Annexure 13:

Macraes Operation Dust Management Plan

Macraes Operation

Dust Management Plan

April 2023
MAC-210-Plan-000

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APPENDICES

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Revision History

Date	Revision No.	Issued for	By
04Mar11	A	Initial Draft	Debbie Clarke
18Mar11	B	Amendments to Draft A	Jenny Autridge
01May13	C	Plan Review	Patrick Windsor
09Jul14	D	General Review and Update to include Coronation	Debbie Clarke
04Aug15	E	Plan Review	Debbie Clarke
10Aug16	F	Plan Review	Lauren Arnold
23Jan17	G	Review and update to include Coronation North	Lauren Arnold
14 May 19	H	Review and update to include Frasers West	Gavin Lee
23 Nov 20	I	General Review and Update to include Deepdell North Stage III and Frasers West.	Charlotte Boyt
02 May 23	J	Review and update to include Golden Point Underground	Renee Tomsett & Lauren Arnold

1 BACKGROUND

1.1 Air Discharge Consents

This Dust Management Plan (DMP) covers the area of the original mining operation at Macraes (up until May 2012), the Macraes Phase III mine expansion area, the Coronation Project area, the Coronation North Project area, the Frasers West Project (variation to the Macraes Phase III consent) and the Deepdell North Stage III project area. The plan has been prepared to fulfil the requirement for a DMP which is a resource consent condition in multiple air discharge consents held by Oceana Gold (New Zealand) Limited (OceanaGold). Two air discharge consents are held for the ventilation of the Frasers and Golden Point Underground mines. Details of these consents are summarised in Table 1.1.

Table 1.1: Air Discharge Consents held by OceanaGold

Consent Number	Details
Discharge Permit 96785_V5	To discharge contaminants from mining operations and post mining rehabilitation to air in the vicinity of Macraes Flat. (all the minesite except features associated with Macraes Phase III and Coronation).
Discharge Permit 2006.689	To discharge contaminants to air for the purpose of ventilating Frasers Underground Mine.
Discharge Permit RM10.351.52_V1	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations (Macraes Phase III expansion and Frasers West Project).
Discharge Permit RM12.378.15	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations (Coronation Waste Rock Stack, Coronation Pit and associated haul roads, utility areas and stockpiles).
Discharge Permit RM16.138.19	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations (Coronation North Project).
Discharge Permit RM20.024.12	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations (Deepdell North Stage III Project).
Discharge Permit RM20.130.01	To discharge contaminants to air for the purpose of ventilating the Golden Point Underground Mine.

Discharge Permit 96785_V5, RM10.351.52_V1, RM12.378.15, RM16.138.19, RM20.024.12 and RM20.130.01 include conditions requiring a DMP. Relevant conditions are reproduced below.

"Prior to the exercise of this consent, the consent holder shall submit a Dust Management Plan to the Consent Authority. The Dust Management Plan shall include, but not be limited to, the following:

(a) A description of potential dust sources and the factors influencing dust generation;

(b) Dust mitigation measures and procedures including, but not limited to:

i) Minimising the areas of disturbed ground;

ii) Watering, with water trucks and fixed sprinklers;

iii) Avoiding as far as possible, ground disturbance when wind may cause dust nuisance;

iv) Taking wind conditions into account in planning and carrying out work to minimise dust dispersion;

v) Ensuring materials being moved are kept in a coarse state;

vi) Covering materials; and

vii) Replanting disturbed ground as soon as possible, including temporary planting if necessary.

(c) A description of dust monitoring equipment and procedures, including methods of analysis and details of the method used for the calculation of background dust concentration should values from one or all of the background sites be unavailable;

(d) Procedures for managing and addressing air quality or odour related complaints; and

(e) Key responsibilities, consultation and reporting, including details of the annual review and independent consultant used as required by Condition 18 of this consent."

"The consent holder shall review the Dust Management Plan annually taking into account the following:

(a) The outcomes of reviews completed in accordance with Condition 10 and 18 of this consent; and

(b) Whether management practices are resulting in compliance with the conditions of this consent.

