Technical Memorandum

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Company:	Otago Regional Council	**SLR Consulting New Zealand Limited**	
cc:	Brad Radloff	**Date:**	12 December 2025
		Project No.	860.016676.00002

RE: Bendigo-Ophir Gold Mine - Air Quality Technical Review

Bendigo-Ophir Gold Project: Assessment of Environmental Effects from the Discharge of Contaminants to Air Peer Review Report

Scope

Otago Regional Council (ORC) has requested SLR undertake a technical review of the *Assessment of Environmental Effects from the Discharge of Contaminants to Air* (the Effects Report) (PDP 2025) and the associated *Air Quality Management Plan: Bendigo Ophir Gold Project* (the AQMP) (MGL, 2025), submitted by Matakanui Gold Limited (MGL) in October 2025. The AQMP is regarding a proposed new gold mine and ancillary facilities called the *Bendigo-Ophir Gold Project* (BOGP). The BOGP is be located on Bendigo and Ardgour Stations in the Dunstan Mountains approximately 20 km from Cromwell (the Site).

This technical review focuses on effects of the proposal in relation to discharges of contaminants to air and in particular construction dust, mining dust, processing dust and gaseous pollutants and remediation dust.

This independent peer review for air quality has considered the information contained in:

- the Effects Report (PDP 2025);
- the AQMP (MGL, 2025);
- the Good Practice Guide for Assessing and Managing Dust (MfE 2016a) (GPGAMD); and
- the Good Practice Guide for Assessing Discharges to Air from Industry (MfE 2016b) (GPGDAI).

It is worth noting, that the GPGAMD identifies itself as a subordinate document focussing on dust and the GPGDAI provides guidance on assessment methodologies.

The intent of the review is to:

- Review the Effects Report to provide a high level review of the methodology of the Effects Report; and
- Review the AQMP for adequacy in management of air quality effects

The review is to have particular reference to:

- The air quality effects of:

  - the construction and operation of the mine
  - transport of ore and waste rock on the network of haul roads
  - discharge of contaminants from the main processing plant
  - concrete batching plant
  - cement paste plant
  - processing of aggregate
- effects of dust and other contaminants on human health and amenity
- community concerns around ‘arsenic dust’ and whether the application presents wind information correctly

The findings of the peer review can be found in the **Information Review** and **Assessment** sections of this report.

Limitations

Whilst SLR has endeavoured to ensure all conditions from the Consent identified in our scope of work were adequately addressed, the following limitations apply:

- There is a general lack of quality information on the responses of vegetation and in particular individual crop species to the impacts of dust. This inhibits the ability to fully assess the ecological impacts of the BOGP. PDP (2025) however, have provided an assessment within this limitation that seems reasonable.

Information Review

Site and Proposal Summary

The BOGP entails mining gold deposits using open pit mining, with the potential for underground mining on one of the four identified deposits. The total potential disturbance includes 592 ha of pastoral area and an additional 52 ha of disturbance establishing offices, security, contractors areas, topsoil storage, emulsion manufacture, magazine facilities plus quarrying and roading.

The project describes construction and operation of four pits, engineered landforms, tailings storage facilities, a processing plant, infrastructure and haul roads. The potential source of discharge of contaminants to air includes:

- Construction dust;
- Operational mine activity dust;
- Ore processing dust and gaseous emissions from wet chemistry process and combustion processes; and
- Remediation dust.

Summary of the assessment scope

The assessment scope has been defined as the effects of dust and gaseous contaminants discharged into the air from:

- Construction of haul roads, a tailings storage facility, engineered landforms, other infrastructure, topsoil stockpiles, four pits and an underground mine;
- Operation of four pits and an underground mine;

- Operation of machinery and travel along haul routes; and
- Operation of a gold ore processing plant.

The dust assessment objectives were identified as:

- Confirming dust sources and locations;
- Quantifying the amount dust likely to be discharged from each source;
- Reviewing the toxicity of each type of dust;
- Assessing the sensitivity of the receiving environment;
- Identifying associated risk; and
- Recommend mitigations.

The gaseous contaminant assessment objectives were identified as:

- Confirming gaseous contaminants and locations;
- Quantifing the type and amount of gaseous contaminants likely to be discharged from each source;
- Assessing the sensitivity of the receiving environment;
- Identifying associated risk;
- Summarising Occupational Health and Safety mitigation and monitoring for discharges of hydrogen cyanide from the processing of gold ore; and
- Recommend mitigation.

