024 data is representative of wind conditions experienced over the longer period in the area and is robust.

13. Sustainable Tarras (ST-16) suggests that the current configuration of five wind monitors should be revised and additional (or alternate sites) on Thomsons Saddle above the Tailings Storage Facility (**TSF**) and on the flats further to the south towards Matilda Rise should be monitored. The current locations monitored have been selected with care. The sites currently monitored provide two types of data; wind conditions at sites of proposed large dust sources and wind conditions representative of the wider area. In my opinion, the current network of five wind monitors provides a high quality and robust set of wind data for the purposes of input into the dust assessment and to inform and plan dust mitigation measures. In my experience, having a network of five wind monitors for an area of this size provides a rich and valuable data set which meets the current and future needs of the project. I do not see any advantages or value in either moving some of the current sites of adding new wind morning sites. However, for practical reasons the Lake Clearview meteorological equipment will be moved the site's administration offices on Ardgour Terrace.

14. Sustainable Tarras (ST-18) express a concern that the assessment does not take into account the (wind[1]) funnelling effects of Shepherds Creek valley. This concern is unfounded. Section 8.2 of the air quality assessment (B.33 AQA) clearly shows the topographical effects on wind direction with a very strong up-valley and down valley wind flow regime in the Shepherds Creek and Rise and Shine Creek valley system. Section 10.3 uses the wind data collected in the Shepherds Creek and Rise and Shine Creek valley system to assess the impacts the dust transported within the valley systems and as such, the wind funnelling effects have been considered in my assessment.

15. Bruce and Sandra Calder (BSC-4) state that my analysis of the wind data showing the predominant dust-generating wind direction is from north-westerlies has never been confirmed with monitoring on the five adjacent properties. The first point to clarify is that the predominant dust producing winds (northwest and southeast directions above 7.5 m/s) occur in the Shepherds Creek and Rise and Shine Creek valley and hill topography. This pattern is strong and is mirrored very closely by both the SRX and CIT monitoring sites. So, I am confident that conclusion is correct.

[1] I am assuming Sustainable Tarras mean wind funnelling, although this is not specified in their comments.

On the Ardgour Flats area, the wind patterns are very different as they are not so strongly influenced by topography and the predominant dust producing winds are from the north. Therefore, I am not at all surprised that the wind patterns from the Shepherds Creek and Rise and Shine Creek sites are not replicated by any wind monitoring undertaken at adjacent properties.

16. Sharon Brodie (SB-3) notes that Bendigo experiences extreme winds (120–160 km/h) at certain times of year. My B.33 AQA and subsequent review of the Lake Clearview data has required me to consider just of three years of wind data, and this includes a number of high wind events. I am confident this data record provides an accurate picture of wind conditions experienced in the area and that these wind conditions have been captured in the dust impact assessment.

DUST EMISSIONS, MONITORING AND CONTROL

17. The comments received on dust monitoring and dust control came from:

    (a) Otago Regional Council (**ORC**);

    (b) Sustainable Tarras;

    (c) Central Otago Winegrowers Association (**COWA**);

    (d) Simon Gibbard and Nicola Mulvena;

    (e) Sharon Brodie;

    (f) Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn;

    (g) Bruce Lambie; and,

    (h) Business South Incorporated (**BSI**).

18. The independent air quality expert (Graeme Stark SLF) engaged by ORC to review the AQA (Document B33) Air Quality Management Plan (**AQMP**) and the three follow up memoranda concluded that (ORC-187), with the updated AQA, AQMP, and additional monitoring commitments, no material risk of adverse air quality effects remains from the operation of the Bendigo-Ophir Gold Project (**BOGP**).

19. This finding by the ORC reviewer mirrors the conclusions reached in the PDP AQA (Document B33) and increases the level of certainty that any adverse effects caused by the discharge of air contaminants from the site will be less than minor. The alignment between myself and the environmental regulator's air quality experts should be reassuring for the groups and individuals that commented on the application.

20. ORC (ORC-132, ORC-133 and ORC-138(b)) note concern about dust emissions from dry beach areas in the TSF. Sharon Broadie (SB-3) and Bruce Lambie (BL-2) also expresses concerns about dry stacked tailings. I address this issue in paragraphs 37 to 40 in my response evidence to the Panel's RFI. These three Panel RFI evidence paragraphs are copied below in italic text in paragraphs 21 to 24.

21. *I can confirm that the effects of dust discharged from the tailing storage facility (TSF) have been carefully considered in the Air Quality Assessment. My conclusion was that dust discharged from the TSF would not cause any offensive or objectional effects to occur beyond the site boundary. One of the key factors contributing to this conclusion is the buffer distance between the TSF and the site boundary. The buffer distance is sufficiently large at over 500 m that any wind events which have the energy to cause dust to travel this distance will be infrequent and the quantum of dust carried beyond the site boundary would be low.*

22. *However, the TSF assessment did assume that the tailings would retain a sufficient moisture content to ensure that surface dust emissions would be minimal. If any beach areas of the TSF do dry out, there is potential for increased dust emissions from the surface. If this situation does occur, it will be identified in the regular and scheduled visual dust monitoring and can be mitigated by:*

    (a) spraying water on the dry tailing beaches;

    (b) redirecting incoming high moisture tailings toward exposed dry beach areas;

    (c) covering dry beach areas area with non-dusty materials e.g. small waste aggregate; or

    (d) *accelerated soil toping and vegetative remediation of dry beach areas.*

23. *In summary, should dry beach areas occur on the TSF, scheduled monitoring will identify this situation and there are a number of practical options to quickly and easily mitigate the increased risk of dust emissions. These additional mitigation measures have been included in the updated AQMP (Appendix D).*

24. *My conclusion is that with regular monitoring and simple mitigation measures, dust discharged from dry beaches on the edge of TSF will be minimised and not cause any offensive or objectional effects to occur beyond the site boundary. This specific TSF risk will only occur during the active mining phase of the project when it can be addressed. The risk is eliminated after the TSF has been rehabilitated.*

25. Sustainable Tarras (ST-15) suggests that the application does not adequately assess dust generating sources of the BOGP. I note there is a lack of specificity within Sustainable Tarras' question on dust sources which they consider have not been adequately assessed. I make the following general comments attempting to respond to Sustainable Tarras's question. Section 5 of the AQA (Document B33) spends 22 pages detailing the seven different types and 30 different sources of dust sources on site. Subsequent to the AQA (Document B33) being written, as a response to the ORC review, PDP provided additional detail on the concrete batching plant and an assessment of dust discharged from the two aggregate pits located on Ardgour Flat in response to a question from the Panel. In my opinion, the AQA (Document B33) and two subsequent documents provide a comprehensive and detailed identification and assessment of the BOGP dust sources. The ORC reviewer has had an opportunity to consider the concrete batching plant assessment and accepts the conclusions from that work.

26. Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn (GKCFF-3) suggest that high winds through Thomson Gorge could carry dust well beyond the site, affecting air quality. The potential for high winds through Thomson Gorge to carry dust beyond the site has been considered carefully in the AQA (Document B33) using on-site wind data and best practice assessment methods, The conclusion I reached was that amenity effects resulting from the discharge of dust from the southern zone would likely be less than minor.

27. BSI (BSI-19) recommended that consent conditions which require real-time air quality monitoring, independent auditing and baseline protection.

28. MGL have equipment, processes, plans and reporting in place to meet the monitoring recommendation made by BSI. The monitoring programme and reporting will be run by MGL staff, but the setup, operation, calibration of equipment and reporting of the data will be independently audited by the ORC consent compliance processes. This aspect of the air quality monitoring programme is documented in the AQMP.

29. MGL have and will be collecting additional baseline air quality data. This baseline data will be used to ensure that any increase in off-site air concentrations is kept to a level that is less than minor. 'Less than minor' is a planning term, but translating this to a practical, air quality sense, less than minor means a small increase which ensures any concentrations are well below the relevant air quality guidelines or standards.

With the air discharge operations proposed, MGL cannot realistically commit to maintaining current background levels. But the less than minor environmental performance criteria can be checked by comparing both the baseline and operational data from that site with relevant National Environment Standard for Air Quality.

30. Simon Gibbard and Nicola Mulvena (SGNM-4) state that the dust that comes from most open pit mines is a very fine silica that drifts and is not easily suppressed by water. I understand this statement is based on personal experience at Macraes mine.

31. Sustainable Tarras express similar concerns (ST-17) to Mr Gibbard and Ms Nuvena and state they consider there is little reference to $PM_{2.5}$ particles or respirable crystalline silica in the air quality assessment. Paragraphs 32 and 33 below address the $PM_{2.5}$ and RCS issues raised by these two parties.

32. The views that Mr Gibbard and Ms Mulvena hold on the size, type of dust and effectiveness of water suppression is inconsistent with my understanding and experience on these issues. Fine particulate is defined as $PM_{2.5}$ (particulate diameter less than 2.5 micron) and is generally generated from combustion or other industrial chemical processes. Dust generated from open pit mines or quarries is generated by mechanical (not chemical) means. From my understanding of the literature and analysis of air quality monitoring data sets, almost all of particulate generated by mechanical processes at open pit mines is larger than PM_{10} and the vast majority of particulate is larger than PM_{20} (particulate matter with a diameter larger than 20 microns). This means only a small proportion of dust generated by open pit mines can be breathed into our lungs. My understanding and experience is that water is an effective means of suppressing both smaller and larger particles that would be potentially discharged from mine surfaces or material handling activities. Material processing crushing and screening does produce more fine particles than extraction or material handling. However, in my experience water (particularly high-pressure misting systems) are very effective mitigating the fine fraction of mechanical generated dust[2].

33. Respirable crystalline silica (RCS) dust is measured at PM_4 (diameter less than 4 microns) because that size fraction can be inhaled into human lungs.

[2] Literature Review: Regulatory best practice for quarry dust management in New Zealand. PDP 2024. Prepared for Environment Canterbury. Report number C04881001R001.

Even if the native material does contain crystalline silica, quarry activities are not likely to produce large amounts of PM_4 because the sources that generate RCS particulate are mechanical and not chemical Data I am familiar with from Canterbury quarries shows that even at very large quarries with multiple crushing and screening plants the monitored concentrations of RCS are often below the limit of detection of the laboratory analysis and do not anywhere near approach the relevant ambient air quality health impact criterion.

34. COWG expressed concern (COWG-25) that one of MGL's real-time dust monitors is to be relocated from Lake Clearview. COWG correctly notes that the Lake Clearview monitor is situated close to horticultural receptors and was used for baseline data collection. I understand the reason for COWG concern is that moving the monitor from the Lake Clearview sites removes the monitoring point that is most relevant for detecting whether dust is reaching vineyards. COWA requests that Lake Clearview monitoring be retained as a condition of consent, with additional monitoring near the boundary of the mine closest to horticultural receptors.

35. COWG raise a valid issue which I will address. The Lake Clearwater site has been operational since February 2023 and to date over three years of background meteorological and PM_{10} data has been collected. This provides an excellent database for us to understand the current dust impacts at Lake Clearview. It is my opinion that the site has served its purpose of establishing background PM_{10} concentrations.

36. At the same time the Lake Clearview monitor has been running, MGL have collected real-time PM_{10} data in the Shepherds Creek and Rise and Shine Creek valley area. A parallel analysis of these two sets of data can help us identify and understand what wind conditions allows dust to travel from the valley system to impact locations on the Bendigo Plains area. This understanding of the wind transport system will help define the MGL site's definition of high dust risk wind conditions. This can be used in a proactive way to mitigate any MGL dust impacts that may occur on Ardgour Plain.

37. Because the Lake Clearview site has already served the dual purposes detailed in paragraphs 28 and 29, I suggested that the Lake Clearview monitor be shifted to a location within the boundaries of the MGL site where it can detect emissions from the key dust sources. This on site PM_{10} data would be used to proactively and effectively manage and mitigate source dust emissions and therefore minimise any dust impacts on Ardgour Plain. I am confident that the two instrument real-time air quality monitoring network proposed is fit for purpose and will facilitate the operation of the MGL project in such a way it does not cause significant adverse dust impacts on Ardgour plain.

38. However, having discussed this monitor relocation option with MGL in the context of the Central Otago Wine Growers comments, MGL have opted to keep the Lake Clearview monitoring operational throughout the project and purchase a third real-time PM_{10} monitor for the second on-site dust monitoring location which will be situated to provide data used in the site's dust emission monitoring and mitigation strategy. This change is reflected in the updated AQMP appended to my RFI response.

DUST TRAVEL DISTANCE AND EFFECTS

39. The comments received on dust monitoring and dust control came from:

    (a) Otago Regional Council;

    (b) Sustainable Tarras;

    (c) Bruce and Sandra Calder;

    (d) David and Juliet Towers;

    (e) Folding Hill Wine Limited;

    (f) Gibbston Valley Wines Limited;

    (g) Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn;

    (h) Bruce Lambie;

    (i) Central Otago Wine Growers; and,

    (j) Chinamans Terrace Services Company Limited.

40. Otago Regional Council (ORC-135, ORC-136 and ORC-138(a)) note that my AQA (DOCUMENT B33) does not discuss in detail how the sensitive receptors were identified and go on to say they identified three dwellings that were either missed or mis-identified as a shed. In addition to doing a desktop identification exercise and having this reviewed by MLG staff, I did also take time to drive around the area, checking that I had captured all the relevant sensitive receptors. Despite these efforts it does appear that I missed two dwellings at 58 and 60 Thomson George Road. However, I note that these dwellings are approximately 500 m from any site dust source and are located close to dwellings I number 1, 2 and 3 in the air quality assessment. I acknowledge omitting the two dwellings noted by ORC but I consider this immaterial to the conclusions I have reached given their distance from any dust sources and their proximity to other dwellings that were considered in the assessment.

41. Sustainable Tarras (ST-13) suggest my assessment of air quality effects is not credible and go on to conclude, the project will have adverse air quality effects. I reject this suggestion and note that the ORC's independent reviewer report details his positive view on the assessment's input information, assessment method and conclusions. The ORC review concludes "*there is no material risk of adverse air quality effects remains from the operation of the Bendigo-Ophir Gold Project*".

42. Sustainable Tarras express a concern (ST-18) that the 300m dust containment (buffer distance) contradicts their local experience and observations at Macraes mine. The 300 m buffer distance used in my assessment was partially based on a dust travel distance assessment that I undertook on a large meteorological and dust data set collected around a large alluvial aggregate quarry just south of Christchurch.[3] I have also reviewed local and international dust guideline documents and found:

    (a) recommendations that a detailed dust assessment if there are any sensitive receptors 250-300 m downwind of a dust source[2].

    (b) data sets showing the PM_{10} impact of an open pit mine or quarry is not measurably different from background concentrations at a distance of greater than about 250 m downwind[2].

43. In summary, there is a healthy body of data, literature and guidelines to support my assumption that a 300 m buffer is a robust initial estimate of how far dust is likely to travel.

44. Bruce and Sandra Calder (BSC-2) state they consider the unique environment should be respected and protected. It must not become an industrial toxic dust bowl. In response to the Calders' concern, the first point I wish to make is that the dust discharged from the MLG will be native material. It will not be industrial toxic waste. Secondly, MGL have invested heavily in understanding, mitigating and monitoring the dust which could potentially be discharged from the site. In my opinion, the proposed mitigation and monitoring programmes represent industry-accepted good practice and for some issues industry-accepted best practice. The primary purpose of this effort is to ensure that a "dust bowl" situation never occurs. The independent ORC reviewer concurs with my findings.

45. David and Juliet Towers (DJT-1) express a concern that significant increase in dust on Thomson Gorge Road will have effects on their peony farm.

[3] Literature Review: Regulatory best practice for quarry dust management in New Zealand. PDP 2024. Prepared for Environment Canterbury. Report number C04881001R001.

I have found the location of the Towers' property and it is approximately 4.5 km from the northern boundary of the site and if the application is granted, will be located on a sealed section of road. Due the large buffer distance between the peony farm and any dust sources associated with the MGL activities and because any mine vehicles passing the farm will be travelling on a sealed road, I consider that the Towers' concern about additional dust affecting their flowers is unfounded.

46. Folding Hill Wine Limited (FHWG-12) is worried about the project potentially introducing risk to the wine industry including dust deposition impacting fruit quality. My dust assessment of the northern zone of the site (Sections 8.4 and 10.2 of the air quality assessment) found the closest grape growing area was located approximately 1 km to the east of the closest MGL northern zone site boundary. I note that this closest vineyard is not owned by Folding Hill Wine. My map search shows that the Folding Hill Wine is approximately 4 km to the northwest of the site boundary. The frequency of high-risk dust winds from the east is very low. When I combine the buffer distance, the wind risk factor, the sources of dust in the northern zone of the MGL site, and the proposed dust mitigation and monitoring programmes, I consider the risk is very low of any grape grower in the area noticing an increase of dust on their fruit above background levels.

47. Gibbston Valley Wines (GVW-2) express concern that their School House Vineyard sits within the immediate landscape of the BOGP area and they believe could be affected by industrial activity including dust. The School House Vineyard is located approximately 2 km to the east of the closest MGL northern zone site boundary. This is a greater buffer distance than is enjoyed by Folding Hill Wines and therefore, I also conclude the risk is very low of any grape grower in the area noticing an increase of dust on their fruit above background levels.

48. Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn (GKDFF-3) note that mining activities generate significant dust especially from blasting, haul roads, and processing. I agree that haul roads, and processing are significant sources of dust. These dust sources have been identified, mitigation proposed, monitoring planned and impacts assessed in the AQA (Document B33).[4] Due to the frequency and duration of blasting events I do not consider blasting a significant source of dust. But it is covered in the AQA (Document B33).[5] However, control of the impact of dust from blasting will be captured by the resource consent conditions and in the AQMP.

[4] AQA Document B33 Sections 5.5, 5.6, 9.1 and 10.3.
[5] AQA Document B33 Sections 4.1.2, 5.2, 9.1 and 10.3.

49. Bruce Lambie (BL-5) expresses a concern about air pollution from dust and wind-blown contaminants. This impact of dust and wind-blown contaminants discharged from the site is explored in detail in the AQA (Document B33).[6] The key conclusions I draw relevant to Mr Lambie's concerns are:

    (a) The assessment of potential amenity effects resulting from the discharge of dust found that for both the northern and southern zones any adverse effect would likely be less than minor; and,

    (b) any adverse health impacts from the particulate matter (PM_{10}, RCS and As) discharged from the proposed mine will be negligible and certainly less than minor.

50. Central Otago Wine Growers (OWG-19) note that their most significant concern is not immediate contamination but is a gradual accumulation of contaminants. Again, I lean on the separation distances and lack of high dust risk windspeeds to help assess both acute effects (short term – 1 day to 1 month) and chronic effects (long term more than a month to a year). It is also useful to remember that the dust material discharged from the MGL site will be natural native material and that the environment, as well as providing a potential deposition pathway, provides a dust removal processes via wind souring and rainfall. Considering the effect of these four factors, I conclude that the chances of any grape grower in the area being able to measure or observe a difference in deposited dust on fruit above background levels are extremely low.

51. Central Otago Wine Growers (CTS-12) note that a major concern is the impact of regular dust plumes emanating from the mine site. Paragraphs 42-45 of my evidence explain my conclusion about the very limited degree of effect of deposited dust on grapes. The same assessment method and rationale can be applied to the potential impact of visual dust plumes at the locations of vineyards. My conclusion on visual dust plumes[7] is that any that do occur, will most likely be confined to within the boundary of the site in accordance with the proposed consent conditions in *D.04 – Schedule Two – General Conditions for ORC Consents* which have been amended as part of this response package. I consider the risk of any visual dust plume reaching a vineyard is very negligible.

[6] AQA Document B33 Sections 2.0, 3.0, 5.0, 7.0, 9.0 and 10.0.
[7] AQA Document B33. Sections 4,1,2, 5.3.1, 5.5, 5.8, 9.1.2, 10.2.7 and 10.3.7.

EMISSIONS FROM THE ORE PROCESSING PLANT

52. The comments received on the ore processing plant came from:

    (a) Sustainable Tarras; and

    (b) Central Otago Wine Growers;

53. Sustainable Tarras (ST-19) suggests that the application provides no detail on the chemical processes or design of the processing plant, including storage of cyanide. Sustainable Tarras concludes that this lack of information makes assessing cyanide risks to the environment and community impossible. I disagree with this statement from Sustainable Tarras and the information provided below in paragraphs 54 to 57 explains why.

54. In my air quality assessment, the following detail is provided on the gaseous contaminants discharged from the processing plant:

    (a) Section 2.2 lists the types of contaminants;

    (b) Section 2.3 describes the potential adverse human health effects of contaminants;

    (c) Section 6.1 explains the sources and mitigation of contaminants;

    (d) Section 6.1 explains the location and configuration of discharge points (vents and stacks); and

    (e) Section 12.3 assesses the health effects of contaminants when discharged to the MGL receiving environment.

55. The information of the types, sources and mitigation of contaminants was developed from literature and with the input of the chemical and process engineering experts (Maca Interquip Western Australia) who were engaged to design the MGL processing plant. Maca Interquip has designed gold processing plants used throughout Australia and are highly experienced and knowledgeable in the types, quantities and mitigation of air contaminants discharged from these plants. While the AQA (DOCUMENT B33) does not provide a detailed description of the chemical processes of the processing plant, a process overview is provided in Section 6.1 of the AQA (DOCUMENT B33) which identifies where in the process gaseous discharges have the potential to occur, and the provides a brief discussion on the chemistry which can generate gaseous emissions.

The reagents used to make the cyanide solutions are solids which do not discharge any gaseous cyanide so I have not been considered this source of emissions in the air quality assessment.

56. In regard to the potential discharge of Hydrogen Cyanide ("HCN"), this is produced only if the wet chemistry processes are not managed correctly. The key mitigation is monitoring and maintaining the correct pH in the reaction vessels. There are numerous equipment and process safety features that ensure that HCN is not produced nor discharged into the atmosphere.[8] MGL will also complies with health and safety requirements by ensuring that there is ambient and personal exposure monitoring for HCN. This is provided for in the proposed consent conditions in *D.04 – Schedule Two – General Conditions for ORC Consents*. The process monitoring system is designed to ensure that it will pick up any vessel conditions which could lead to the discharge of HCN well before the gas is discharged. This means the risk of any negative health impacts occurring for the MGL workers is low and ensures the risk of any negative health impacts occurring for members of the public beyond the boundary of the site is near zero.

57. In summary, I disagree with Sustainable Tarras on this issue. My opinion is that while the assessment is process-based and not quantitative, the information presented in the AQA (DOCUMENT B33) is sufficiently robust and comprehensive enough to allow the Panel to make an informed decision on the potential risks and effects from the potential discharge of HCN.

58. Sustainable Tarras (ST-20) express a concern the application does not specify the quantity of cyanide converted to ammonia (NH_3) nor the amount of ammonia expected to be released to air.

59. Given that NH_3 is the contaminant discharged to air, this is what I will focus on when responding to this comment. I acknowledge that the AQA (DOCUMENT B33) does not quantify the amount of NH_3 discharged to the air. Instead, I relied on the information gained from Maca Interquip[9] which enabled me to understand chemical reactions in the electro winning cells generate NH_3. The reports and textbooks I reviewed showed NH_3 emission rates at similar sites are low. At the MGL site, the electro-cell gases will be collected and dispersed via a 15 m tall stack into a receiving environment with low sensitivity to the potential impact of this contaminant. It is an important consideration that any sensitive receptor is more than 2 km away from the point of discharge of NH_3.

[8] AQA Document 33 Sections 6.1, 9.2 and 12.2.
[9] https://www.maca.net.au/project/maca-interquip/

While Sustainable Tarris is correct, the assessment of the potential impacts of the discharge or NH_3 into the environment is not quantitative, it is based on best practice mitigation measures and experience gained at similar sites. I will also reiterate that the ORC air quality expert reviewer did not express any concerns about the impacts of NH_3 emissions. I am again confident the information presented in the AQA (DOCUMENT B33) is sufficiently robust and comprehensive enough to allow the Panel to make an informed decision on the potential risks and effects from the potential discharge of NH_3 from the processing plant.

60. Sustainable Tarras (ST-21) considers that application does not assess the risk of a catastrophic cyanide tank failure or the potential for the valley to become a confined or restricted space for workers.

61. In the first stage of ORC review of the AQA (DOCUMENT B33), the reviewer asked specially about emissions during upset process situations at the plant. Mr Crimmins noted that upset conditions within the gold processing plant are unlikely to occur given the range of continuous monitoring and contingency response systems built into the process and detailed those response systems. Mr Crimmins concluded that no specific assessment of any hypothetical upset conditions is necessary given the significant range of systems and controls to avoid the instance of such conditions. The ORC reviewer accepted this response. The health and safety of workers is clearly important but outside the scope of my AQA (DOCUMENT B33). I do know however from my time spent with the plant designers, that the plant will comply with all the relevant WorkSafe requirements and will not present a confined space hazard in the unlikely event of a plant upset.

62. Sustainable Tarras (ST-23) suggests the application provides insufficient detail on the nature, quantity, and environmental impacts of air emissions from the dore (*sic*) smelting furnace, making it unclear why a 15 m discharge stack is necessary if discharges are expected to be minimal.

63. In the AQA (DOCUMENT B33), the furnace is defined and explained as an induction furnace. This is sometimes referred to as a core induction furnace. I am assuming that Sustainable Tarras referring to a "*dore*" smelting furnace is referring to the same source of emissions. Section 6.1 of the AQA (DOCUMENT B33) details the particulate and gaseous emissions discharged from the induction furnace and lists the mitigation measures which are designed into the plant. In regard to the nature, quantity and impacts of gaseous contaminants discharged from the induction furnace, Section 12.2 of the AQA (DOCUMENT B33) presents an impact assessment of the contaminants discharged from the induction furnace by discussing the amount, mitigation measures, method of discharge (15 m stack), monitoring, and distance to boundary.

The assessment I undertook is a qualitative assessment which aligns with accepted good practice when the quantity of contaminants discharged is low and the degree of risk presented by the discharge. The 15 m stack simply provides a discharge point well above the height of other nearby structures and ensures that any contaminants will be discharged into free-flowing air which provides efficient and effective dispersion.

64. Central Otago Wine Growers (COWG-10) states that the processing plant will discharge gaseous contaminants including HCN and NH_3. They go on to say these are chemically distinct from dust and present separate deposition pathways with different consequences for organic certification.

65. Central Otago Wine Growers are correct when they state that the gaseous and particulate contaminants have different effects and present separate "*deposition*" pathways, although I would term the second factor, different dispersion pathways. The gaseous contaminants are not deposited on surfaces after a certain travel distance like particulates are.

66. Gases are sufficiently light that they are not affected by gravity and remain suspended in the atmosphere while being diluted by clean air and in the case of NH_3 and HCN eventually chemically change to other chemically inert species. This means that the gases discharged from the processing plant could, in theory, reach the vineyards if the plume meandered or travelled this quite circuitous pathway. In my opinion, given the travel distance and the small amounts discharged from the plant, the quantity of any gaseous contaminant that reached the vineyard would be at extremely low concentrations and likely be below the limits of detection for commercially available monitoring equipment.

67. The second factor that I will consider is the duration of exposure of the fruit to any gases means that the gaseous contaminants will not likely impact the vineyard fruit. The gases are moving with the air which means even at low windspeeds the fruit would only be exposed if the plume travelled from the plant to the vineyards and likely for a duration of seconds to minutes rather than hours. I am not a plant physiology expert, but my basic understanding is that the risks of the plants absorbing any contaminant at these low concentrations, short exposure times and infrequent events would be very low. It is outside my area of expertise to comment on the potential impact of this potential exposure on the organic certification process.

DUST CONTAINING ELEVATED LEVELS OF ARSENIC

68. The comments received on the potential effects of dust containing elevated levels of arsenic came from:

    (a) Sustainable Tarras (ST-14 and ST-17);

    (b) Environmental Defence Society Incorporated (EDS-125);

    (c) David and Juliet Towers (DJT-3);

    (d) Bruce Lambie (BL-2);

    (e) Professor Geoffrey Kearsley and Dr Claire Fletcher-Flinn (GKCFF-3);

    (f) Business South Incorporated (BSI-20);

    (g) Central Otago Wine Growers (COWG-7 and COWG-7); and,

    (h) Chinaman's Terrace Services Company Limited (CTSC-9).

69. Six of the eight comments all echoed very similar themes expressing concern about the perceived potential human health impact of dust containing elevated levels of arsenic, the lack of assessment of this contaminant, and the need for very careful monitoring and controls. The last two comments came from Central Otago Wine Growers and Chinaman's Terrace Services Company and expressed similar themes but focused on the impact of dust containing elevated levels of arsenic being deposited on the skin of grapes.

70. Rather than address these very similar comments individually, I provide a response that addresses the themes contained in the eight comments.

71. In the AQA (DOCUMENT B33) the sources, potential effects, mitigation and actual; effects of arsenic dust are assessed in a comprehensive qualitative method. Specifically, relating to arsenic dust:

    (a) naturally occurring soil particles are described in Section 2.1;

    (b) potential human health impacts are summarised in Section 3.1;

    (c) air exposure limits are referenced in Section 4.1.3;

    (d) soil stockpile sources are detailed in Section 5.1.3;

(e) mitigation measures are provided in Section 5.1.3 and in Section 5.4 Priority 3 Dust Sources of the AQMP; and

(f) human health impacts are assessed in Section 12.2.

72. The conclusions of my assessment were that *"In summary, it is concluded that the discharges of As from the BOGP are unlikely to cause any exceedance of the relevant ambient AQA (Document B33) criteria at a location where people are likely to be exposed or a resulting health risk. PDP concludes that based on the nature of the BOGP dust, the separation distance to the nearest location where the public may be exposed for any duration of more than one hour and the implementation of the proposed management measures any adverse health impacts from the particulate matter (arsenic) discharged from the proposed mine will be negligible and certainly less than minor*".

73. In regard to the impact of dust deposition on grape skins, I refer back to paragraphs 45 to 50 where I conclude that the chances of any grape grower in the area being able to measure or observe a difference in deposited dust on fruit above background levels are extremely low.

74. Having reflected on the outcome of the ORC review of the air quality assessment, the questions from the Panel and comments from the invited groups, I remain confident the information presented in the AQA (DOCUMENT B33) is sufficiently robust and comprehensive enough to allow the Panel to make an informed decision on the potential risks and effects from the potential discharge of arsenic containing particles from the site. However, MGL has heard the public concerns about this specific contaminant and following discussions with ORC, MGL has agreed to undertake an arsenic ambient air sampling programme as documented in Appendix A attached to this evidence.

75. The key aim of the monitoring programme is to provide ambient air quality data on arsenic to inform the public of the actual impacts of MGLs' proposed activity.

76. The sampling method used will capture dust and arsenic in ambient air (rather than deposited particulate). The sampling and analytical methods are described in the PDP memorandum (Appendix A). As a starting point the filters will be exposed for a period of 30 days. This exposure period may be varied depending on the amount of material collected, as we need to ensure we capture enough material to get above the laboratory's analytical detection limits. A total of 12 filters will be exposed aiming to provide an annual average concentration to be compared against the MfE ambient air quality guideline for arsenic.[10]

[10] Ministry for the Environment Ambient Air Quality Guidelines, 2002. https://environment.govt.nz/assets/Publications/Files/ambient-guide-may02.pdf

Pre-activity sampling will start as soon as practical to establish baseline (background) arsenic ambient air concentrations. As agreed with the ORC technical reviewer, baseline measurement will occur at one site within the valley system.

77. When the activity starts on site, arsenic in air will be measured at two locations. Downwind of:

(a) crushing plant; and

(b) elevated arsenic soil stockpiles.

78. After 12 filters (one year of monitoring), results will be reviewed by ORC and MGL with the aim of assessing whether the monitoring programme should be extended or can cease because of low arsenic concentrations. The AQMP includes arsenic trigger levels which, if exceeded, will require either additional monitoring and/or further mitigation of arsenic dust sources.

79. The AQMP (Appendix B) has been updated to specifically state that MGL has committed to the arsenic monitoring programme. The updated AQMP has the headings and bullet points to indicate the framework of the arsenic ambient air sampling programme. The arsenic monitoring programme will be written up into the site's updated AQMP and be certified as part of the Panel approval.

80. In summary, I am confident that the actual effects from the site's emission of particles containing elevated levels of arsenic will be definitely less than minor and most likely negligible. To demonstrate compliance with this conclusion, MGL has committed to running an arsenic air quality monitoring programme that will establish background levels of this contaminant and ensure that the emissions form potential sources do not in reality generate any adverse effects on the receiving environment beyond the boundary of the site. The results from the arsenic monitoring programme will be reviewed by ORC and be made available to the public.

OTAGO REGIONAL COUNCIL DRAFT CONDITIONS

81. I previously reviewed the main body of the ORC draft air quality consent conditions in October 2025. I provided my feedback on these to MGL. I am comfortable with the general direction and content of this first tranche of consent conditions.

82. I have reviewed four new proposed air quality consent conditions as detailed in Appendix 04 of ORC comments. The four issues that these new consent conditions aim to manage are:

    (a) arsenic air quality monitoring programme;

    (b) deposited dust monitoring programme;

    (c) Real-time TSP and/or PM_{10} monitoring programme;

    (d) Defining the content of the air quality management plan.

83. I have suggested further amendments to the four new consent conditions, and these are reflected in the updated consent conditions provided as Part 4 of this Comment Response Package.

84. My suggested amendments aimed to more clearly define the method, locations, duration, analysis and reporting of results, environmental performance criteria and recommendations for the need for on-going monitoring the following air quality monitoring programmes;

    (i) Arsenic;

    (ii) deposited dust;

    (iii) meteorology; and,

    (iv) real-time TSP and/or PM^{10}.

85. My feedback also included suggested amendments to the definition of the contents of the AQMP aiming to capture the improvements discussed.

