



memorandum

TO Olivia Stirling and
Danielle Ter Huurne

FROM Cameron Brown and Chris
Bender

Central Otago District Council and
Otago Regional Council

DATE 15 December 2023

RE Technical Review RC220350 – Hawkeswood Mining Limited – Air Quality
Assessment

1.0 Introduction

Hawkeswood Mining Limited (HML) is proposing to establish and operate an alluvial gold mining operation at 1346 – 1536 Teviot Road, Millers Flat (the site). The proposal requires land use consent from the Central Otago District Council (CODC) and resource consent for discharges to air from the Otago Regional Council (ORC).

Barker and Associates (B&A) on behalf of CODC has previously engaged Pattle Delamore Partners Limited (PDP) to provide a technical review of the original application documents for land use consent prepared by Town Planning Group. The original application included an application for resource consent to the CODC¹ and an associated dust management plan². The outcome of PDP's review of these two documents, as well as a review of the applicant's response to a further information request³, was recorded in a memorandum dated 19 May 2023. In general, PDP's May 2023 review concluded that the information provided was lacking in detail regarding the nature of potential dust discharges and their effects on the surrounding environment. In particular, the assessment of the effects of dust and particulate matter with a diameter less than 10 microns (PM₁₀) was not undertaken in accordance with recommendations made in the Ministry for the Environment (MfE) *Good Practice Guide for Assessing and Managing Dust*, 2016 (GPG Dust).

Following PDP's May 2023 review, the applicant revised the scope of the proposal to increase the quantity of material processed in the mining operation, the area and depth of the mining activities within the site, and the proposed consent duration. The applicant submitted a revised application to CODC for land use consent on 24 October 2023. The revised application included a description of the amended proposal, an updated assessment of effects, and an updated Dust Management Plan (October 2023 DMP) which addressed information gaps identified in PDP's May 2023 review. The applicant also submitted an

¹ Town Planning Group, *Application for Resource Consent to the Central Otago District Council: Hawkeswood Mining Limited Land use consent to establish and operate a gold mining activity at 1346-1536 Teviot Road, Millers Flat*, 12 October 2022.

² Town Planning Group, *Hawkeswood Mining Limited: Dust Management Plan – Millers Flat Gold Mine – 1346-1536 Teviot Road, Millers Flat*, 9 February 2023.

³ Town Planning Group, *Response to Further Information Request RMZ/2022/220350 – Teviot Road, Roxburgh*, 10 February 2023.

application for air discharge consent to ORC which included an air quality assessment of effects prepared by Air Matters Limited (Air Matters)⁴.

B&A, on behalf of CODC, and ORC have engaged PDP to prepare a technical review of these documents. This memorandum is an update of the 2023 PDP review which incorporates the new material provided by the applicant.

2.0 Scope of and Process for Review

PDP's May 2023 review specifically considered:

- a. Have the potential sources of dust have been identified?
- b. Has the risk of impact from each dust source been identified and prioritised?
- c. Have the relevant sensitive receptors have been identified and considered?
- d. Has the influence of winds on the transport of dust been considered?
- e. Has the influence of separation distances on the impact of dust been considered?
- f. Do the proposed mitigation measures fit with accepted good practice? Will the proposed mitigation measures be effective?
- g. Does the proposed dust and wind monitoring programme fit with accepted good practice? Will the monitoring programme provide the information needed to ensure that the mitigation measures will be effective?
- h. Is there sufficient water supply on site to meet the dust suppression requirements?
- i. Are the dust management responsibilities of the company well defined?
- j. Is the dust management plan fit for purpose?

In updating this technical review, PDP has reviewed the following documents which were provided to ORC and CODC after May 2023:

- ∴ Resource Consent Applications – Otago Regional Council Proposed alluvial gold mine at Millers Flat⁵;
- ∴ Assessment of Environmental Effects – Discharge of Contaminants into Air from the Operation of an Alluvial Gold Mine⁶ (Air Matters AEE);
- ∴ Application for Resource Consent to the Central Otago District Council: Hawkeswood Mining Limited Land use consent to establish and operate a gold mining activity at 1346-1536 Teviot Road, Millers Flat⁷; and,
- ∴ Hawkeswood Mining Limited: Dust Management Plan⁸ (DMP).