Key Pollutants

Dust pollutants were identified as Total Suspended Particulate (TSP) (particulate less than 10 micron in diameter (PM_{10})) and particulate less than 2.5 micron in diameter ($PM_{2.5}$). The makeup of the soil was discussed including heavy metals (As, Cd) and Respirable Crystalline Silica (RCS). The impacts of atmospherically deposited dust were also assessed.

Key gaseous pollutants were identified as Hydrogen Cyanide (HCN), ammonia (NH_3) and Nitrogen Dioxide (NO_2).

Assessment Methodology

In general, the Effects Report follows standard New Zealand methodologies for extractive resource air quality assessments.

- Meteorological analysis: three monitoring stations within/near the BOGP with at least two years of data formed the basis of this analysis. Masts are ≥6 m (not all at 10 m) but this should still be sufficient to characterise project meteorology.
- Existing pollutant levels (TSP, PM_{10}, deposited dust) were derived from monitoring and this data appears robust and appropriate to the setting.
- Mine portal emissions assessed semi quantitatively by anticipated concentrations within portal exhaust compared to ambient criteria.
- Processing plant emissions assessed semi quantitatively based on expected emission rates and distances to sensitive receptors.

- Dust and vehicle emissions assessed qualitatively using risk-based FIDOL methods (frequency, intensity, duration, offensiveness, location) per MfE Good Practice Guides (2016a, 2016b); separation distances framed per IAQM Guidance (2016).
- IAQM (2016) cautions against quantitative mining assessments due to limited accurate local emission data; applicability overseas requires careful consideration of climate, working practices, and criteria.

The GPGAMD refers to the GPGDAI for detailed guidance on how to prepare an assessment and appropriate methodologies to employ in preparing an assessment. The guidance describes qualitative assessments as suitable for dust effects assessments but best suited to activities with minimal discharges easily controlled by process design and standard operating procedures, with an example given of workshop spray booths. It also identifies that activities suitable for qualitative assessment are likely to be permitted or controlled under the regional plan.

However, the GPGDAI also identifies that a more comprehensive dust assessment is likely to be required if:

- there is a high level of community concern,
  - This is the first mining approval in ORC in decades.
  - The community is concerned, particularly about arsenic laden dust.

Similarly, a ***quantitative*** assessment is more likely to be required if:

- the discharges are toxic or carcinogenic,
  - HCN, NH_3, As and Cd can all be considered toxic (and carcinogenic for As and Cd);
- the activity is classified as discretionary or restricted discretionary in the regional plan;
- the proposal is for a new discharge of PM_{10} in a polluted airshed. This is not the case here.

Additionally, Section 8.4 of the Effects Report identifies a dwelling located within the Environmental Protection Authority Victoria separation distance guideline (EPAV 2024) that should trigger a more detailed assessment.

Whilst SLR appreciate the concerns raised in the Effects Report regarding the uncertainty in estimating dust emission and dispersion rates, SLR considers that dispersion modelling aims to provide conservative, risk-focused results, enabling clear communication to laypersons and a quantitative framework for regulators. Given community concern, SLR believes that a quantitative assessment would have been more appropriate in this setting.

However, site-specific factors including complex valley terrain and strong winds (north outside the valley; northwest within) imply:

- The valley walls are providing shelter from the wider wind patterns in the locations where the bulk of the construction and mining activity are occurring; and
- Stronger winds are blowing from the northwest up the valley meaning the most significant winds with dust generating potential are blowing away from receptors.

So, despite the belief that some form of quantitative assessment might have provided an easier assessment framework within the Effects Report, the IAQM methodology is in line with the methodologies outlined in the GPGAMD and those used in similar recent assessments (Beca, 2024). Therefore in this particular location with its particular geography

and wind patterns, the IAQM methodology is more likely to produce a satisfactory assessment of the risks associated with the BOGP.

It is also worth noting that the Effects Report does not meet it's stated objective of quantifying the amount of dust likely to be discharged from each source (Section 1.5.1).

Ecological Impact Assessment

An ecologically sensitive receptor (annual herb) was identified as the vegetation type in and around CIT Pit, the Ore Stockpile and the Plant and Infrastructure Area (Figure 1).