Jeffrey George Bluett

17 April 2026

APPENDIX A - ORC MEMORANDUM: Bendigo-Ophir Gold Project Air Quality Assessment Addendum: Visual Dust Monitoring and Instrumental Arsenic Dust Monitoring. 17 March 2026

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memorandum

TO	Cheryl Low	FROM	Jeff Bluett, Technical Director – Air Quality
	Santana Minerals Ltd	DATE	17 March 2026
RE	Bendigo-Ophir Gold Project Air Quality Assessment Addendum: Visual Dust Monitoring and Instrumental Arsenic Dust Monitoring.		

1.0 Introduction

Matakanui Gold Limited (MGL) has lodged a Fast Track consent application for the Bendigo-Ophir Gold Project (BOGP). Included as part of the application was an Air Quality Assessment (AQA) prepared by Pattle Delamore Partners Limited (PDP) (dated 13/10/2025, Fast Track Document Number B.33) and an Air Quality Management Plan (AQMP, dated 05/09/2025, Fast Track Document Number G.23).

The BOGP Fast Track consent application has been reviewed by Otago Regional Council (ORC). In a letter dated 17/12/2025, ORC provided an external peer review of the PDP AQA (SLR, 12/12/2025). Based on the SLR Review, the ORC letter posed nine questions as requests for further information. The responses to the nine questions were provided in two memoranda written by PDP C051440001M002 (dated 29 January 2026) and PDP C051440001M003 (dated 4 February 2026). Following SLR's review of those two memoranda ORC was satisfied that the key issues had been addressed by PDP, and stated that "*There are a couple of areas of minor disagreement, but nothing that I feel like I need further information on at this time*".

To assist the Fast Track Panel, Santana has asked PDP to provide information aimed at resolving these areas of minor disagreement. This memorandum responds to the following two issues:

- An improved way for BOGP staff to assess if visible dust crosses the site boundary; and
- The pros and cons of undertaking low-cost arsenic deposition monitoring.

2.0 Assessing if visible dust crosses the site boundary

SLR considers the previous response incomplete and states: "*Please provide a more detailed explanation of how the "visible dust crossing the boundary" trigger will operate in practice, given that workers in the valley cannot actually see the boundaries*".

Sections 2.1 to 2.4 of this memorandum aim to provide a more detailed explanation of how visible dust crossing the boundary will trigger a dust mitigation response.

2.1 Identifying Site Boundaries During Dust Observations

The BOGP site boundary is shown in Figure 1.

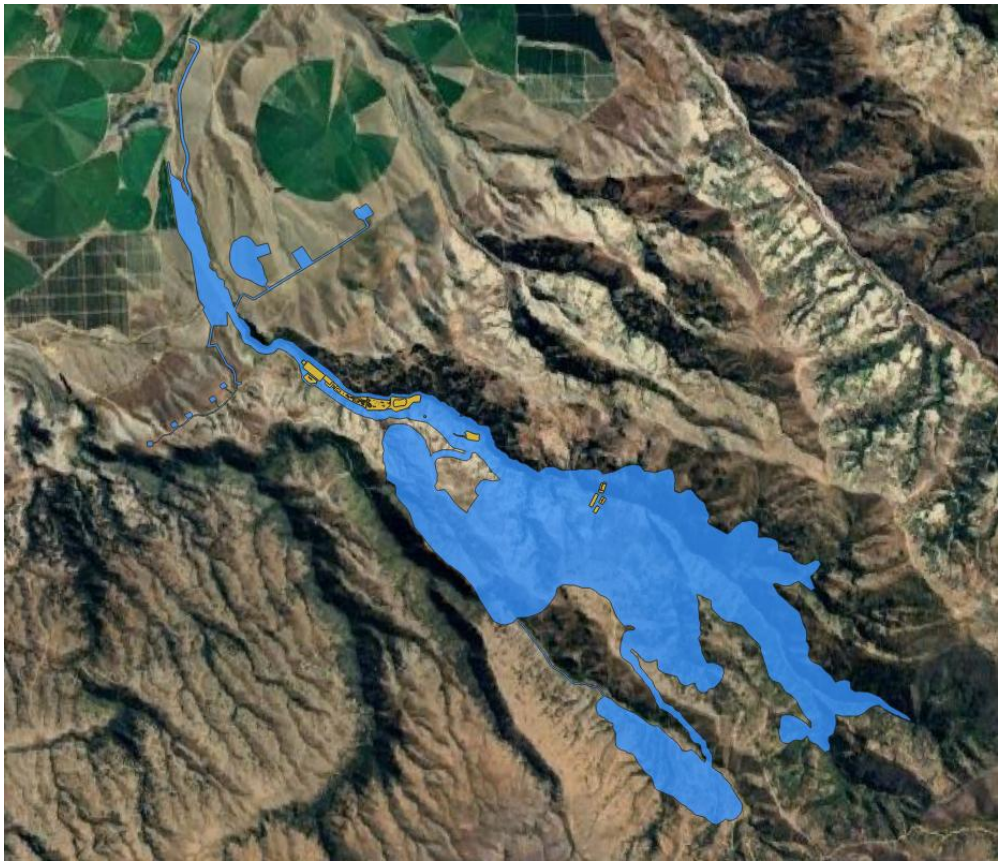


Figure 1: BOGP site boundary

There are no fences or boundary markers for the majority of the site boundary which would enable BOGP staff to assess whether dust plumes are travelling over the boundary. Therefore, they will be required to understand and identify the site boundaries using landmarks.

The main impact area is contained within two valley systems, the RAS Creek Valley and the Shepherds Creek Valley**Error! Reference source not found.**. **Figure 2** shows a plan view of the two valleys within which the BOGP mine will sit. Shepherds Creek valley floor is shown by a green line, the Rise and Shine Creek valley floor is shown by a yellow line. The project outline is shown in blue. Shepherds Creek valley floor is at an approximate elevation of 595 m asl with the northern valley wall rising 290 m over a distance of 1,000 m and the southern valley wall rising high valley wall to the north and 253 m high valley wall to the south. The Rise and Shine Creek valley floor is at an approximate elevation of 756 m asl with the northern valley wall rising 100 m over a distance of 250 m.

The key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary with the two-valley system (red oval in **Figure 2)** are:

- The northern floor of Shepherds Valley forms the northern site boundary;
- The eastern floor of Shepherds Valley forms the northeastern part of eastern site boundary;
- Jean Creek indicates the middle part of the northeastern part of eastern site boundary;
- Rise and Shine Creek and the Clear Water Creek indicate the approximate location of the southern site boundary; and

- The southern floor of Shepherds Valley forms the western part of the southern site boundary.

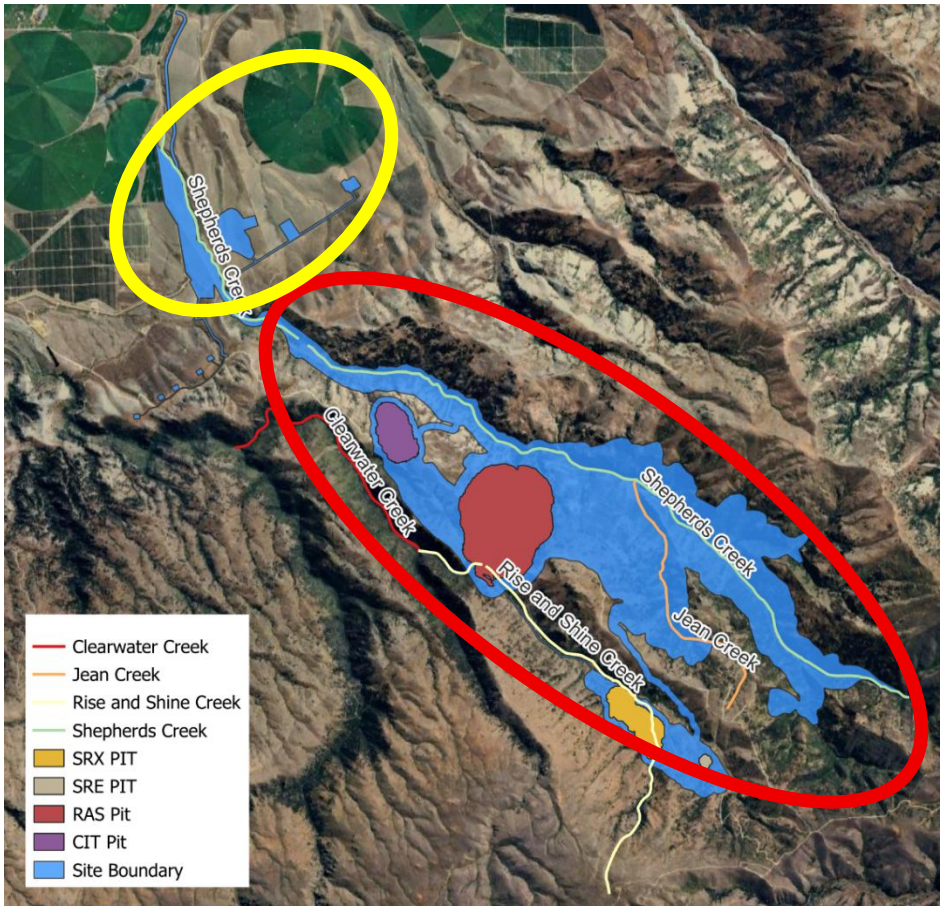


Figure 2: BOGP layout in the RAS Creek valley and the Shepherds Creek valley

The key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary located on the plains to the north of the two-valley system (yellow oval in **Figure 2)** are:

- The fence lines of the accommodation and administration buildings located to the northeast of Thomson Gorge Road;
- 1.5 km Thomson Gorge Road north from the intersection of Matilda rise defines the northern boundary; and,
- 200 m west of Thomson Gorge Road 1.5 km north from the intersection of Matilda rise defines the northern boundary.

The above information which defines key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary will be added to the dust monitoring section of the Air Quality Management.

2.2 Enhanced Descripton of Visible Dust Plumes

To enable BOGP staff to more effectively allocate dust suppression resources to visible dust plumes it would be beneficial to enhance the description of any dust plumes observed. PDP suggests that the dust plumes are classified by three criteria each of which has three sub-classes.

- Colour: brown, light grey, or dark grey/black;

- Opacity: low opacity (little visual impairment - can easily see through plume), medium opacity (some visual impairment – like looking through a dirty window), or high opacity (high visual impairment - cannot see through the plume); and
- Size: low (< 50 m long), medium (50 to 150), large (< 150 m).

These three factors can be combined to provide a qualitative assessment of dust plume impact. By assigning a low classification a value of 1, a medium classification a value of 2 and a high classification a score of three, the three criteria scores can be tallied to give the total impact of the dust plume as shown below:

- Low impact – total of three risk factor scores is 3-4.
- Medium impact – total of three risk factor scores is 5-6.
- High impact. – total of three risk factor scores is 7- 9.

The above information provides a three-level dust impact assessment based on three visual criteria assessed in the field by BOGP. BOGP staff will convey the dust impact assessment to the site manager as part of their visual dust observations. The dust risk assessment will used by the site manager to identify and allocate appropriate dust suppression resources. The three level dust impact assessment process and reporting will be added to the dust monitoring section of the Air Quality Management and log form.

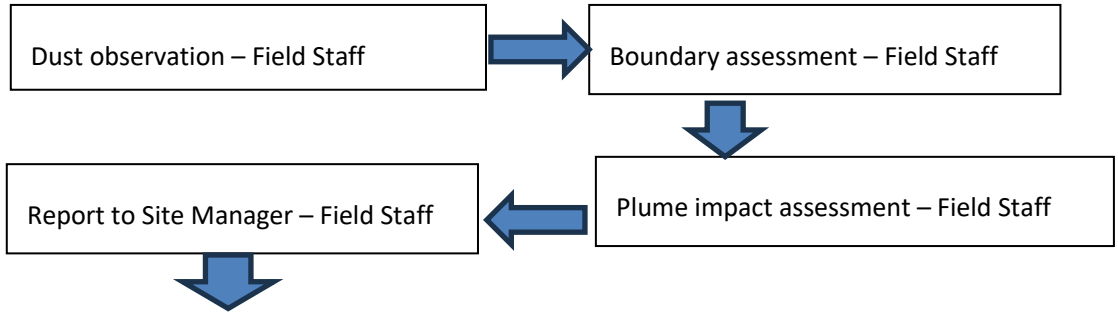
2.3 Communication of and Response to Dust Observations and Impact Assessment

BOGP staff will convey the dust impact assessment via phone call or text message to the site manager as part of their visual dust observations. The dust risk assessment and will used by the site manager to identify and allocate appropriate dust suppression resources.

2.4 Dust Observation and Reporting Workflow Process

The anticipated dust observation and reporting workflow Process is shown in

Figure 3.



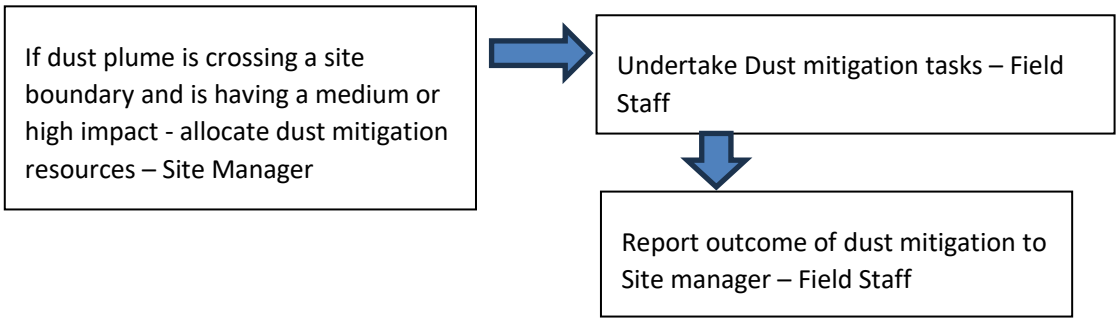


Figure 3: Dust observation and reporting workflow process

2.5 Potential Use of Boundary Dust Cameras

PDP recommend quarterly assessments on the effectiveness of visual observations. The assessment of effectiveness of visual observations should be undertaken by the site management team and consider:

- Staff visual observations as described in Sections 2.1 to 2.4;
- Any dust complaints from public; and,
- Any ORC compliance reports or non-compliance notices.

In the unlikely situation where the quarterly assessment shows that visual dust observations are not being effective then PDP recommend that BOGP consider the installation of a camera to provide an additional supporting input into the dust observations and dust mitigation responses. Any dust camera would be located to capture images of:

- Downwind dust plumes from the problematic dust source/s; and,
- The dust plume moving across the closest boundary.

The potential use of boundary dust cameras will be added to the site's AQMP.

3.0 Low-Cost Arsenic Dust Monitoring

Following SLR's review of the two previous memoranda written by PDP,SLR informed ORC that "*given high levels of Community concern about the project providing monitoring of arsenic transport via atmospheric dispersion remains an action that could be undertaken to alleviate some of these concerns. Additional low-cost arsenic deposition monitoring is still recommended to support community reassurance*."

Sections 3.1 to 3.5 of this memorandum explores the comments made by SLR and PDP's thoughts on undertaking arsenic dust monitoring.

3.1 PDP's Position on the Need to Undertaking Arsenic Dust Monitoring

PDP has undertaken a detailed impact assessment of the potential effects of dust containing arsenic being discharged to air. This is detailed in the site's air quality assessment and explored further in the PDP memorandum C051440001M002 (dated 29 January 2026). In summary PDP considers that the risk of dust from handling arsenic containing soils has been adequately assessed by the AQA and is appropriately controlled by the AQMP. One of the key points to reiterate is that the main area where arsenic containing soils will be worked in any great volume is over 200 m from the site boundary.

This leads PDP to conclude there is no need, and little benefit from undertaking arsenic dust monitoring.

3.2 Methods Available for Arsenic Dust Monitoring

In a report prepared for the Ministry for the Environment (Cavanagh, J. (2024) [1].) it is noted that "*Currently there is no commercially available method for the determination of arsenic in particulate matter. The general method outlined in the European standard EN 14902:2005 is similar to that used for determining arsenic in soils*".

International standards do include methods for measuring the amount of arsenic contained in dust collected from ambient air. PDP has identified the most practical method for the BOGP situation as US EPA Method IO-3.1. Very briefly this method takes pre-field tared filters, runs sample air run through them, and after exposure the filers are reweighed to determine total mass of particulate matter, then the filter and particulate matter are digested in acid (distilled HNO_3 can be used[2]) and analysed by for metals including Arsenic.

PDP has been involved in projects where this method has been used to quantify the amount of metals contained in ambient dust downwind of a metal recycling plant. Our experience with this monitoring method is:

- A filter and pump air sampler system is required; and;
- A meteorological monitoring system should be operated in parallel with the air sampler;

PDP note there are at least two commercially available pieces of equipment that measure dust and metal content of that dust in real time. However, the purchase, shipping, installation and operation of this type of equipment would easily run into a six-figure cost. PDP have not considered these real-time arsenic monitoring options for the BOGP in any detail because in this context, where any sensitive receptors are a long way from the source of dust, the cost of this type of monitoring far outweighs the management benefits gained.