⁴ Air Matters Limited, *Assessment of Environmental Effects. Discharge of Contaminants into Air from the Operation of an Alluvial Gold Mine*. November 2023.

⁵ MacDonnell Consulting Ltd. *Resource Consent Applications – Otago Regional Council Proposed alluvial gold mine at Millers Flat*, 16 November 2023.

⁶ Air Matters Limited. *Assessment of Environmental Effects – Discharge of Contaminants into Air from the Operation of an Alluvial Gold Mine*. 14 November 2023. (AEE).

⁷ Town Planning Group, *Application for Resource Consent to the Central Otago District Council: Hawkeswood Mining Limited Land use consent to establish and operate a gold mining activity at 1346-1536 Teviot Road, Millers Flat*, 25 October 2023.

⁸ Town Planning Group. *Hawkeswood Mining Limited: Dust Management Plan*. 30 November 2023.

The scope of this review focuses on the key points agreed with CODC and ORC, in particular whether the DMP will achieve its intended outcome of:

- ∴ Substantially reducing the scale of potential dust effects;
- ∴ Ensuring dust does not cause nuisance from outside of the property; and,
- ∴ Ensuring dust does not compromise the amenity experienced from properties within the surrounding area.

ORC has provided additional scope for this review in an email from Danielle Ter Huurne dated 28 November 2023⁹, which included a table of questions to be addressed in PDP's review of the application. ORC's questions and our answers to these are provided in Appendix A.

This memorandum provides the outcomes of PDP's updated review of the November 2023 amended HML application. PDP has not undertaken a site visit and the review presented in this memorandum is based on a desk top analysis of the information provided.

3.0 Description of the Activity and Discharge of Contaminants

3.1 Activity and Discharge of Contaminants

HML propose to establish an alluvial gold mining operation at Teviot Road, Millers Flat. The activity area is defined by Air Matters as a 68-hectare area of the site where the following activities will take place:

- ∴ Site preparation and bunding;
- ∴ Topsoil and overburden removal which will take place progressively as the pit advances;
- ∴ Dredging (or sluicing) of alluvial material using a mobile floating barge. This activity involves digging up target alluvium using an excavator, which is then placed into a hopper on the floating gold plant. Approximately 180 cubic metres (m³) of alluvium will be processed per hour. The extent of the working pit will be 150 m by 100 m (1.5 ha) at up to 18 m depth, with the excavator and dredge working the active face; and,
- ∴ Rehabilitation and end use, which involves the post-reinstatement of the topsoil with the intention being for the topsoil to be seeded with grass and returned to pasture.

The proposed activities that have the potential to generate dust include:

- ∴ Earthworks, including stripping of overburden and topsoil;
- ∴ Vehicle movements on unpaved surfaces;
- ∴ Wind generated dust from dry exposed areas such as stockpiles, haul roads and backfill areas;
- ∴ Rehabilitation; and,
- ∴ Loading and unloading materials.

The type and scale of activity has potential to generate significant amounts of dust if not properly mitigated.

⁹ Danielle Ter Huurne. Subject: *FW: Hawkeswood Mining Limited*. Tuesday, 28 November 2023 10:47 a.m.

Section 2.1.4 of the Air Matters AEE states the hours of operation and staffing. The proposed hours of operation are 7:00 am to 7:00 pm Monday to Friday and 7:00 am to 1:00 pm on Saturdays. No earthworks or dredging will occur on Sundays or public holidays. There will typically be around 20 staff employed on site.