PDP (2025) (Section 11) states "The annual herb zone which is within 100 m of the key dust sources has been assessed as potentially having a:

- High frequency of exposure to the dust emissions;
- High intensity of dust loading;
- Long duration of dust exposure; and
- Moderate sensitivity to the impacts of dust."

PDP (2025) considered the impact of dust discharged from the proposed activities on annual herbs will likely be:

- High on the plants located within 100 m of the key dust sources;
- Moderate on the plants located 100 m – 200 m from the key dust sources; and
- Low on the plants located more than 200 m from the key dust sources.

PDP (2025) considered the proposed mitigation and monitoring measures of operational dust minimisation, progressive rehabilitation, buffer zones and potentially offset areas as mitigation to minimise impacts on annual herb areas.

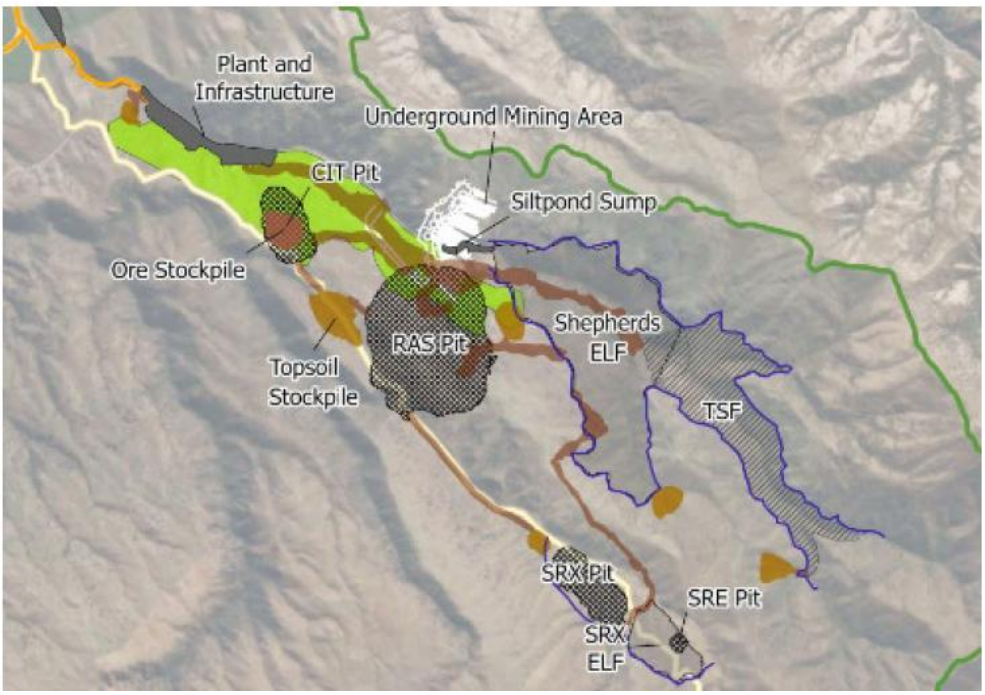

Figure 1: Location of Annual Herbs (extract from Section 8.5 (Figure 33) PDP, 2025)

SLR has assessed the PDP (2025) ecological impact assessment as reasonable based on the dust loading, vegetation type and rainfall within the area. In fact, the assessment is likely

conservative given the vegetation type being an annual herb. With annual herbs having a lifespan of less than one year (approximately 9 mths) and dust not having long periods of time to accumulate on leaves, the dust impacts are likely to be less than those stated in PDP (2025). A potentially greater threat than dust to the annual herb population is clearing more impact assessed and sediment runoff from cleared and stockpile areas. The management controls associated with these issues should be managed as 'critical controls'.

Dust Effects Assessment

The assessment of dust effects has assessed the impacts of amenity separately from health impacts and has broken the amenity assessment into North and South zones reflective of the nature of the activities being undertaken across the BOGP. The following observations were made from the assessment.