3.3 Ambient Air Health Impact Assessment Criteria for Arsenic

The Ministry for the Environment's New Zealand Ambient Air Quality Guidelines include an annual average guideline for arsenic of 0.0055 $\mu g/m^3$. If any arsenic monitoring were undertaken, then this is the guideline which the measurements would be compared against.

3.4 Practical Considerations of Monitoring Arsenic Dust on the BOGP site

PDP have identified the following practical consideration which would have to be considered if arsenic dust were to be monitored on the BOGP site:

- Potentially one of the air sampling monitors currently operated by BOGP could be quite easily converted to provide the arsenic filter collection function;
- A meteorological monitoring system would need to be installed and operated in parallel with the arsenic air sampler monitor;
- Potentially one of the meteorological monitoring sites operated by BOGP could be quite easily moved to support the arsenic filter collection function;

[1] Cavanagh, J. (2024). Arsenic in air. In: Lohrer, D., et al. Information Stocktakes of FiftyFive Environmental Attributes across Air, Soil, Terrestrial, Freshwater, Estuaries and Coastal Waters Domains. Prepared by NIWA, Manaaki Whenua Landare Research, Cawthron Institute, and Environet Limited for the Ministry for the Environment. NIWA report no. 2024216HN (project MFE24203, June 2024).

[2] https://pmc.ncbi.nlm.nih.gov/articles/PMC10002384/

- Repurposing one of the current dust and wind monitors would compromise monitoring environmental monitoring in another location on site;
- Repurposing BOGP's current kit would encounter labour, engineering and electrical costs. PDP estimate these costs to be in the order of $10,000;
- Purchasing and installing new dust and meteorological monitoring equipment for the purposes of arsenic monitoring would likely incur costs of around $40,000;
- Operating the sites, collecting the filters and having them analysed by a laboratory would be in the order of $1,000 per sample;
- After a 33-day exposure period in the PDP project mentioned earlier, the results for arsenic were below detection levels. Therefore, a long exposure period for any soil dust sampling will likely be required; and,
- To improve the quality of the data an upwind and downwind monitor would potentially be required.

In summary, there is a lot of planning and work required before an arsenic monitoring programme could be implemented on the BOPG.

3.5 PDP's Position on the Benefits of Undertaking Arsenic Dust Monitoring

PDP concludes that it is possible, but not easy to implement an arsenic dust monitoring programme. PDP considers that before the Fast Track Panel decide on whether an arsenic dust monitoring programme might be required, the costs of such a programme (high) be considered alongside the potential risks of the impact from the discharge of dust (low).

If the Fast Track Panel decides that an arsenic dust monitoring programme is required, PDP recommend that an initial screening monitoring programme be undertaken that occurs for three months over summer when the arsenic containing soils are being worked.

If the results of the screening monitoring clearly indicate that concentrations of arsenic will be well below the health assessment criteria then the arsenic monitoring programmed can be ceased. If in the unlikely circumstances concentrations of arsenic are measured which indicate that the annual guideline might be exceeded, then Santana and PDP will work with ORC to discuss if and how the screening programme could be extended.

4.0 Conclusion

This memorandum has responded to the two outstanding issues from the review of the air quality assessment and air quality management plan that SLR undertook for the ORC.

PDP has developed an improved method for BOGP staff to assess and report if visible dust crosses the site boundary. PDP have recommended this new dust monitoring and reporting material be incorporated into an updated Air Quality Management plan for the site.

PDP has explored the pros and cons of undertaking arsenic dust monitoring on the BOGP site. While PDP does not believe the arsenic risk profile of the dust generating activity justifies monitoring, if the Fast Track Decision panel see that a monitoring programme would be beneficial, we have provided a compromise path forward which involves a screening monitoring programme which would be undertaken for a period of three months over one summer period.

5.0 ORC and Matakanui Gold Meeting on Arsenic Ambient Air Sampling

Following the release of this memo on 17 March 2026, ORC and Matakanui Gold meet on 19 March 2026 to discuss the issue of arsenic ambient air sampling. The outcomes of that meeting are recorded in Appendix A and present a departure from PDP's position presented in section 3.5 and 4.0. It is important that this Appendix is read with the rest of the memorandum.

6.0 Closing

PDP trust the information provided in this memorandum satisfactorily addresses the two outstanding issues from the SLR review undertook for ORC on the Air Quality Assessment and Air Quality Management. We appreciate the opportunity to revisit these issues and would be happy to engage with SLR or ORC should they have any follow up questions.

Disclaimer

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Santana Minerals Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This memorandum has been prepared by PDP on the specific instructions of Santana Minerals Ltd for the limited purposes described in the memorandum. PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Prepared by

Jeff Bluett

Service Leader – Air Quality

Reviewed and Approved by

Andrew Curtis

Technical Director – Air Quality

Appendix A. Matakanui Gold Proposed Arsenic Ambient Air Sampling Programme

This email is

1) A record of the outcomes of a meeting between Otago Regional Council and Matakanui Gold on the Proposed Arsenic Ambient air Sampling Programme.
2) Intended to become an appendix to the PDP memorandum C051440001M004_Final_170326

Meeting Attendees:

- Shay McDonald (ORC)
- Graeme Stark (SLR for ORC)
- Cheryl Low (Matakanui Gold)
- Jeff Bluett (PDP for Matakanui Gold)

Key Outcomes:

- Matakanui Gold has agreed to undertake an Arsenic Ambient Air Sampling Programme.
- The Key aim of the monitoring programme is to provide Arsenic Ambient air quality data to inform Stakeholders of the actual impacts of Matakanui Gold's proposed activity.
- The sampling method used will capture dust and arsenic in ambient air (rather than deposited particulate). The sampling and analytical methods are described in the PDP memorandum C051440001M004_Final_170326.
    - As a starting point the filters will be exposed for a period of 30 days. –This exposure period may be varied depending on the amount of material collected. We need to ensure we capture enough material to get above the laboratory's analytical detection limits.
    - A total of 12 filters will be exposed aiming to provide an annual average concentration to be compared against the MfE ambient air quality guideline.
    - The aim is to use Matakanui Gold's two samplers to collect the filters.
- Pre-activity sampling will start as soon as practical to establish baseline Arsenic Ambient Air concentrations.
    - It was agreed a baseline measurement at one site within the valley system should be sufficient.
- When the activity starts on site, arsenic in air will be measured at two locations. Downwind of:
    - Crushing plant.
    - Elevated As soil stockpiles.
- After 12 filters (one year of monitoring), results will be reviewed by OR and Matakanui Gold with the aim of assessing whether the monitoring programme should be extended or can be curtailed because of low As concentrations.

- The Arsenic Ambient Air Sampling Programme will be written up into the site's Air Quality Management Plan
- ORC will review and if happy certify the site's Air Quality Management Plan.

APPENDIX B - UPDATED Air Quality Management Plan: Bendigo Ophir Gold Project. 16 April 2026

MATAKANUI

GOLD LIMITED

Air Quality Management Plan:

Bendigo Ophir Gold Project

Date ~~October 2025~~ April 2026

DOCUMENT CONTROL

Revision	Author	Comments	Date	Approved
DRAFT 1	Jeff Bluett	**DRAFT Status** This version of the AQMP has not been through the PDP review or quality assurance processes. The purpose of this DRAFT is to provide an update on progress to date and allow us to identify any key omissions from the content of the AQMP	04 February 2024	
DRAFT 2	Jeff Bluett	**FINAL DRAFT** This version of the AQMP has been updated to match the final Draft Bendigo-Ophir Gold Project: Assessment of Environmental Effects from the Discharge of Contaminants into Air PDP document number: C051440001R003 Final Draft 240425 Dated: April 2025	30 April 2025	
DRAFT 3	Jeff Bluett	**Revising Draft 3 to address BOGP review comments on DRAFT 2.**	16 May 2025	
FINAL	Jeff Bluett	**Aligning Stage 2 Assessment with updated AQMP following review comments from Daiman Spring**	5 June 2025	
FINAL-R1	Jeff Bluett	**Minor edit – updated soil contamination data**	2 July 2025	
FINAL-R2	Jeff Bluet	**Revised to align with proposed consent conditions**	5/09/2025	
FINAL -R3	Jeff Bluett	**Revised to incorporate ORC review comments, Fast Track Panel review comments and Invited Party review comments.**	17 April 2026	

1. INTRODUCTION

1.1. Plan purpose and scope

Pattle Delamore Partners Ltd (PDP) produced the Bendigo-Ophir Gold Project: Assessment of Environmental Effects from the Discharge of Contaminants into Air [1] on behalf of Matakanui Gold Limited (MGL). That assessment report can be used as a reference for this Air Quality Management Plan (AQMP) as it presents full details on the sources, mitigation, monitoring and effects of the air contaminants discharged from the Bendigo-Ophir Gold Project (BOGP).

This AQMP has been prepared by PDP on behalf of MGL and presents a summary of the key information on the sources, mitigation and monitoring of the air contaminants discharged from the BOGP.

The overarching objective of this AQMP is to set out actions and measures that will be taken by MGL to ensure that air discharges from the BOGP do not result in noxious, dangerous, objectionable, or offensive dust or gases beyond the site boundary.

1.2. Key Objectives

The key objectives of the AQMP are:

- Identify and categorise sources of air contaminants, including dust and gaseous emissions.
- Outline mitigation strategies for managing air quality impacts during the establishment, operation, and restoration phases of the project.
- Establish monitoring protocols for assessing the effectiveness of air quality controls.
- Promote proactive and adaptive management of air quality risks.

1.3. Key Outcomes

The key outcomes from executing the AQMP will be:

- Implementing best practicable options for controlling air contaminant emissions from all site activities.
- Establishing a robust environmental monitoring programme that provides real-time data to assess the effectiveness of air emission control strategies.
- Providing a proactive framework for managing air quality across the development, operational, and restoration phases of the BOGP.

[1] Bendigo-Ophir Gold Project: Assessment of Environmental Effects from the Discharge of Contaminants into Air. Pattle Delamore Partners report number C051440001R003. Dated April 2025.

- Aligning with industry best practice and meet the requirements of relevant consents and environmental standards.
- Defining the types and maximum scale of activities permitted to discharge contaminants into the air.
- Establishing environmental bottom lines and performance measures, including the requirement that no air discharges cause offensive, objectionable, noxious, or dangerous effects beyond the site boundary.
- Requiring implementation of mitigation measures outlined in the AQMP, including dust suppression, buffer distances, and dust emission controls.
- Mandating an environmental monitoring programme to verify the effectiveness of mitigation measures and compliance with performance standards.
- Including provisions for complaints management, reporting, and AQMP review and updates.

2. KEY ENVIRONMENTAL FACTOR: DUST

2.1. Introduction

The activities which have the potential to generate dust within the BOGP are in relation to the establishment, operation and (where required) the restoration of:

- Haul and public roads;
- Ore crushing;
- Tailing storage facility;
- The four open pits;
- Soil and ore stockpiles; and,
- Engineered landforms.

Error! Reference source not found.~~Figure 1~~ shows the footprint of the BOGP and the location of each of the dust sources.

Using the spatial scale, location, frequency and duration of dust discharges and the buffer distances between BOGP dust sources and sensitive receptors, each of the six dust sources have been categorised as either:

- **Priority 1** – Large scale constant dust source requiring routine and intensive dust suppression. Priority 1 dust source will be the focus of the day-to-day routine dust management programme and likely require intensive dust management.
- **Priority 2** – Small scale constant dust source requiring routine dust suppression. Priority 2 dust sources will be part of the day-to-day routine dust management programme but require less intensive dust management.

- **Priority 3** - Small scale intermittent dust source requiring intermittent dust suppression. Due to the intermittent nature of these dust sources, and the site's buffer distances to sensitive receptors, Priority 3 dust sources will be mitigated on a as needed basis.

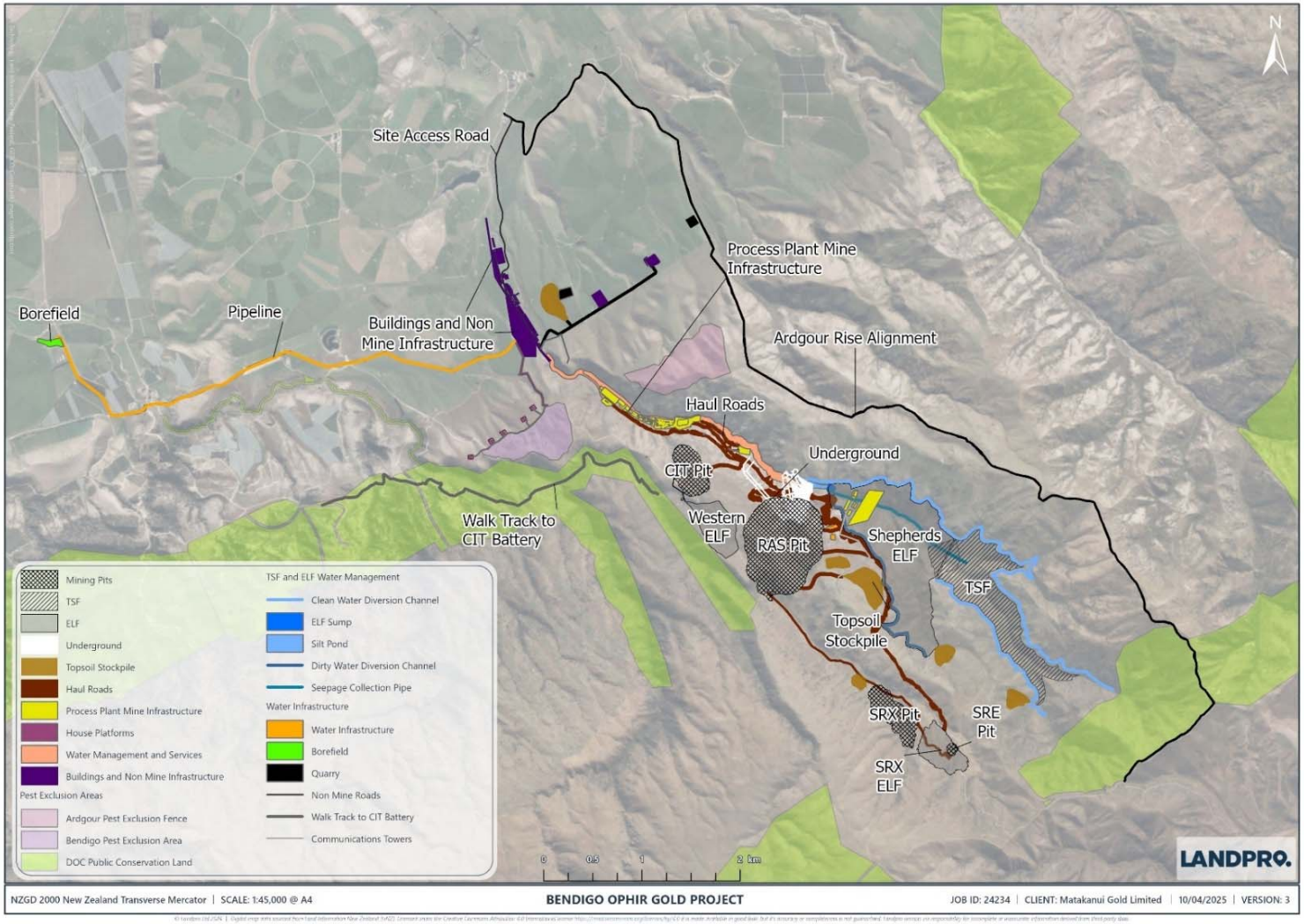


Figure 1 BOGP general site layout and dust sources

The following sections detail BOGP's Priority 1, 2 and 3 dust sources and describe the characteristics of the dust discharged from each source.

2.2. Priority 1 Dust Source – Haul and Public Roads

The BOGP includes the development and use of on-site haul roads which will be travelled by machinery to transport soil, rock, ore and tailings from the pits to stockpiles, Engineered Landforms (ELFs), the processing plant or the Tailings Storage Facility (TSF). The project will also require some small sections of new or re-aligned public roads outside of the site footprint to efficiently connect the BOGP with the local roading network. The consent holder will be responsible for controlling the dust generated from the construction of the affected public roads, however the consent holder is not responsible for controlling the dust generated from the operation of public roads.

The roading works included in the BOGP are:

- Upgrades to the Ardgour and Thomsons Gorge Roads (TGR) from SH8 to the entry point of Shepherds valley;
- A new road from TGR through the "neck" of the lower Shepherds gorge into the process plant area; and
- Ardgour Rise - Re-alignment of the western portion of the TGR to follow the Ardgour ridge through to an existing easement in the DOC reserve and then re-joining with the TGR at Thomsons saddle
- Haul roads – the establishment of haul roads on the project site

The surfaces of the haul and re-engineered public roads will be unsealed gravel. The sources and characteristics of the haul road dust particles are outlined in Table 1~~Table 1~~.