Section 2.2 of the Air Matters AEE (November 2023) identifies the nature of discharges to air and the potential of activities associated with the proposal to generate dust. Air Matters state that the main source of discharges to air will be dust, which PDP agrees with. Table 1 of the Air Matters AEE summarises the activities undertaken as part of the site operations and their potential to generate dust, which is presented Table 1 below.

Table 1: Activities undertaken as part of the site operations and their potential to generate dust		
Activity	Potential to generate dust (relative scale)	Description
Topsoil and overburden removal and transport	High	Topsoil contains a high proportion of finer grained material (silt and sand).
Stockpiling of topsoil and overburden	Moderate	Increased risk of windblown dust from exposed stockpiles and bunds.
Dredging of the wash with excavator	Low	Undertaken as a wet process.
Processing of alluvium through the gold plant	Low	Undertaken as a wet process.
Replacing overburden and topsoil	High	Topsoil contains a high proportion of finer grained material (silt and sand).
Vehicle movements on roads and accessways	Low-Moderate	Unsealed roads and accessways.

PDP considers the activities are appropriately covered and accurately describe the potential dust generating activities based on experience with similar sites.

4.0 Receiving Environment

The applicant correctly states that the site and surrounding area are zoned Rural Residential and Rural Resource Area. The nearest residential areas are Millers Flat around 700 metres to the southeast of the site boundary, and the township of Ettrick being approximately 800 metres to the northwest. The Air Matters AEE identifies adjacent properties in relation to HML’s site and the sensitivity to dust. The sensitivity classifications are based on good practice, and PDP considers the sensitivity of receiving environment to be appropriately defined by the applicant as low-moderate from rural sites, and moderate-high for rural residential and rural holiday accommodation.

Based on their location, the receptors that have a higher risk of experiencing adverse dust effects have been highlighted in the Air Matters AEE. These receptors are listed below and are those either located within 250 m of the site, or slightly further than 250 m:

- ∴ 1334 Teviot Road (Receptor A);
- ∴ 61-69 Clutha Road (Receptor B);
- ∴ 5280 & 5330 Ettrick-Raes Junction Road (Receptor D);
- ∴ 1535a Teviot Road (Receptor I);
- ∴ 1377 Teviot Road (Receptor M); and,
- ∴ 1333 Teviot Road (Receptor N).

PDP agrees with using a 250 m separation distance and conservatively assessing those located slightly further than 250 m from an active area of the site. The receptors have been further assessed in the FIDOL (Frequency, Intensity, Duration, Offensiveness, and Location) section of the AEE.

5.0 Existing Air Quality

Section 3.3 of the Air Matters AEE discusses the general air quality of the Millers Flat area which considers the air quality in the surrounding area to generally be good. Given the rural nature of the surroundings and the absence of other major sources of air contaminants, PDP agrees with this conclusion and considers there is a very low likelihood of cumulative dust effects being present.

6.0 Meteorology

The DMP states there is a MetService weather station (Ettrick No.2, Station ID 5645) located within the site boundary of the proposal. A wind rose of data from this station was provided in the DMP and the Air Matters AEE and shows the predominant wind directions, including for strong winds with the greatest potential for generating dust, as being from the northwest and southeast. The meteorological conditions have been taken into account when assessing the potential for adverse dust effects to be experienced at the nearby receptors. PDP considers the meteorological analysis to be undertaken appropriately.

7.0 Assessment of Environmental Effects

Section 4 of the Air Matters AEE provides an assessment of environmental effects. Air Matters highlight sensitive receptors within a 250-metre distance of the active area as per widely used industry guidelines. Receptors slightly further than 250 metres away have also conservatively been assessed.

A FIDOL (Frequency, Intensity, Duration, Offensiveness, and Location) assessment has been undertaken which correctly identified the potential for a number of receptors to experience moderate to high dust impacts. The FIDOL assessment presented in the Air Matters AEE is summarised below:

- ∴ Frequency:
 - Greater than 98% of the time the windspeeds are less than 7 m/s, during which time standard dust mitigation measures will be sufficient to manage dust effects; and,
 - The predominant wind directions are from the west northwest and east southeast, meaning the receptors A, B, D, and I (the nearest receptors to the northwest and to the southeast of the site) are those most at risk of adverse dust effects.