Construction Dust

No assessment of construction dust effects has been undertaken in the Effects Report which would be normal for this phase of this type of project due to the highly variable activity that will occur. Instead Effects are proposed to managed through mitigation and presumably the AQMP. A number of mitigation measures have been proposed including:

- Buffer zones: maintain ≥500 m separation between major sources and sensitive receptors (not feasible for all receptors, e.g., Dwelling 3)
- Water-based suppression on haul roads, stockpiles, and active earthworks
- Operational controls: cease dust-generating activities during high-risk winds (>7.5 m/s) withing 500 m of a sensitive receptor or when dust is observed crossing site boundaries
- Schedule earthworks for cooler/wetter months where possible
- Minimise material drop heights during loading/unloading
- Surface stabilisation: vegetate soil stockpiles and engineered landforms
- Maintain road surfaces to reduce loose fines; apply pea metal near sensitive receptors
- Enforce site-specific speed limits
- Monitoring and management via an Air Quality Management Plan

These mitigation measures are considered appropriate to this phase of the project..

However, as Dwelling 3 will be located within the recommended 500 m separation distance additional measures should be (and are proposed to be) applied to this location. It would be advisable to modify the AQMP to address the particular concerns relating to this phase of the project including monitoring, including a Trigger Action Response Plan, at (or near) Dwelling 3.

Recommendation: modify the AQMP to address the particular concerns relating to the construction phase of the project including monitoring, including a Trigger Action Response Plan, at (or near) Dwelling 3.

No concrete batching plants or cement paste plants have been identified as part of the assessment and the absence of these sources need to be clarified.

Action: clarify the presence or absence of concrete or cement batching plants.

Operational Mitigation – Dust

The Effects report offers the following mitigation strategies to be applied to the minimisation of dust generation during the operation of the mine:

- Activity Scheduling - Cease earthworks, drilling, blasting, and soil handling when winds exceed 7.5 m/s toward sensitive receptors within 500 m and/or visible dust plumes cross the site boundary. Prefer cooler, wetter months for soil stockpile building and TSF remediation.
- Water-Based Suppression - Apply water on haul roads, stockpiles, active earthworks, crushers and transfer points.
- Stabilise surface – vegetation of soil stockpiles and engineered landforms. Maintain haul roads to minimise fines and potholes.
- Limit stockpile height to 30 m.
- Apply pea metal on haul roads near sensitive receptors.
- Maintain engineered haul road surfaces to minimize loose fines.
- Enforce speed limits:
- Minimize drop heights during loading/unloading.
- Separate and document elevated arsenic soils; dampen and vegetate these stockpiles.
- Water sprays at ROM bin and transfer points.
- Enclosed reagent handling systems.
- Dust extraction and wet scrubbers in tunnels.
- Lime silo fitted with reverse-pulse dust collectors.

These are all appropriate mitigations for the project and are reflected in the Air Quality Management Plan. In addition, the AQMP provides criteria for the number of checks that these mitigations are being effectively applied. SLR notes that the proposed cease activity level of 7.5 m/s is lower than the GPGAMD recommended 10 m/s but that the AQMP caveats the cease work to conditions when work cannot be adequately controlled **and** winds are towards sensitive receptors **and** when dust is seen blowing over the boundary. This methodology relies on workers having diligence to observe dust generation, being able to see boundaries within a tight valley and anticipating conditions outside the valley from inside the valley. Implementing a monitoring camera within the service and administration area on Ardgour Terraces to identify dust events would improve the likelihood of applying appropriate action to dust leaving the project boundaries near the sensitive receptors.

Suggestion: Dust monitoring camera in service and administration area.

Northern Zone - Amenity

As stated earlier the methodology applied to the Northern Zone amenity effects is in accordance with the recommendations of the GPGAMD. The following are comments on concerns relating to the assessment of amenity effects in the Northern Zone.

1. Section 10.2.2 - The characterisation of the frequency of potentially dust winds is not consistent with the IAQM (2016) method. The IAQM (2016) method identifies frequency of dusty winds based on winds >5.5 m/s (moderate winds) from the direction of the dust source on dry days. The Effects Report has utilised winds >7.5 m/s based on a claim that the GPGAMD recommends that ***high*** risk conditions occur when wind speeds are >7.5 m/s. The Effects Report supports this position with a plot of hourly average PM_{10}

concentrations compared to wind speed produced by Watson (2000). However, this method does not link hourly observations to the averaging period (24 hour) for the PM_{10} criterion.