Table 1: Sources and characteristics of unsealed road dust

Activity	Dust type	Relative size of dust source
Haul and public road construction	Soil dust. Brown in colour. Brown rock dust. Brown in colour Mainly TSP (total suspended particulate matter) with a small component of PM_{10}.	Medium
Haul road use	Brown rock dust. Brown in colour. Mainly TSP with a small component of PM_{10}.	Large

2.3. Priority 2 Dust Sources

2.3.1. Ore Processing Plant

Table 2~~Table 2~~ describes the sources and characteristics of ore processing plant dust.

Table 2: Sources and characteristics of ore processing plant dust		
Activity	**Dust type**	**Relative size of dust source**
Run of Mine (ROM) pad.	Grey/black rock dust. Mainly TSP with a small component of PM_{10}.	Small
ROM bin.	Grey/black rock dust. Mainly TSP with a small component of PM_{10}.	Small
Covered crushed ore stockpile.	Grey/black rock dust. Mainly TSP with a small component of PM_{10}.	Medium
Reagent make-up	White dust. Mainly TSP with a small component of PM_{10}.	Small
Lime silo.	White dust. Mainly TSP with a small component of PM_{10}.	Small

2.3.1. Tailings Storage Facility

The sources and characteristics of the TSF dust particles are outlined in Table 3~~Table 3~~.

Table 3: Sources and characteristics of ore processing plant dust		
Activity	**Dust type**	**Relative size of dust source**
TSF construction.	Grey/black rock dust. Mainly TSP with a small component of PM_{10}.	Small.
TSF operation.	Grey/black rock dust. Particulates < 100 μm.	Small.
TSF remediation.	Brown soil dust. Mainly TSP with a small component of PM_{10}.	Medium.

2.4. Priority 3 Dust Sources

Due to the size of the site footprint and distances to off-site receptors, some large dust sources are considered as posing a negligible risk of off-site dust effects. These Priority 3 Dust Sources are detailed below:

2.4.1. Open Pits

The BOGP mine includes four open pits, RAS, CIT, SRX and SRE. Table 4~~Table 4~~ shows the sources and characteristics of pit dust.

Table 4: Sources and characteristics of pit dust		
Activity	**Dust type**	**Relative size of dust source**
Soil overburden removal	Soil dust. Brown in colour Mainly TSP with a small component of PM_{10}.	Large
Drilling and Blasting	Brown waste rock dust or grey ore dust. Mainly TSP with a component of PM_{10}.	Medium
Rock overburden and ore removal	Brown waste rock dust or grey ore dust. Small amounts of TSP with a minor component of PM_{10}.	Small

2.4.2. Soil and Ore Stockpiles

The BOGP mine includes six stockpiles where overburden soil will be stored until it is used for remediation. Table 5~~Table 5~~ shows the sources and characteristics of soil stockpile dust.

Table 5: Sources and characteristics of soil stockpile dust		
Activity	**Dust type**	**Relative size of dust source**
Soil overburden	Soil dust. Brown in colour. Mainly TSP with a small component of PM_{10}.	Medium
Elevated arsenic soil overburden	Soil dust. Brown in colour. Mainly TSP with a small component of PM_{10} containing As with concentrations between 150 and 500 ppm.	Medium

The BOGP mine includes one stockpile where ore will be stored until it is transported to the processing plant. Table 6~~Table 6~~ shows the sources and characteristics of ore stockpile dust.

Table 6: Sources and characteristics of ore stockpile dust		
Activity	**Dust type**	**Relative size of dust source**
Ore rock stockpiling	Ore dust. Black in colour. Mainly TSP with a small component of PM_{10}.	Small

2.4.3. Engineered Landforms

The sources and characteristics of the ELF dust particles are outlined in Table 7~~Table 7~~.

Table 7: Sources and characteristics of ELF dust		
Activity	**Dust type**	**Relative size of dust source**
ELF construction	Brown rock dust. Brown in colour Mainly TSP with a small component of PM_{10}.	Small
ELF rehabilitation	Soil dust. Brown in colour. Mainly TSP with a small component of PM_{10}.	Moderate

3. KEY ENVIRONMENTAL FACTOR: GASEOUS AIR CONTAMINANTS

3.1. Introduction

The BOGP activities which have the potential to discharge gaseous air contaminants are:

- Ore processing plant;
- Machinery and vehicles; and
- Underground mine exhaust portals.

The following sections detail BOGP's sources of gaseous air contaminants and describe the characteristics of the gases discharged from each source.

3.2. Ore Processing Plant

The are three potential sources of gaseous air contaminants and one source of particulate from the ore processing plant:

- Leaching and adsorption tanks;
- Acid wash and elution columns; and,
- Electro-winning cells.

Table 8~~Table 8~~ describes the sources and characteristics of ore processing plant gaseous and particulate air contaminants.

Table 8: Sources and characteristics of ore processing plant gaseous pollutants		
Process	**Pollutant type**	**Quantity of Emission**
Leaching and adsorption tanks	HCN	Zero – subject to mitigation.
Gold recovery Acid wash and elution columns	HCN	Zero – subject to mitigation.
Electro-winning cells	NH_3	Minor
Induction furnace	Particulate and base metals	Minor

3.3. Machinery and Vehicles

The key combustion products discharged from the burning of diesel in machines and vehicles are PM_{10} and NO_X. PDP's experience with large quarry and mining sites shows that the operation of diesel-powered machinery and vehicles are usually a minor source of gaseous contaminants and impacts are always less than minor. For this reason, the effects of combustion products discharged from the burning of diesel in machines and vehicles are not considered further in this AQMP.

3.4. Underground Portals

In the underground mine the following diesel-powered machinery will be operated:

- Two twin boomed development jumbos;
- Three 50-t dump trucks; and
- One 17-t bucket underground loader.

As for the above-ground machines, the key combustion products discharged from the underground machines are PM_{10} and NO_X.

4. RESPONSIBILITIES

4.1. Site Manager and Staff

The Site Manager has the day-to-day responsibility for implementing the AQMP. The Site Manager has the responsibility to ensure that:

- The conditions of all relevant resource consents are complied with at all times;

The dust control and mitigation measures and procedures outlined in the AQMP are implemented effectively;

- There are adequate personnel and equipment on site at all times to implement the dust control;
- Processes and equipment are in place to enable water application outside BOGP operational hours when required;
- The meteorological and dust monitoring programmes are carried out as required, including recording of daily observations;
- Any complaints received are investigated and resolved as far as practicable;
- All records are kept and are available to the relevant regulatory authorities; and
- All personnel working on the Project have responsibility for following the requirements of the air discharge consent conditions and the AQMP and reporting to the Site Manager on these issues.

4.2. Staff Training

Successful dust management depends on appropriate actions by site personnel in effective day-to-day and after-hours operations of the site. Environmental training for all staff will be undertaken as part of the site induction programme. The environmental induction will include the following information specific to this AQMP:

- Information about the activities that may cause dust discharges within the site with the potential to impact neighbouring areas;
- Consent requirements;
- Dust mitigation procedures;
- Description of dust and meteorological monitoring for the site; and
- Complaints management procedures.
- Staff training records will be maintained on site. The records will include:
    - Who was trained;
    - When the person was trained; and
    - General description of training content and whether follow up/refresher courses are required at a later date.

5. MANAGEMENT OBJECTIVES: DUST MITIGATION

5.1. Good Practice Mitigation – All Dust Sources

All Priority 1, 2 and 3 dust sources will, as far as practical, be constructed, operated and (where required) decommissioned using good practice dust mitigation as detailed in **Table 9~~Table 9~~**.

Table 9: Good Practice Mitigation – Design Measures	
Mitigation and Design	**Description**
Phasing of extraction activities	As far as practicable, dust-generating activities have been located away from highly sensitive receptors. Minimisation of dust through site design is addressed through extraction of ore in 3 stages, minimising unconsolidated areas.
Design and location of dust-generating activities	Stockpiles, haul roads, and exposed areas have been located distant from sensitive receptors.
Management	An AQMP has been produced and will be adhered to. Effective site management practices are critical to demonstrate the willingness of the operator to control dust emissions and provides a mechanism for auditing site operations. Such management procedures are outlined within the AQMP. This includes recording of all dust and air quality complaints, identification of cause(s), appropriate measures taken to reduce emissions in a timely manner, and record of the measures taken.
Provision for water supply	Planning and design of the scheme has made provision for water supply to meet the site demand for mitigation and dampening.
Equipment and vehicles	The site has been designed to minimise haul route distances and to locate haul routes away from sensitive receptors.
Planting	Soil stockpiles will have surfaces stabilised by planting of vegetation.
Training	MGL will provide training to the site personnel on dust mitigation. Training will also cover 'emergency preparedness plans' to react quickly in case of any failure of the planned dust mitigation.
Monitoring	An appropriate monitoring scheme will be implemented. This includes a range of monitoring methods from visual inspections, wind monitoring and real-time PM_{10} continuous monitoring locations. MGL will undertake daily on-site inspections, audit the monitoring programme, carry out

Table 9: Good Practice Mitigation – Design Measures	
Mitigation and Design	**Description**
	regular site inspections to monitor compliance with the AQMP and adjust the frequency of site inspections according to dust risk (higher frequency in dry and windy conditions)
Communication	MGL aims to maintain good communication to help alleviate anxieties between the operators and the surrounding communities.
Planning of activities	Some activities should ideally be planned only during favourable weather conditions. Where possible, particularly dusty activities should be avoided during extended periods of dry and windy conditions. Excavation of ore from open pits and earthworks activities will cease if winds are greater than 7.5 m/s and when dust can be seen blowing over the site boundary.
Vehicle movements	Standard good practices for site haulage include: • Regular clearing, grading and maintenance of haul routes. • When sensitive receptors are within 250 m of a highly trafficked area lay down a bed of pea metal (<6mm stone), which keeps the truck tyres out of contact with fine dust. • Setting a site-specific and enforceable speed limit of 60 km/hour. • The speed limit reduces to 20 km/hour on sections of road when the road surface and/or wind conditions are such that dust plumes are likely to be blown across the site boundary. • Evenly loading vehicles to avoid spillages. • Regular application of water in dry conditions.

5.2. Priority 1 Dust Source - Haul Roads and Public Road Works

Table 10: Unsealed road dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Haul road construction. • Upgrades to Ardgour and Thomsons Gorge	Establishing haul road foundation by backhoe excavator and tracked dozer.	Not undertaking haul road construction activities when windspeeds are greater than 7.5 m/s and toward sensitive receptors within 500 m of the site boundary and when dust can be seen blowing over the site boundary.

Table 10: Unsealed road dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Roads (TGR) from SH8 to the entry point of Shepherds valley. • A new road from TGR into the process plant area. • Re-alignment of the western portion of the TGR to follow the Ardgour ridge.	Establishing roadway surface dumping surface material from rigid body dump truck and rolling surface. Wind erosion on unconsolidated surfaces.	Minimising drop heights from excavator and dump truck. Dampen surface of construction surfaces. Maintain adequate buffer distance (>250 m) to sensitive receptors.
Haul road use	Up to 420 vehicle movements per day. 68% light duty vehicles. - <3,500 kg tare weight 32 % heavy duty vehicles - >3,500 kg tare weight.	Engineered surface which minimises free fine material which can generate dust. Maintain haul road surfaces to avoid excess fines and potholes. Reduction of speed limit to 20 kph when dust can be seen blowing over the site boundary. Dampen surface of haul roads in response to any discharged road dust blowing over the site boundary.

5.3. Priority 2 Dust Sources

5.3.1. Ore Processing Plant

Table 11: Ore processing plant dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Run of Mine (ROM) pad.	ROM ore is stockpiled on the pad for blending into the plant feed. ROM ore is deposited by trucks and	Maintain adequate buffer distance (>500 m) to sensitive receptors.

Table 11: Ore processing plant dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
	moved by front-end Loader (FEL).	Dust mitigation by water truck or sprinkler in response to any ROM dust blowing over the site boundary.
ROM bin.	ROM Ore is deposited into the open ROM bin by FEL.	Dust mitigation by water sprays. Feed out of this bin is by apron feed, water sprays at transfer points Automated as FEL approaches bin and over jaw crusher.
Covered crushed ore stockpile.	Material is deposited into the crushed ore stockpile by conveyor. Ore is removed by apron feeders located in a tunnel below the stockpile.	Water sprays at transfer points to mitigate dust. Ore crusher fitted with high pressure low volume misting system. Dust mitigation in tunnel is by extraction at transfer points and extraction along tunnel length to a wet scrubber.
Lime silo.	Silo delivers lime into mill feed conveyor which is transporting primary crushed ore via a screw feeder.	Silo dust collector is reverse pulse baghouse with felt bags and will return collected dust to the silo. Lime transfer to the conveyor belt by a screw feeder with minimal drop height.
Reagent make-up.	Dry reagents are unloaded from bulk bags.	All dry reagents are unloaded from bulk bags inside an enclosed bulk bag breaker located directly above the make-up tank to contain dust.

5.3.2. Tailings Storage Facility

Table 12: Tailings Storage Facility dust generating activities and dust mitigation strategies		
Activity		Mitigation measures
TSF construction.	Rock overburden dumped by dump truck and ELF formed by tracked dozer.	Maintain adequate buffer distance (500 m) to sensitive receptors.
TSF operation.	The tailings are pumped to the TSF as a slurry and are wet when they arrive and are deposited.	The continuous delivery of the tailings slurry to the TSF keeps the surface damp.

Table 12: Tailings Storage Facility dust generating activities and dust mitigation strategies		
Activity		Mitigation measures
		Spraying water on the dry tailing beaches; Redirecting incoming high moisture tailings toward exposed dry beach areas; Covering dry beach areas area with non-dusty materials e.g. small waste aggregate; or Accelerated soil toping and vegetative remediation of dry beach areas.
TSF remediation.	Dumping soil from dump truck. Shaping soil covering by backhoe excavator and tracked dozer. Wind erosion on unconsolidated surfaces.	Targeting the soil stockpile building or disturbance for the cooler and wetter months of the year when soil moisture content is relatively high (March to October). Not undertaking soil stockpile building or disturbance when: • Windspeeds are greater than 7.5 m/s; **and** • Winds are blowing toward sensitive receptors within 500 m of the site boundary; **and,** • Dust can be seen blowing over the site boundary Minimising drop heights from excavator and dump truck. Dampen surface of soil in response to any ROM dust blowing over the site boundary. Maintain adequate buffer distance (500 m) to sensitive receptors. Establish vegetative cover on stockpile surface which is resistant to wind erosion.

5.4. Priority 3 Dust Sources

5.4.1. Open Pits

Table 1213: Pit dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Soil overburden removal	Soil scraping by tracked dozer. Soil loaded into dump truck by backhoe excavator or wheeled FEL.	Not undertaking soil overburden removal when windspeeds are greater than 7.5 m/s **and** toward sensitive receptors within 500 m of the site boundary **and** when dust is seen blowing over the site boundary. Minimising drop heights from excavator to dump truck. Dampen surface of soil where dry soil is seen to be causing dust discharges. Maintain adequate buffer distance (500 m) to sensitive receptors.
Drilling and Blasting	Bulk waste drilling Ore drilling	Not undertaking drilling or blasting when windspeeds are greater than 7.5 m/s **and** toward sensitive receptors within 500 m of the site boundary **and** when dust is seen blowing over the site boundary. Maintain adequate buffer distance (500 m) to sensitive receptors.
Rock overburden and ore removal	Rock overburden and ore loaded into dump truck by backhoe excavator or wheeled FEL.	Not undertaking rock overburden and ore removal when the rock material is coated with fines **and** windspeeds are greater than 7.5 m/s **and** toward sensitive receptors within 500 m of the site boundary and when dust can be seen blowing over the site boundary.

Table 1213: Pit dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
		Maintain adequate buffer distance (500 m) to sensitive receptors.

5.4.2. Soil and Ore Stockpiles

Table 1314: Soil stockpile dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Soil overburden	Dumping soil from dump truck Shaping soil stockpile by backhoe excavator or tracked dozer. Wind erosion on unconsolidated surfaces.	Targeting the soil stockpile building or disturbance for when the soil moisture and/or wind conditions are such that dust plumes are unlikely to be blown across the site boundary. Minimising drop heights from excavator and dump truck. Dampen surface of soil in response to any soil dust blowing over the site boundary. Maintain adequate buffer distance (500 m) to sensitive receptors. Establish vegetative cover on stockpile surface which is resistant to wind erosion. Build soil stockpiles to a maximum height of 30 m.
Elevated arsenic soil overburden		Keep elevated arsenic soil overburden in a separate stockpile. Do not mix with uncontaminated soils. Document the location and quantity of elevated As soil stockpiles. Dampen surface elevated As soil stockpiles in response to any soil dust witnessed.

Table 1314: Soil stockpile dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
		Minimise time elevated As soil is stockpiled. Where practical direct transfer elevated As soils to rehabilitation areas where the native material was high in As. Establish vegetative cover on elevated As soil stockpile surfaces which is resistant to wind erosion. Use elevated As soil overburden for rehabilitation in areas with naturally elevated levels of these contaminants (i.e. Soil from SRX pit used on SRX ELF, Soil from southwest side of CIT returned to SW side during rehabilitation of CIT).