- ∴ Intensity:
 - Receptors A, B, D, I, M, and N have been identified as those being located within 250 m of the site and therefore are those with the greatest risk of experiencing dust of a relatively high intensity; and,
 - Very high dust levels that may pose a hazard due to reduced visibility to vehicles on Teviot Road or cyclists on the cycle trail are not expected to occur.
- ∴ Duration:
 - The duration or length of exposure relates to the duration of dust generating activities and/or strong wind events causing elevated emissions from the site and the duration a receptor may experience these effects;
 - The occupants of nearest residences may be present at any time to be exposed to dust, however the dust generating activities associated with the proposal are considered to be of limited duration; and,
 - Exposure to dust from the site by cyclists using the cycle trails will be of limited duration given the short period to transit the site.
- ∴ Offensiveness:
 - The type of dust generated will be of natural origin;
 - The material will be brown/grey in colour and will be consistent with dust generated from surrounding properties during typical rural activities; and,
 - The type of dust is not out of character with the surrounding area and has a low offensiveness potential.
- ∴ Location:
 - The surrounding rural land is expected to have a relatively low sensitivity to dust impacts;
 - Rural/lifestyle residential dwellings and commercial holiday properties are expected to have a moderate to high sensitivity to dust impacts and have therefore been the focus of the above analysis.

PDP considers the FIDOL assessment method presented in the Air Matters AEE matches accepted good practice and is sufficiently detailed for the scale and type of activity proposed. The FIDOL assessment concludes that there is the potential for nearby receptors, particularly those to the northwest and the southeast, have a moderate to high risk to be adversely affected by dust if proper mitigation measures are not implemented.

Monitoring and mitigation measures provided in Section 5 of the Air Matters AEE and the updated DMP are summarised in Section 9 of this memorandum. The applicant considers that if the proposed mitigation measures are implemented then the effects of dust on the surrounding environment will be less than minor.

PDP agrees with the assessment that the activities associated with the proposal have the potential to result in adverse effects from dust, and also that the proposed dust mitigation measures should be able to control the dust so that the effects can be less than minor.

8.0 Assessment of Health Effects

Section 4.2 of the Air Matters AEE identifies the potential for adverse health effects from respirable particulates, in particular PM₁₀ and PM_{2.5}. Respirable particulate matter has not been quantitatively assessed using dispersion modelling due to the difficulties in modelling fugitive dust sources such as those associated with the proposal. Rather, the health effects associated with dust from the proposal are assumed to be at an acceptable level provided the proposed mitigation measures in Section 5 of the AEE are implemented. Particulate monitoring proposed in the AEE will provide feedback on the dust management procedures to ensure that emissions of respirable particulate are adequately controlled.

PDP agrees with this assessment of potential health effects associated with dust from the proposal.

9.0 DMP

9.1 Mitigation and Controls

PDP reviewed the DMP submitted with the initial application to CODC¹⁰, and identified a number of matters to be addressed. In October 2023, Air Matters also undertook a peer review¹¹ of the DMP and made additional recommendations. An updated DMP dated October 2023 which was submitted with the applications to CODC and ORC, and which addressed the recommendations in the PDP and Air Matters reviews.