2. The assessment fails to clarify why only high-risk wind conditions are considered capable of affecting Dwelling 3, located 140 m from the internal road emission source, for particulates smaller than 10 microns—especially given that mechanically generated dust from vehicle movements is likely the main contributor to dust emissions near this receptor. The GPGAMD does not use the value 7.5 m/s anywhere and in fact, Section 5.2.2 of the GPGAMD indicates that dust pick-up (from road surfaces) can occur at wind speeds >5 m/s and vehicle re-entrainment can occur under any conditions. For that reason, it would be reasonable to expect that the use of at a maximum >5 m/s for potentially dusty winds for a more robust assessment. This has been the methodology applied by other recent studies (Beca, 2024). For Dwelling 3 the assessment of road dust, which will be mechanically generated, a lower value might be appropriate.

Recommendation: Justify the use of 7.5 m/s. Not used in the GPGAMD and not appropriate to mechanically generated dust.

It is noted that an indirect assessment for Dwelling 3 and the cherry orchard is provided for amenity impacts in Section 4.1.2. There is an unsupported statement indicating that a receptor between 250 m and 100 m from a dust source that is employing good practice dust suppression is unlikely to experience detrimental effects on amenity values. This appears to be an experiential assessment but would be worth clarifying the source of this claim.

Recommendation: Justify the statement that receptors located between 250 m and 100 m from a well manage source are unlikely to experience amenity impacts.

3. Section 8.2 - The effects report bases the analysis of wind speed frequencies based off less than the 5 years of data as recommended in the IAQM (2016) Method (due to lack of available data). This is unlikely to be influential in the assessment and therefore can be accepted as is.
4. Section 10.2.7 - The operation of roads Residual Source Emissions (RSE) are predicted to be small to medium effects without any contextual information. It would be useful to understand traffic volumes predicted and worst-case annual emission rates of particulate on these haul routes to contextualise this prediction.

Recommendation: Identify traffic volumes and predicted emission rates.

Southern Zone

As stated earlier the methodology applied to the Northern Zone amenity effects is in accordance with the recommendations of the GPGAMD. The following are comments on concerns relating to the assessment of amenity effects in the Southern Zone.

Section 10.3 - The southern zone assessment has utilised same higher than recommended wind speed (>7.5 m/s) as the Northern Zone with respect to wind speed frequencies. Given the distance between the nearest receptors (sensitive or ecological) this is unlikely to be influential on the assessment.

Review of underground portal emissions from the processing plant

As stated earlier the methodology applied to the underground portal emissions was semi quantitative. Anticipated portal emission concentrations were compared to ambient air quality guidelines and concluded to be no more than 1.5 times higher at the source. This was predicted to disperse quickly and SLR agrees with this assessment.

Respirable Crystalline Silica and Arsenic

RCS has been assessed to have low potential for significant emissions. This would be consistent with SLRs experiences with other mines. Unless elevated concentrations are identified in the material being processed SLR considers this assessment appropriate.

Arsenic was identified, in Section 2.1, as being potentially being emitted from overburden soil that has naturally elevated concentrations of arsenic. The risks associated with arsenic emissions are not explicitly assessed but are proposed to be managed via appropriate mitigation of the material handling of overburden soil that has naturally elevated arsenic concentrations. These mitigations are appropriate to the management of this issue. However, there is however a level of concern in the community about the potential impacts that may result from any emissions that do occur as a result of this material handling. Hence SLR recommend the establishment of a dust deposit gauge near the Cherry Orchard for the purpose of monitoring the arsenic deposition rates as an indicator for control of this potential contaminant and effects outside of the project boundaries. The deposition rates can be assessed against the criterion of 4 µg/m³ (TALuft, 2002).

Recommendation: Establish dust deposition monitoring at the Lake Clearview and Ardgour Flats monitoring locations for the purpose of monitoring arsenic deposition rates.

Gaseous emissions from the processing plant assessment

The processing plant has been assessed semi quantitatively and has the following mitigation strategies applied:

- Maintaining pH in the cyanidation process to between 10 and 12. This will reduce HCN emissions to zero. Automated dosing will be employed to maintain these levels coupled with alarms to notify operators if pH falls outside these levels;
- Ambient air HCN monitoring within the process plant to alert operators to abnormal conditions;
- Fume hood gas and particulate extraction system, glass silica curtains, furnace bag filters and a tall stack will be employed at the furnace; and
- Separation – the plant will be located at a distance from sensitive receptors within the BOGP that will prevent the potential for impacts on sensitive receptors.