Table 1415: Ore rock stockpile dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
Ore rock stockpiling	Dumping Rock from dump truck Shaping ore stockpile by wheeled FEL. Wind erosion on unconsolidated surfaces.	Minimising drop heights from excavator and dump truck. Maintain adequate buffer distance (500 m) to sensitive receptors.

5.4.3. Engineered Landforms

Table 1516: ELF dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
ELF construction	Rock overburden dumped by dump truck and ELF formed	Maintain adequate buffer distance (500 m) to sensitive receptors.

Table 1516: ELF dust generating activities and dust mitigation strategies		
Activity	**Dust generation method**	**Mitigation measures**
	by backhoe excavator or tracked dozer.	
ELF rehabilitation	Dumping soil from dump truck. Shaping soil covering by backhoe excavator or tracked dozer. Wind erosion on unconsolidated surfaces.	Targeting the soil stockpile building or disturbance for when wind conditions are such that dust plumes are unlikely to be blown across the site boundary. Minimising drop heights from excavator and dump truck. Dampen surface of soil in the working area in response to any soil dust blowing over the site boundary. Maintain adequate buffer distance (500 m) to sensitive receptors. Establish vegetative cover on stockpile surface which is resistant to wind erosion.

6. MANAGEMENT OBJECTIVES: WATER FOR DUST SUPPRESSION

6.1. Water Demand

One of the key dust mitigation measures is the application of water. As a benchmark for dust suppression the Ministry for the Environment Good practice guide on assessing and managing dust recommends a water application rate 1 mm/hour (or 1 litre/m^2 per hour). This recommended water application rate often proves to be conservative because site evapo-transpiration data usually peaks at 0.8mm/hour on the hottest part of the hottest days over summer.

Three stages of the mine life cycle have been identified as providing representative scenarios for assessing the water demand for dust mitigation. The three stages of the mine life cycle assessed are detailed in **Table 17** which shows the volume of water per hour required for dust suppression for each of the three assessment scenarios.

Table 1617: Mine life cycle stages for assessing dust mitigation water demand		
Stage of mine life cycle	**Timing (years)**	**Dust Sources**

Startup and Project Development	0 to 2	Accommodation area development Haul Roads and public roads development Ore Processing plant development RAS site prep Soil stockpiles
RAS pit mining on its own	3 to 5	Haul Roads use RAS pit Processing plant Soil stockpiles
RAS Pit plus RAS UG, plus CIT (CIT Pit mined months 102 to 114) (SRX Pit mined months 145 onwards)	6 to 11	Haul Roads use RAS pit CIT Pit Processing plant Soil stockpiles

The dust suppression water demand volumes have been calculated for the three assessment scenarios using the following assumptions:

- Water application rate 1 mm/hr (1 L/m^2/hr);
- Water applied to roads for 8 hours per day;
- 10 % of infrastructure construction site areas may need water suppression at any one time;
- 50% of active ELF area may need water suppression at any one time;
- 50% of haul Roads may need water suppression at any one time; and,
- Processing plant requires 10 m^3/hr for dust suppression.

Table 17~~Table 18~~ shows the volume of water per hour required for dust suppression for the key dust sources associated with each of the three site-development and operational scenarios.

Table 17~~18~~: Dust mitigation water demand				
Stage of mine life cycle	**Dust Sources**	**Area of dust source (ha)**	**Dust suppression area (ha)**	**Volume of water (m^3/hr)**
Startup and Project Development Years 1 and 2	Accommodation area development	15	1.5	15
	Ore Processing plant development	10	1	10
	Haul Road RAS to Plant	3.2	1.6	16.2
	Haul Road RAS to ELF	8.7	4.4	43.5
	ELF	1	0.5	5
	Haul road length to topsoil outside	3.9	1.9	19.3
	Infrastructure area	2	1	10.2
	Haul road to TS stack	2	1	10.2
	Total volume of dust suppression water (m^3/hr)			**129 (36 l/s)**
RAS pit mining Years 3 to 5	Haul Road RAS to Plant	**3.2**	**1.6**	16.2
	Haul Road RAS to ELF	**8.7**	**4.4**	43.5
	ELF	**1**	**0.5**	5
	Haul road length to topsoil outside	**3.9**	**1.9**	19.3
	Dust suppression infrastructure area	**2**	**1**	10.2
	Average haul road to TS stack	**2**	**1**	10.2
	Processing plant	**NA**	**NA**	10
	Total volume of dust suppression water (m^3/hr)			**114 (32 l/s)**
RAS pit plus CIT or SRX pit mining Years 6 to 11	Haul Road RAS to Plant	**3.2**	**1.6**	16.2
	Haul Road RAS to ELF	**8.7**	**4.4**	43.5
	ELF	**1**	**0.5**	5
	Haul road length to topsoil outside	**3.9**	**1.9**	19.3
	Dust suppression infrastructure area	**2**	**1**	10.2

Table 17~~18~~: Dust mitigation water demand				
Stage of mine life cycle	**Dust Sources**	**Area of dust source (ha)**	**Dust suppression area (ha)**	**Volume of water (m^3/hr)**
	Average haul road to TS stack	**2**	**1**	10.2
	Processing plant	**NA**	**NA**	10
	CIT or SRX to Plant/ELF	**7.5**	**3.7**	37.4
	Total volume of dust suppression water (m^3/hr)			**152 (42 l/s)**

6.2. Water Supply

The BOGP water supply system will need to be designed to deliver up to 50 l/s, 180 m^3/hr or 4,320 m^3/day for the purposes of dust suppression. In addition to the BOGP water supply system, two years after the start of the site development, a minimum of 5 l/s water will be available for dust suppression from the dewatering of the pits.

6.3. Applying Water to the Site

MGL will ensure that 50 l/s of water is available daily for potential dust suppression purposes for the first two years of site development and a minimum of 55 l/s in subsequent years. There will be two dust suppression water carts on site. Use of a cart rather than fixed sprinkler lines allows dust suppression target areas to move around with staging of ore extraction. Should the need be identified by visual dust monitoring, this AQMP will be reviewed to determine the need for fixed sprinklers, mobile k-line sprinkler system, and water truck with cannon for haul roads and active mine areas in addition to the water cart.

During the period of peak demand for dust suppression water (summer for RAS pit plus CIT or SRX pit mining) the water demand is estimated to be 42 l/s. The water supply during that period will be at least 55 l/s. This means there will be at least 12 l/s (43 m^3/hr) available for dust suppression for any dust sources beyond those identified in Table 17~~Table 18~~ which may on occasion require suppression (e.g. soil overburden removal, soil stockpiles, soil bunds).

In summary, the site provides sufficient water for typical and for high demand dust suppression. All water supply and dust mitigation systems installed will be designed to

ensure 1 mm water per hour over mine operation target areas on dry days at any stage of the mine's life.

7. MANAGEMENT OBJECTIVES: GASEOUS AIR CONTAMINANTS

Table 18~~Table 19~~ details the ore processing plant gaseous air and particulate contaminants generating activities and gas mitigation strategies.

Table 18~~19~~: Ore processing plant gaseous pollutant generating activities and mitigation measures

Activity	Gas generation method	Mitigation measures
Leaching and adsorption tanks	CN^- ions in solution may combine with H^+ ions to produce HCN gas.	OHS requirements. pH maintained at >10.5. pH Alarms and HCN sensors.
Gold recovery Acid wash and elution columns	CN^- ions in solution may combine with H^+ ions to produce HCN gas.	OHS requirements. pH maintained at >10.5. pH Alarms and HCN sensors.
Electro-winning cells	During the electrowinning process a small amount of NH_3 may be generated.	Gases from the electrowinning cells are captured by a hood and then are fan forced and vented to the atmosphere and from a 15 m high stack for adequate dispersion.
Induction furnace	The gold smelting process removes impurities from gold ore. These could be the original impurities found in gold deposits in the earth, or impurities added to gold in manufacturing. To remove these impurities, extremely high temperatures, pressure and a number of fluxes are used. In these extreme conditions, particulate matter can be produced and discharged from the liquid mixture of metals and	Fume hood. Glass silica curtains. Furnace Bag Filter System. Comprehensive dust extraction system. Environmental and OHS requirements. Reverse Jet self-cleaning polyester filter bags. Any fumes are captured by a hood and then are fan forced and vented to the atmosphere and from a 15 m high stack for adequate dispersion.

Table 1819: Ore processing plant gaseous pollutant generating activities and mitigation measures		
Activity	**Gas generation method**	**Mitigation measures**
	slag (SiO_2) contained in the furnace curable.	

The vehicle, machine and generator engines and all associated emission control systems will be routinely maintained in accordance with the manufacturer's instructions.

The underground mine will be served by two inlet ventilation portals fitted with 110 kW ventilation fans. Two fans will draw air down into the mine and two fans to drive air back up and discharge via the by two ventilation portals. The underground mine ventilation system will draw up to 200 m^3/s which is more than sufficient to meet the health and safety requirements for the miners working underground. The ventilation portals will be 3 m wide and 3 m high and discharge horizontally at ground level.

Given the number of vehicles and machines used on the surface and underground on site, the vehicle maintenance programme and underground ventilation system will be sufficient to ensure no adverse effects will occur from this source of contaminants.

8. MANAGEMENT OBJECTIVES: COMPLAINTS

8.1. Receipt Procedure

MGL acknowledges the importance of ensuring that any complaints are recorded and promptly investigated to identify and resolve the cause of the complaint. Requirements and procedures for complaints are detailed below.

The Site Manager is responsible for response to and follow up all complaints regarding dust or any other air quality matters, and to ensure that suitable trained personnel are available to respond to complaints at all times.

Following the receipt of a complaint the Site Manager must, and in the mind of the Site Manager there are reasonable grounds that a breach of the consent conditions is possible as soon as is possible, respond as follows:

- Undertake a site inspection. Check the required dust controls are in place. Note all dust-producing activities taking place and the mitigation methods being used, take photographs for reference as appropriate. If the complaint was related to an event in the recent past, where possible, note any dust-producing activities taking place at that time and review on site weather records and shift plan and report;
- Initiate any remedial action necessary, which may include a stop work period;

- Note the time and date of the complaint/s and (unless the complainant refuses to provide them) the identity and contact details of the complainant. Ask the complainant to describe the discharge:
- Is it constant or intermittent?
- How long has it been going on for?
- Is it worse at any time of day?
- Does it come from an identifiable source?
- Review meteorological data from the on-site station;
- Note if the complaint has been referred to the ORC;
- As soon as possible (within 1 hour, where practicable), visit the area from where the complaint originated to ascertain if dust is still a problem;
- If it becomes apparent that there may be a source of dust other than the BOGP activities causing the complaint, it is important to verify this, for example, photograph the source and emissions and/or make notes;
- As soon as possible after initial investigations have been completed, contact the complainant to explain any problems found and remedial actions taken; and
- If necessary, update any relevant procedures to prevent any recurrence of problems and record any remedial action taken.

8.2. Response Procedure

Following the receipt of the complaint, and in the mind of the Site Manager there are reasonable grounds that a breach of the consent conditions is possible, the following actions will be undertaken:

- Fill out the appropriate complaint form;
- Advise site personnel as soon as is practicable that a complaint has been received, what the findings of the investigation were, and any remedial action taken; and
- Call or visit the complainant to update them on the actions taken and to check that the issue has been resolved.

9. ENVIRONMENTAL MONITORING

The environmental monitoring that will be undertaken to achieve the air quality management objectives are detailed in the following sections.

~~9.~~10. Dust Monitoring - Visual

~~9.1.~~10.1. Method

Visual monitoring of dust must be undertaken to assess the level of dust emissions on the site and beyond its boundary. The visual monitoring will:

- Identity source(s) of dust (e.g. from vehicle movements, stockpiles, earthworks or material disturbance, etc.);
- Identify any areas of deposited dust from the site on surrounding roads and properties;
- Assess the extent and direction of any dust plumes (e.g. within boundary, cross-boundary, or covering a large extent);
- Identify receptors potentially impacted by the plume (e.g. properties downwind to the northeast);
- Assess overall impact as high, medium, or low.

All staff are required to continuously monitor activities to identify dust events. The Site Manager or delegate undertakes site visual dust monitoring at least once per day, in the early afternoon, to assess the overall effectiveness of the AQMP and ensure compliance with the requirements of the resource consent conditions.

10.2. Description of Visible Dust Plumes

To enable BOGP staff to more effectively allocate dust suppression resources to visible dust plumes it would be beneficial to enhance the description of any dust plumes observed. PDP suggests that the dust plumes are classified by three criteria each of which has three sub-classes.

- Colour: brown, light grey, or dark grey/black;
- Opacity: low opacity (little visual impairment - can easily see through plume), medium opacity (some visual impairment – like looking through a dirty window), or high opacity (high visual impairment - cannot see through the plume); and
- Size: low (< 50 m long), medium (50 to 150), large (< 150 m).

These three factors can be combined to provide a qualitative assessment of dust plume impact. By assigning a low classification a value of 1, a medium classification a value of 2 and a high classification a score of three, the three criteria scores can be tallied to give the total impact of the dust plume as shown below:

- Low impact – total of three risk factor scores is 3-4.
- Medium impact – total of three risk factor scores is 5-6.
- High impact. – total of three risk factor scores is 7- 9.

The above information provides a three-level dust impact assessment based on three visual criteria assessed in the field by BOGP. BOGP staff will convey the dust impact assessment to the site manager as part of their visual dust observations. The dust risk assessment will used by the site manager to identify and allocate appropriate dust suppression resources. The three level dust impact assessment process and reporting will be added to the dust monitoring section of the Air Quality Management and log form.

10.3. Communication of and Response to Dust Observations and Impact Assessment

BOGP staff will convey the dust impact assessment via phone call or text message to the site manager as part of their visual dust observations. The dust risk assessment and will used by the site manager to identify and allocate appropriate dust suppression resources.

10.4. Dust Observation and Reporting Workflow Process

The anticipated dust observation and reporting workflow Process is shown in Figure 2.

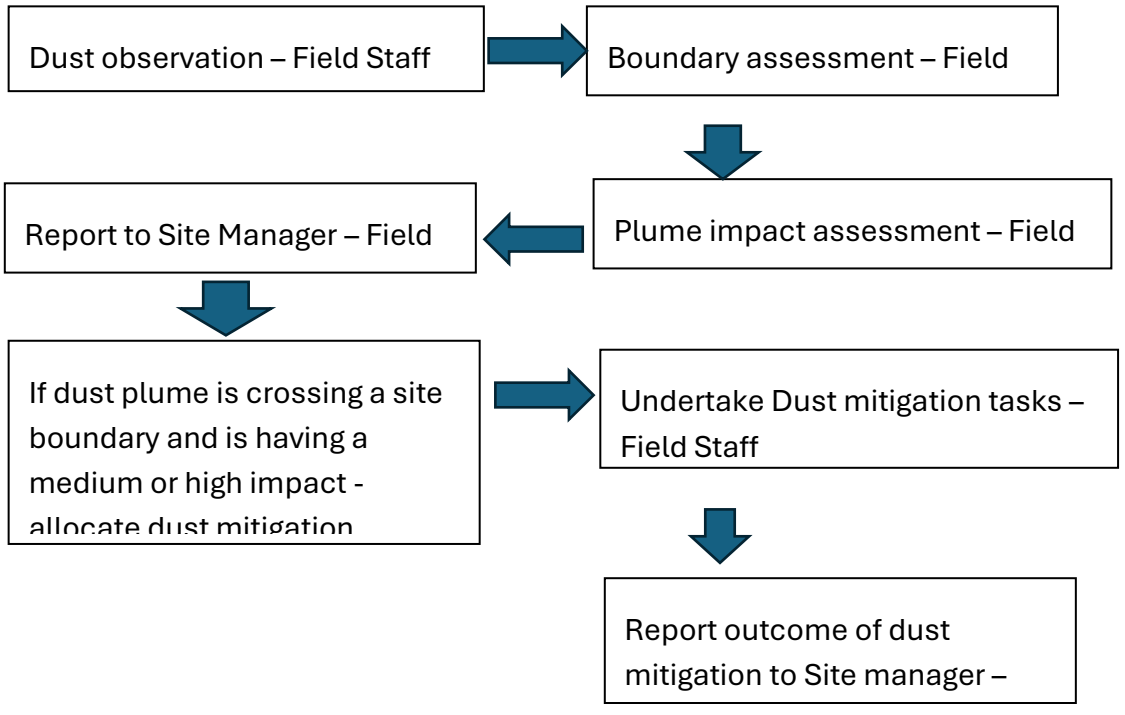


Figure 2: Dust observation and reporting workflow process

10.5. Identifying Site Boundaries During Dust Observations

The BOGP site boundary is shown in Figure 3~~Figure 3~~~~Figure 1~~.