Town Planning Group detail a number of dust mitigation procedures in Section 5 of the October 2023 DMP. The key mitigation measures presented in the October 2023 DMP are summarised below:

- ∴ High risk dusty activities such as topsoil removal and replacement will cease when conditions are dry, and winds are strong. The wind speed trigger for stopping dusty activities will be set to 6.3 m/s initially as a 1-hour average and an instantaneous value of 10 m/s (1-minute average), based on the existing MetService weather station (6 m height);
- ∴ Exposed surfaces will be kept to a minimum;
- ∴ Use of a water cart and fixed sprinklers during topsoil and overburden removal to pre-dampen the material as far as practical;
- ∴ Vehicle speeds on site will be restricted to a maximum of 15 kilometres per hour (km/hr);
- ∴ Regularly maintain unsealed access roads using best industry practices which could include grading and laying of fresh metal;
- ∴ Limit the height of stockpiles to 7 m;
- ∴ Keep active stockpiles damp when necessary;
- ∴ Vegetate or cover long-term stockpiles as soon as possible; and,
- ∴ All soil stockpiled for longer than six months shall be protected from exposure to wind by covering them with a synthetic material or growing a suitable vegetative cover.

¹⁰ PDP, *Technical Review - RC220350 – Hawkeswood Mining Limited – Air Quality Assessment*, 19 May 2023.

¹¹ Air Matters Limited, *Dust Management Plan – Peer Review – Hawkeswood Mining Limited, Teviot*, 12 October 2023.

PDP considers that the proposed mitigation measures will be effective in controlling dust emissions if implemented and in general are in line with the recommendations in the MfE GPG Dust. PDP notes that signs for the 15 km/hr speed limit should be posted around the site to advise vehicle operators of the speed limit, and that the speed limit is different in the Resource Consent Applications – Otago Regional Council (which states a speed limit of 30 km/hr). The more conservative 15 km/hr limit in the October 2023 DMP is considered appropriate for the site and should be implemented.

9.2 Monitoring

Section 6 of the October 2023 DMP sets out a dust monitoring plan, including visual and instrumental monitoring of dust. Two real time dust monitors are proposed to be installed in predominant downwind locations which are to be confirmed. A 1-hour average PM₁₀ trigger level of 150 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) has been proposed which is consistent with the MfE GPG suggested 1-hour average trigger level. If this trigger level is exceeded, an investigation into the cause of the exceedance and a review of controls will be undertaken.

In addition, Section 6.2 of the October 2023 DMP states that visible dust emissions will be instantaneously monitored beyond the site boundary. PDP considers the combined instrumental and visual monitoring procedures to be appropriate for informing the effectiveness of dust management procedures.

PDP notes that Table 1 of the DMP briefly outlines meteorological monitoring, requiring the operators to check weather forecasts for strong winds daily and observe weather conditions from observations and data from weather station. While PDP agrees these monitoring activities are required, PDP notes that strong winds should be quantitatively defined (i.e. hourly average wind speed greater than 7 m/s). Real time notifications of wind speeds should also be included in the DMP to alert the relevant staff members of real time winds speeds that exceed the 7 m/s hourly average or 10 m/s 1-minute average (during two consecutive 10-minute periods). PDP notes that Section 5.1 of the DMP states that the wind trigger levels will be monitored using the nearby MetService weather station, however, the site should have its own weather station as recommended in the Air Matters DMP review from which real time notifications of wind speed triggers levels can be received.

These wind speed limits are stated Section 5.4 of the Air Matters AEE, which also states that high dust generating activities will cease when these wind speed limits are exceeded. PDP also notes that the above stated recommendations should be included in the Dust Monitoring Record Form in Appendix C of the October 2023 DMP.

9.3 Complaints Response Procedure

Section 7 of the October 2023 DMP details a complaints response procedure which PDP considers is appropriate for the activity. Appendix C of the October 2023 DMP also contains appropriate monitoring, exceedance investigation, and complaints investigation forms.

9.4 Water Supply

Water for dust suppression is identified as being ample and available from the dewatering of the mine void. PDP agrees that the water supply should be adequate for dust suppression within the site.

9.5 Dust Management Responsibilities

The October 2023 DMP states a minimum of two site employees will be employed to implement the procedures in the DMP, with the site manager ultimately responsible for ensuring that the objectives of the October 2023 DMP are fulfilled. PDP recommends that the names and contact details of the specific people nominated to be responsible be included in the October 2023 DMP once they are known.