Below are some comments relating to observations resulting from the gaseous emission assessment:

Section 9.2 – This qualitative assessment has relied upon very low emission rates to predict negligible impacts. Given the toxicity of the pollutants being assessed, discussion of the management of upset conditions, especially within such complex terrain as the valley in which the project is being conducted, would provide additional certainty to the assessment.

Recommendation: Discuss the management of upset conditions.

Table 25 within the Effects Report identifies emission rates for HCN and identifies NH_3, particulate and base metal emission rates as “minor”. This effectively forms a quantitative assessment for HCN and NH_3 emissions. Given the mitigation applied SLR believes this is appropriate.

General

The Effects Report does note that BOGP can rely on consent conditions and monitoring activity to ensure compliance with the Air Quality Assessment criteria outlined in Section 4.0 and we believe this can be achieved but runs the risk of having to apply retrospective mitigation.

Key issues relating to the Effects Report

The Effects Report incorrectly applies the use of 7.5 m/s to the qualitative assessment of dust effects throughout.

Justification for the statement that receptors within 250 m and 100 m of a well maintained dust source are unlikely to experience amenity impacts.

The Effects Report does not provide an assessment method that can adequately address the potential impacts at Dwelling 3 and the cherry orchard from unpaved road emissions on the access road.

The Effects Report does not provide quantification of emissions from the proposed dust emission sources.

The assessment does not directly address community concerns regarding arsenic emissions.

The report does not address whether upset conditions will result in high levels of concentrations of HCN and/or NH3.

Further information required.

1. Provide quantification of the expected emissions from all sources including haul road traffic.
2. Justification for the use of wind speeds >7.5 m/s in the qualitative assessment, rather than 5.5 m/s recommended by the IAQM (2016) Method or <5 m/s discussed in the GPGAMD. This needs to be provided in the context of mechanically generated dust from vehicle activity rather than just from wind blown dust.
3. If the 7.5 m/s cannot be justified the Effects Report needs to either:
    a. Utilise the quantification above to provide some level of quantitative assessment methodology particularly for Dwelling 3 in the northern zone
4. Provide confirmation that upset conditions that result in higher than usual emissions at the processing plant have been considered (if these occur).
5. Confirmation that there will be no concrete or cement batching plants present.
6. Justification for the statement that receptors within 250 m and 100 m of a well maintained dust source are unlikely to experience amenity impacts.

Assessment of the AQMP

The AQMP substantially meets the recommendations for an AQMP set out in the GPGD. Mitigation measures proposed in AQMP have been assessed to be reflective of the proposed mitigation identified in the Effects Report and appropriate to the proposed project (aside from issues identified earlier regarding caveats on cease work conditions). Given the construction phase of the project is anticipated to continue for at least two years this component of the project should be addressed in the AQMP.

Recommendation: AQMP be modified to address construction related issues (or a separate Construction AQMP be developed) and in particular the impacts at Dwelling 3 and the cherry orchard, including monitoring with an associated Trigger Action Response Plan.

The monitoring proposed is appropriate given the geography and location of the mine and applies appropriate trigger levels aside from monitoring for arsenic.

Recommendation: Update the AQMP to reflect the need for deposited dust monitoring to be undertaken at the Lake Clearview and Ardgour Flats monitoring locations and assessed against deposited arsenic rates less than 4 µg/m²/day;

There are no exceedance reporting requirements identified within the plan.

Recommendation: Document exceedance reporting requirements.

The AQMP documents the need to respond and adapt to changes in dust management, results of inspections and audits and/or the outcomes of investigations into discharges of dust/odour/air pollutants.

Preliminary Proposed Consent Conditions

The following are preliminary proposed consent conditions, subject to updates of the Effects Report and the AQMP, are detailed below:

- There shall be no noxious, dangerous, objectionable or offensive gaseous or dust emissions to the extent that the discharge causes an adverse effect at or beyond the boundary of the site.
- An air quality management plan, reviewed must be developed and approved by Council prior to the commencement of construction activities and be updated annually;
- Mitigation proposed in air quality management plan must be implemented and maintained.
- Air quality monitoring proposed in the air quality management plan must be implemented and maintained.
- Triggers for additional mitigation proposed in the air quality management plan must be implemented and maintained.
- Meteorological conditions shall be continuously monitored and recorded for the purposes of informing Trigger Action Response Plans.

Regards,

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