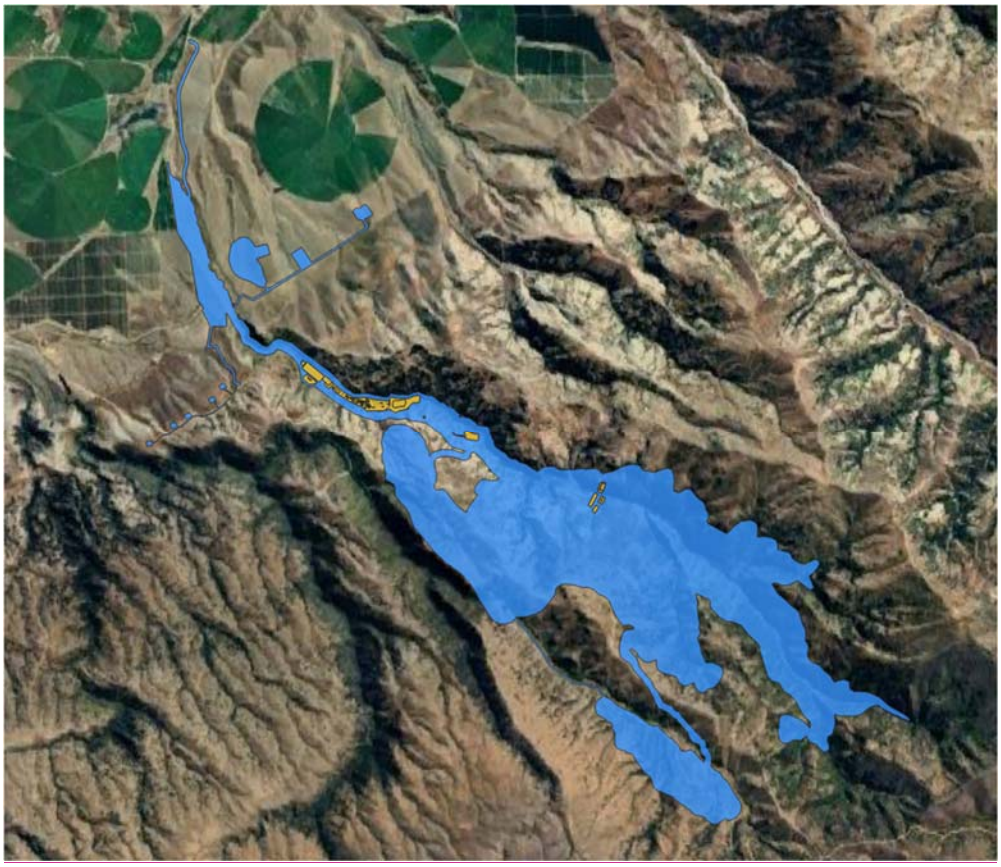


Figure 3~~3~~1: BOGP site boundary

There are no fences or boundary markers for the majority of the site boundary which would enable BOGP staff to assess whether dust plumes are travelling over the boundary. Therefore, they will be required to understand and identify the site boundaries using landmarks.

The main impact area is contained within two valley systems, the RAS Creek Valley and the Shepherds Creek Valley**Error! Reference source not found.**. **Figure 4~~Figure 4~~**~~Figure 2~~ shows a plan view of the two valleys within which the BOGP mine will sit. Shepherds Creek valley floor is shown by a green line, the Rise and Shine Creek valley floor is shown by a yellow line. The project outline is shown in blue. Shepherds Creek valley floor is at an approximate elevation of 595 m asl with the northern valley wall rising 290 m over a distance of 1,000 m and the southern valley wall rising high valley wall to the north and 253

m high valley wall to the south. The Rise and Shine Creek valley floor is at an approximate elevation of 756 m asl with the northern valley wall rising 100 m over a distance of 250 m.

The key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary with the two-valley system (red oval in **Figure 4**~~**Figure 4**~~Figure ~~2~~) are:

- The northern floor of Shepherds Valley forms the northern site boundary;
- The eastern floor of Shepherds Valley forms the northeastern part of eastern site boundary;
- Jean Creek indicates the middle part of the northeastern part of eastern site boundary;
- Rise and Shine Creek and the Clear Water Creek indicate the approximate location of the southern site boundary; and
- The southern floor of Shepherds Valley forms the western part of the southern site boundary.

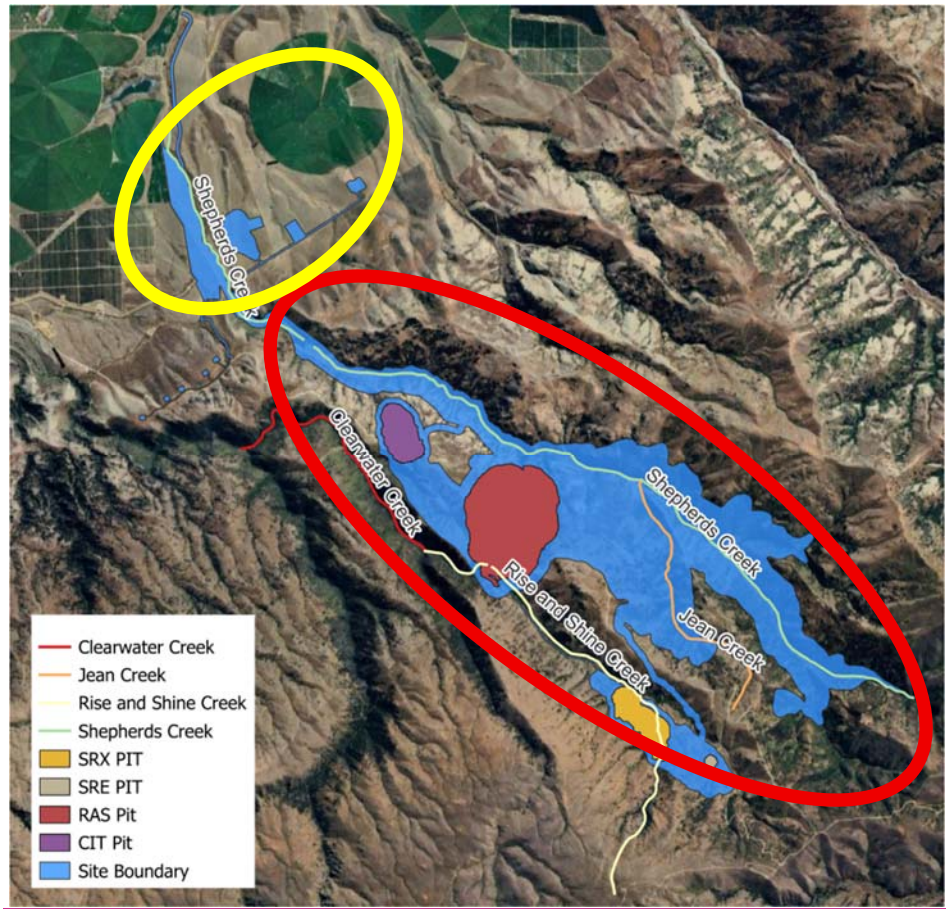


Figure 4: BOGP layout in the RAS Creek valley and the Shepherds Creek valley

The key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary located on the plains to the north of the two-valley system (yellow oval in **Figure 4**~~**Figure 4**~~Figure ~~2~~**)** are:

- The fence lines of the accommodation and administration buildings located to the northeast of Thomson Gorge Road;
- 1.5 km Thomson Gorge Road north from the intersection of Matilda rise defines the northern boundary; and,
- 200 m west of Thomson Gorge Road 1.5 km north from the intersection of Matilda rise defines the northern boundary.

The above information which defines key landmarks which BOGP staff will use to visually identify the approximate location of the site boundary will be added to the dust monitoring section of the Air Quality Management. Potential Use of Boundary Dust Cameras

PDP recommend quarterly assessments on the effectiveness of visual observations. The assessment of effectiveness of visual observations should be undertaken by the site management team and consider:

- Staff visual observations as described in Sections 2.1 to 2.4;
- Any dust complaints from public; and,
- Any ORC compliance reports or non-compliance notices.

In the unlikely situation where the quarterly assessment shows that visual dust observations are not being effective then PDP recommend that BOGP consider the installation of a camera to provide an additional supporting input into the dust observations and dust mitigation responses. Any dust camera would be located to capture images of:

- Downwind dust plumes from the problematic dust source/s; and,
- The dust plume moving across the closest boundary.

The potential use of boundary dust cameras will be added to the site's AQMP.

Site observations are recorded in a daily log form and the daily log forms will be kept for at least 3 years.

~~9.1.1.~~10.5.1. Action and Responses

Recording relevant inspection results, as well as the conditions of external and internal factors on the log forms, must be used to help assess if control measures are effective and

to define appropriate corrective or preventative actions in the event that adverse effects occur.

~~10.~~11. Dust Monitoring – Deposition

~~10.1.1.~~11.1.1. Sites and equipment

The Consent Holder must undertake dust deposition monitoring Sampling programme as described in this condition:

a. Background concentration of deposited dust must be determined as detailed in the AQMP prior to any significant soil or rock excavation starts;

b. Background dust deposition monitoring must commence– as soon as bulk materials are being handled and/or excavated on site; and,

c. Impact dust deposition monitoring must commence start as significant soil or rock excavation starts.

Figure 5~~**Figure 5**~~**Figure 2** shows the location of the five dust deposition monitoring sites that have been installed to collect dust data to assess and manage the impact of dust discharged from BOGP. The sampling method will as closely as practical, follow the requirements of Australia/New Zealand is AS/NZS 3580.10.1:2016 (Deposited matter - Gravimetric method). This monitoring programme must be undertaken for the duration of this consent unless the review process determines otherwise.A photograph of a dust deposition gauge is shown in **Figure 6**~~**Figure 6**~~**Figure 3**. The metadata for each of the dust deposition monitoring sites is shown in **Table 19**~~**Table 20**~~.

Figure 5~~52~~: Locations of dust deposition monitoring sites

Figure 6~~63~~: Photograph of a dust deposition gauge.

Table 19~~20~~: Metadata for dust deposition monitoring sites			
Site name	**Install date**	**Equipment**	**Site Type**
Ardgour Flats			Background

CIT Valley	11 September 2024	Dust Deposition Gauges to meet the requirements of ISO4222.2	Impact
CIT Stamper			Impact
CIT Valley North			Impact
RAS			Impact

~~10.1.2.~~11.1.2. Triggers and Responses

The dust deposition data will be used for two purposes:

- Assessing the pre-development dust deposition rates; and,
- Determining if the BOGP dust mitigation measures are being effective.

Typically for a sensitive receptor, an increase in dust disposition rate of 4 g/m^2 over 30 days above background dust deposition rates is accepted as an indicator that additional dust mitigation is likely required. Given the low sensitivity of the on-site locations of the dust deposition gauges and distances to off-site receptors, the indicator that additional dust mitigation is required will be 6 g/m^2 over 30 days above background dust deposition rates.

For the BOGP the Ardgour Flats dust deposition monitoring site has been identified as providing the most useful indicator of the wider area's background dust deposition rates.

The increase in dust disposition rate due to the BOGP activity will be estimated as the difference between the deposition rate measured at each of the four impact sites and the deposition rate measured at the Ardgour Flats.

Should the increase in dust disposition rate at any of the four impact sites be calculated as greater than 6 g/m^2 over 30 days then the following actions will be taken:

- Identify the key source/s of dust impacting the sites which have exceeded the dust deposition trigger level; and
- Review and if needed improve the dust mitigation measures being used on the relevant dust sources.

11.1.3. Process for review of dust deposition

After the first 12 consecutive months of pre-operation monitoring, the Consent Holder must engage a suitably qualified and experienced independent air quality expert chosen in

consultation with Otago Regional Council to review and interpret the monitoring data and determine what the background concentrations of deposition monitoring rates are.

The suitably qualified and experienced independent air quality expert shall consider the monitoring results, the actual or potential effects on sensitive receptors from arsenic, the nature, duration, and location of the upcoming mining operations.

After the first 12 consecutive months of operational monitoring, the Consent Holder must engage a suitably qualified and experienced independent air quality expert chosen in consultation with Otago Regional Council to make recommendations as to the necessity of continued operational monitoring. ,

If the arsenic monitoring shows that is that arsenic concentrations in ambient air have not increased by more than 500% above the background level or are not above 66% of the MfE guideline, or if the recommendation of the independent SQEP is that the monitoring is not required, the Consent Holder may:

i. Advise Otago Regional Council of its intention to cease the monitoring, and the date by which it intends to do so; or

ii. Elect to continue monitoring. If this option is selected, the Consent Holder may choose to follow the review process in part (f)(ii) annually to determine if monitoring should continue for subsequent years.

~~11.~~12. Dust Monitoring – Real Time

~~11.1.~~12.1. Sites and equipment

Figure 7~~Figure 7~~~~Figure 4~~ shows the location of the ~~two~~ three real-time dust monitoring sites that have been installed to collect dust data to assess and manage the impact of dust discharged from BOGP. A photograph of the current real-time dust monitoring equipment is shown by the red circles in **Figure 8~~Figure 8~~~~Figure 5~~**. It is important to note that the Lake Clearview monitor will be shifted to the site's administration offices on Ardgour Terrace when those buildings have been set up. The new site is approximately 2 km due east of the current Lake Clearview site and is shown as the green circle in **Figure 8~~Figure 8~~~~Figure 5~~**. The new site will meet the requirements of usefully assessing any off-site dust impacts of the mining operation. The metadata for each of the sites is shown in **Table 20~~Table 21~~**.

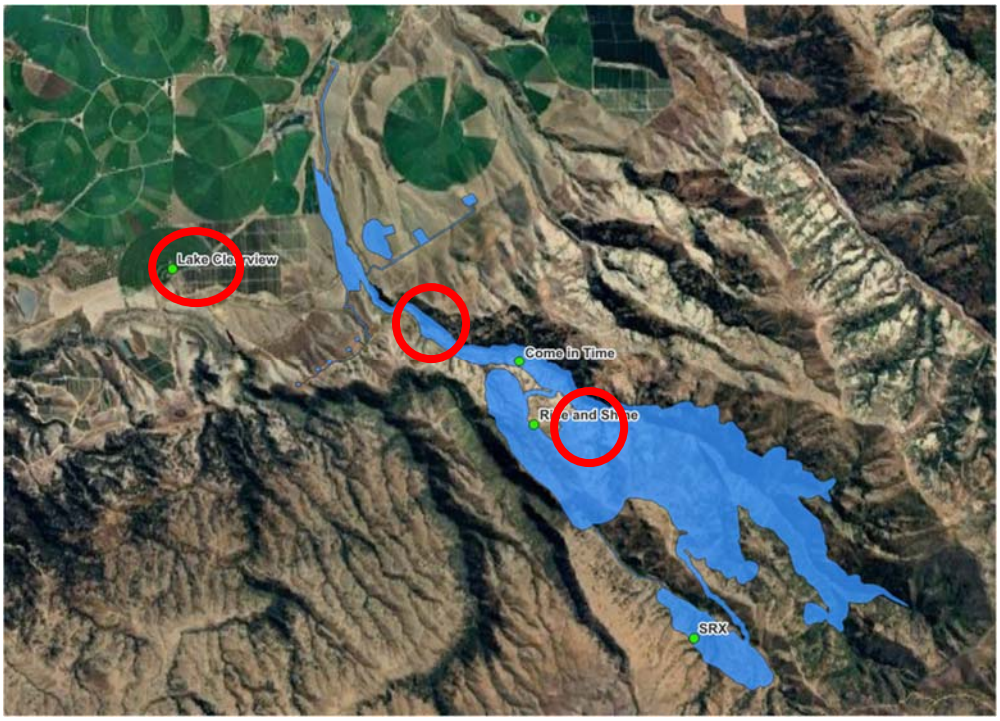


Figure 7~~7~~4: Locations of real-time particulate monitors (red circles)

Figure 8~~8~~5: Photograph of real time dust monitoring equipment

Table 2021: Metadata for PM_{10} dust monitoring sites			
Site name	**Install date**	**Equipment and PM measurement type**	**Data capture rate (%)**
Lake Clearview	11 February 2023	e-BAM Plus	99.8
CIT valley North	11 December 2024	ES-642 - TSP	N/A
TBC Processing plant	TBC	TBC	TBC

11.2.12.2. Triggers and Responses

The dust monitoring instruments will provide real time data to the site staff. This information will be used to assist with the dust management of the site. The dust monitoring system must be set up to send email and SMS text alerts to site staff. The monitors provide real-time PM_{10} or TSP data each minute and will send an alert to the site's Environmental Manager when concentrations exceed the trigger level, shown in Table 21Table 22Table 24.

Table 2122: TSP and PM_{10} Trigger level	
1-hour rolling average concentration	**Actions**
150	• Identify the key source/s of dust impacting the sites. • Review and if needed improve the dust mitigation measures being used on the relevant dust sources. • Continue reviewing dust monitoring data until the 1 -hour rolling average concentration drops below 150 µg/m^3.
300	• Halt dust generating activities until the 1 -hour rolling average concentration falls below 300 µg/m^3.

Upon receipt of the dust alert message the site manager will undertake the relevant action/s that are defined in **Table 23Table 24**. The dust data will be logged and archived and will be used in the complaint response procedure (see Section 8.210.2).

13. Arsenic Dust Monitoring

The key aim of the monitoring programme is to provide Arsenic Ambient air quality data to inform Stakeholders of the actual impacts of Matakanui Gold's proposed activity.