10.0 Consent Conditions

The applicant has not proposed a set of conditions for either the land use consent or the air discharge consent. PDP notes that good practice requires that conditions in resource consents relating to dust must be clear, reasonable, and enforceable. The consent conditions must ensure that any impacts of dust discharged from the site shall be less than minor at locations at or beyond the site boundary.

Because dust effects can be subjective, there are special considerations when writing consent conditions for dust management. In particular, a condition relating to 'no offensive or objectionable dust effect' will often require supporting conditions, for example:

- ∴ Dust trigger levels;
- ∴ Control equipment and performance requirements; and,
- ∴ Operating and management requirements (e.g., on-site vehicle speed limits, specifying the use of water carts).

The MfE GPG Dust recommends, as a minimum, that access to meteorological monitoring (i.e., wind direction and wind speed) be included as a condition of consent for any activity with potentially significant dust discharges (e.g., a large quarry with residences located on the boundary). Local meteorological data is particularly useful for investigating dust complaints.

PDP further recommends that the October 2023 DMP, subsequent to the amendments recommended in Section 9.2 this memorandum, be reviewed, and approved by ORC before the activity takes place.

11.0 Conclusions

In general, PDP considers that the Air Matters AEE and October 2023 DMP provide sufficient detail to understand the nature of potential dust discharges and their effects on the surrounding environment. The assessment has been undertaken in accordance with recommendations presented in industry used guidelines and appropriately assesses the potential adverse effects on the surrounding environment.

The Air Matters AEE concludes that based on the separation distances and a FIDOL assessment, there is the potential for adverse effects on neighbouring properties if the dust levels are not controlled and mitigated properly. The Air Matters AEE also goes on to say that based on the proposed scale and type of activity, and the effective implementation of the proposed dust mitigation being implemented, the effects of nuisance and health related dust will be less than minor on the receiving environment.

PDP agrees with both of these statements and considers the potential dust effects can be effectively controlled using the appropriate mitigation measures, provided the monitoring recommendations presented in Section 9.2 of this memorandum are implemented.

12.0 Closing

PDP trusts the review presented in this letter meets the requirements of CODC and ORC. If you have any questions or comments about the review, please do not hesitate to contact Chris Bender or Jeff Bluett.

13.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Town Planning Group, Air Matters Limited, CODC, and ORC. 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 Barker and Associates and Otago Regional Council 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.

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Appendix A: Response to Questions from Otago Regional Council

Table 2: ORC Questions	
Q:	Is the technical information provided in support of the application robust, including being clear about uncertainties and any assumptions? Yes, or no. If not, what are the flaws?
R:	Yes.
Q:	Are there any other matters that appear relevant to you that have not been included? Or is additional information needed? Please specify what additional info you require and why [please explain]
R:	The Dust Management Plan prepared by Town Planning Group should include details about posting speed limit signs around the site for vehicle operators to see.
Q:	Have the effects on air quality including specific effects on neighbouring landowners been appropriately identified and assessed? Please identify any neighbouring landowners that you consider to be affected by these activities
R:	Yes – refer to Section 4.0 of this memorandum.
Q:	Are the mitigation measures proposed by the applicant appropriate in this circumstance? If no, why not?
R:	Yes.
Q:	If monitoring of the air quality is required, where should monitoring be undertaken, how should monitoring be undertaken, what parameters should be monitored, and how often?
R:	The monitoring of air quality proposed by the applicant is summarised in Section 9.2 of this memorandum. PDP considers the proposed monitoring of air quality to be fit for purpose for the proposal., however notes the recommendations made regarding the meteorological monitoring.
Q:	Have the cumulative effects of the activity been appropriately assessed? Yes/no
R:	Yes.
Q:	If granted, are there any specific conditions that you recommend should be included in the consent?
R:	Section 10.0 of this memorandum summarises the minimum consent requirements as recommended by the Ministry for the Environment’s <i>Good Practice Guide for Assessing and Managing Dust</i> .