13.1. Sites and equipment

Figure 7~~**Figure 4**~~ shows the location of the two arsenic monitoring sites that will be installed to collect dust data to assess and manage the impact of dust with elevated levels of arsenic discharged from BOGP. They key sites are:

- Crushing plant.
- Elevated As soil stockpiles.

The most practical method for the BOGP situation as US EPA Method IO-3.1.

PDP has been involved in projects where this method has been used to quantify the amount of metals contained in ambient dust downwind of a metal recycling plant. Our experience with this monitoring method is:

A filter and pump air sampler system is required; and;

- A meteorological monitoring system should be operated in parallel with the air sampler.

Very briefly this method takes pre-field tared filters, runs sample air run through them, and after exposure the filers are reweighed to determine total mass of particulate matter, then the filter and particulate matter are digested in acid (distilled HNO_3 can be used[2]) and analysed by for metals including Arsenic.

As a starting point the filters will be exposed for a period of 30 days. –This exposure period may be varied depending on the amount of material collected. We need to ensure we capture enough material to get above the laboratory's analytical detection limits.

A total of 12 filters will be exposed aiming to provide an annual average concentration to be compared against the MfE ambient air quality guideline.

The aim is to use Matakanui Gold's two samplers to collect the filters.

- Pre-activity sampling will start as soon as practical to establish baseline Arsenic Ambient Air concentrations.

[2] https://pmc.ncbi.nlm.nih.gov/articles/PMC10002384/

- It was agreed a baseline measurement at one site within the valley system should be sufficient.

- When the activity starts on site, arsenic in air will be measured at two locations. Downwind of:
  - Crushing plant.
  - Elevated As soil stockpiles.

A photograph of the current real-time dust monitoring equipment is shown by the red circles in Figure 9~~Figure 9~~. Figure 10 shows a photo of a generic arsenic dust monitor. The metadata for each of the sites is shown in Table 22~~Table 23~~~~**Table 21.**~~

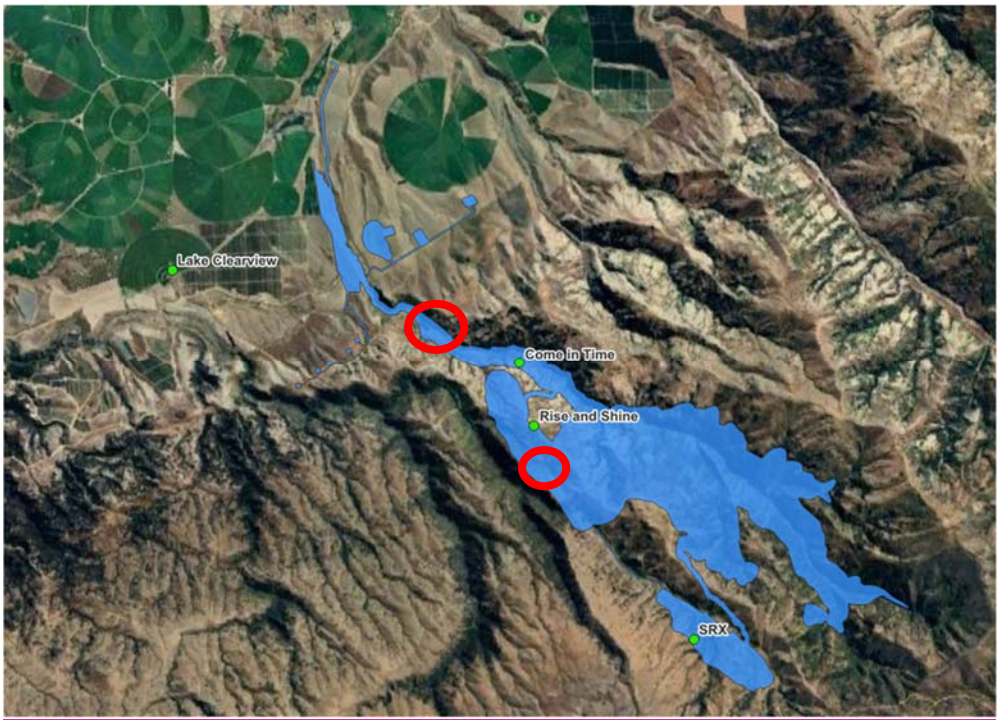


Figure 9: Locations of real-time particulate monitors (red circles)

Figure 10: Generic photograph of arsenic dust monitoring equipment

Table 22: Metadata for PM_{10} dust monitoring sites			
Site name	**Install date**	**Equipment and PM measurement type**	**Data capture rate (%)**
Background	TBC	TBC	TBC
Crushing Plant	TBC	TBC	TBC
As soil stockpiles	TBC	TBC	TBC

13.2. Triggers and Responses

The As Environmental Performance Indicator will be based on but not greater than the MfE Ambient air quality Guideline value. The As Environmental Performance Indicator will be defined in the AQMP after discussion between MGL and ORC. The As Environmental Performance Indicator is likely to be in the order of 66% of the MfE guideline value.

13.3. Review Process

After the first 12 consecutive months of operational monitoring, the Consent Holder must engage a suitably qualified and experienced independent air quality expert chosen in

consultation with Otago Regional Council to make recommendations as to the necessity of continued operational monitoring.

If the arsenic monitoring shows that is that arsenic concentrations in ambient air have not increased by more than 500% above the background level or are not above 66% of the MfE guideline, or if the recommendation of the independent SQEP is that the monitoring is not required, the Consent Holder may:

i. Advise Otago Regional Council of its intention to cease the monitoring, and the date by which it intends to do so; or

ii. Elect to continue monitoring. If this option is selected, the Consent Holder may choose to follow the review process in part (f)(ii) annually to determine if monitoring should continue for subsequent years.

~~12.~~14. Meteorological Monitoring

~~12.1.~~14.1. Sites and equipment

Figure 11~~**Figure 11**~~**Figure 6** shows the location of the four meteorological monitoring sites (green dots) that have been installed to collect wind data to inform the dust assessment. The location and design of the meteorological stations are, as far as practicable, consistent with the AS/NZS 3580.1.1:2016. A photograph of the monitoring equipment is shown in **Figure 12**~~**Figure 12**~~**Figure 7**. It is important to note that the Lake Clearview monitor will be shifted to the site's administration offices on Ardgour Terrace when those buildings have been set up. The new site is approximately 2 km due east of the current Lake Clearview site and is shown as the green circle in **Figure 12**~~**Figure 12**~~**Figure 7**. The new site will meet the requirements of usefully assessing the wider Bendigo area wind conditions. The metadata for each of the sites is shown in **Table 22**~~**Table 23**~~**.**

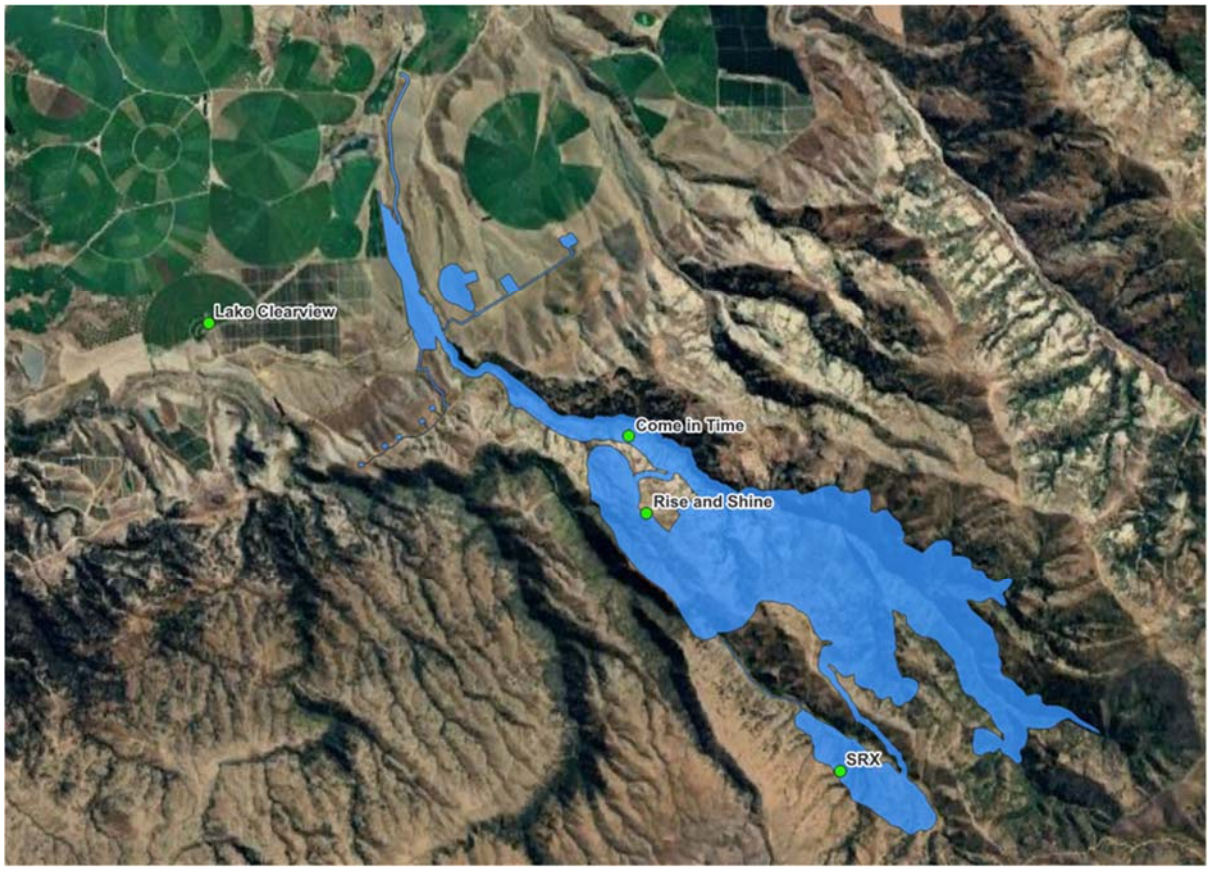


Figure 1116: Locations of meteorological monitoring sites

Figure 12~~127~~: Photograph of the Lake Clearview meteorological monitoring equipment

Table 22~~23~~: Metadata for meteorological monitoring sites				
Site name	**Install date**	**Equipment**	**Anemometer height (m)**	**Data capture rate (%)**
Lake Clearview	11 Feb 2023	The Gill Windsonic Ultrasonic Wind Sensor is a high-end meteorological grade wind speed and direction sensor. The Harvest Air Temperature/Relative Humidity/Barometric The sensor has a calibrated accuracy of ±0.1°C (temperature), ±1.5% relative humidity, and ±1.5mbar barometric pressure. The HyQuest TB3 is a high-quality tipping bucket rain gauge with	10	99.9
CIT	11 Feb 2023		6	99.8
RAS	13 Dec 2024		6	NA
SRX	11 Feb 2023		6	100

Table 2223: Metadata for meteorological monitoring sites				
Site name	**Install date**	**Equipment**	**Anemometer height (m)**	**Data capture rate (%)**
		accuracy of ±2% for measuring rainfall.		

~~12.2.~~14.2. Actions, Triggers and Responses

Monitoring weather forecasts will be undertaken daily and used to inform the potential need for additional mitigation measures (e.g. in the event that strong winds are forecast).

Before the daily briefing meeting, the Site Manager must obtain the weather forecast for the day and identify whether high dust risk conditions (see Table 23~~Table 24~~) may occur. If high dust risk conditions are forecast, the Site Manager will highlight this to other on-site staff and instruct whether any additional dust mitigation is to be implemented for that day.

The forecast occurrence of high dust risk conditions shall be noted in the daily log along with any outcomes from the daily briefing meeting.

The meteorological station will provide real time data to the site staff. This information will be used to assist with the dust management of the site. The meteorological system will be set up to send email and SMS text alerts to site staff. An alert will be sent when 1-hour average windspeeds exceed 5 m/s which will prompt site staff to carefully monitor dust sources and implement additional mitigation measures if required. An alert will be sent when 1-hour average windspeeds exceed 7.5 m/s, which will prompt site staff to stop work on dust generating activities if dust discharges are witnessed that cannot be adequately controlled **and** are toward sensitive receptors within 500 m of the site boundary **and** when dust is seen blowing over the site boundary.

Where an alert of strong winds (>7.5 m/s as a 1-hour average) coincides with

Table 23~~Table 24~~ shows a summary of the meteorological conditions contributing to different dust risk levels, the associated notifications, and required responses.

Table 2324: Dust Risk Levels, Meteorological Conditions and Responses				
Dust Risk Level	**Wind Speed**	**Wind Direction (blowing from)**	**Notification**	**Response**

Table 2324: Dust Risk Levels, Meteorological Conditions and Responses				
Low	< 5 m/s	All directions	-	-
Medium	5 – 7.5 m/s		Text & email	Prepare for mitigation actions, visual inspection of dust discharges and implement water application for dust suppression if required
High	≥ 7.5 m/s		Text & email	Operators to visually identify any dust discharges and sensitive receptors within 500 m in downwind direction. Dust mitigation measures are to be implemented as appropriate in response to any dust discharges witnessed. If dust is witnessed crossing the boundary, work is to cease.

Meteorological data will be logged and archived and will be used in the complaint's response procedure (see Section 8.2~~10.2~~).

~~12.3.~~14.3. Ore Processing Plant Gaseous Air Contaminant Monitoring

The ore processing plant gaseous air and particulate contaminants discharges are continuously monitored at the control room. This monitoring includes instrumental monitoring of the pH within the leaching and adsorption tanks to avoid the generation of HCN. Instrumental HCN monitors with set trigger alarm points are in the ore processing plant for health and safety purposes. Any instance of elevated HCN concentrations leads to a shut-down of the process.

The airflow from the electro-winning cell and induction furnace is continuously monitored. The induction furnace reverse jet furnace bag filter system includes a pressure-drop gauge to monitor for clogging and bag tears.

~~12.4.~~14.4. Frequency of Monitoring

Table 24~~Table 25~~ outlines the frequency of the activities undertaken as part of the monitoring programme.

Table 2425: Monitoring Programme Activities and Frequency	
Monitoring Activities	**Frequency**
Check weather forecasts for strong winds and rainfall to plan appropriate activities and dust management response (7-day forecasts also available on www.metvuw.com and www.metservice.com).	Daily and as conditions change
Visual dust monitoring early afternoon site assessment.	Daily
Daily log form for visual monitoring of dust.	Daily
Monitor ore processing plant operational conditions, including the pH of the leaching and adsorption tanks, furnace bag filter system, and extraction fans operation.	Ongoing
Monitor workplace exposure to HCN with alarms for detection.	Ongoing
Record the pressure drop across the induction furnace fabric filter baghouse emission control system to detect any blinding or tears.	Daily
Inspect and calibrate ore processing plant pH monitors, HCN alarms, and emission control systems.	Monthly
Inspect watering systems (water cannon, sprinklers, water carts and any other spray system) to ensure equipment is maintained and functioning to effectively dampen exposed areas.	Weekly
Inspect dust generating activities (as listed in Section 23) to ensure dust emissions are effectively controlled.	Ongoing
Monitor dust concentrations in air, with alerts for high concentrations.	Ongoing
Monitor dust generating activities and water application rate.	In winds over 7.5 m/s blowing all directions.

12.5.15. Reporting of Monitoring Programme

The following information must be recorded in a daily log or equivalent system:

- Results of the daily site inspections of visible dust emissions;
- Likely source(s) of any observed dust;
- General weather conditions during the day (i.e., windy, calm, warm, rain etc.);
- The frequency of use of the sprinkler system, water cannon and any water carts (if needed);
- Dust and ore processing plant emissions control equipment malfunctions and any remedial action(s) taken;

- Any unusual on-site activities; and
- Records of any complaints or other community feedback.

The log forms will be collated and stored on site and will be made available to ORC staff upon request.

Data from the dust and meteorological monitors is to be continuously recorded to an electronic system at a minimum of 10-minute resolution. The data is to be held for at least two years from the date recorded.

~~13.~~16. CHANGE MANAGEMENT

The AQMP will be reviewed and updated, with the necessary re-certification, throughout the course of the mining activity timeline to reflect changes in dust management techniques, staging of excavation and fill areas, or changes to the receiving environment. Re-certification by ORC will be required for any relevant revisions of a material nature for the AQMP. The review will take into consideration:

- Any significant changes to dust management activities or methods;
- Key changes to roles and responsibilities;
- Changes in industry best practice option for dust controls;
- Results of inspection and maintenance programmes, logs of incidents, corrective actions, internal or external assessments; and
- The outcome of investigations into discharges of dust/odour/air pollutants.

Reasons for making changes to the AQMP will be documented and version tracking will be recorded in the 'Document Control' register at the start of this report. A copy of the original AQMP document and subsequent versions will be kept for the project records and marked as obsolete. Each new/updated version of the AQMP documentation will be issued with a version number and date and the following version update table be completed and added to the Exec summary of the AQMP.

Item	Section	Summary of change	Reason for change	Complexity of change	Date
1.				☐ Minor ☐ Moderate ☐ Major	
2.				☐ Minor ☐ Moderate ☐ Major	

3.				☐ Minor ☐ Moderate ☐ Major	