Confirmation of the review and any revisions will be included in the Project Overview and Annual Work and Rehabilitation Plan for the Macraes Gold Project site. The consent holder shall provide the Consent Authority with any updates of the Dust Management Plan within one month of any update occurring."

1.2 Purpose

The purpose of this DMP is:

To facilitate the avoidance, remediation and mitigation of any adverse effects of dust discharges generated from mining activities and to promote proactive solutions to the control of dust discharges from the site.

The DMP includes information on the following:

- The sources of dust at Macraes Gold Project;
- Dust mitigation and prevention measures;
- Monitoring methods;
- Mechanisms for remediation of adverse effects (should this be required);
- Methods for managing complaints regarding dust and keeping records related to compliance; and
- Key responsibilities, consultation and reporting.

The DMP is intended to be a working document and is to be reviewed annually. Any updates made to the DMP must be forwarded to the Otago Regional Council within one month of the update occurring.

1.3 Objectives

The objectives of this management plan are:

- To describe current and proposed dust management methods and procedures;
- To enable OceanaGold to operate in full compliance with resource consent requirements; and

- To describe the dust monitoring regime and reporting of results.

2 SITE OVERVIEW

2.1 Description of Mine Areas

The key features of the Macraes Gold Project up until March 2023 are:

- The Deepdell South (now fully backfilled), Deepdell North, Golden Point, Round Hill, Innes Mills, Frasers, Golden Bar (now a pit lake), Coronation, Coronation North and Frasers West Open Pits;
- Frasers and Golden Point Underground;
- Pit Backfilling in Deepdell South, Deepdell North, Coronation, Coronation North, Innes Mills and Frasers Pit;
- The Mixed Tailings, Southern Pit 11 and Top Tipperary tailings storage facilities;
- The Deepdell North, Deepdell East, Northern Gully, Western, Back Road, Frasers West, Frasers East, Frasers South, Golden Bar, Coronation, Coronation North and Trimbells Waste Rock Stacks;
- A processing plant;
- Various offices, workshops and ancillary buildings;
- The Lone Pine Fresh Water Reservoir;
- Haul roads, light vehicle access roads, assorted silt ponds, topsoil stockpiles, oxide stockpiles and low-grade stockpiles;
- Works associated with road realignments of Macraes-Dunback Road and Golden Bar Road; and
- Dams in Camp Creek and Coal Creek (yet to be constructed).

2.2 Description of Site and Local Environment

Macraes sits within a rural upland landscape of fluvially dissected rolling hills of moderate relief and with characteristic broad ridge crests; being the coastal extent of Central Otago' s basin and range topography. Prominent regional landscape features include the Nenthorn Valley, Taieri Ridge, Taieri Valley and the Rock and Pillar Range, which lie to the south and west, the Shag Valley and Horse Range to the east and the coastal hills and extinct volcanic cones of Palmerston and Waikouaiti to the south.

Pastoral farming is the broad land use in the area, followed by gold mining; the latter has a history in the area that goes back to the nineteenth century. Macraes is on the eastern edge of the schist country and the broader historic goldfields of Central Otago. The presence of the relatively large scale Macraes Gold Operation is a noticeable and culturally interesting element in the current landscape. The Macraes Gold Operation is the modern 'face' of open pit gold mining and its presence and effect relative to landscape change is now a major feature contributing to the local landscape character.

The long term, focal and cultural landscape feature of Macraes Flat is the Macraes village with its hotel, school, churches, cemeteries and small clusters of houses and various outbuildings and shelterbelts. The village sits in splendid isolation within 'the flat' and various local roads lead to even more isolated farms and homesteads. Scattered and isolated habitation is a feature of the open, rolling, landscape on the edge of basin and range topography that expands through to the upper Taieri and the Maniototo.

2.2.1 Macraes Gold Project

Macraes Gold Project has been operational since 1990.The existing mining area extends to the north and south of Macraes-Dunback Road as shown on Figure 2.1.

Macraes Gold Project includes:

- Various open pits;
- The Frasers and Golden Point Underground mines;
- Numerous waste rocks stacks (both active and rehabilitated);
- A network of haul roads;
- A Processing Plant;
- Tailings storage facilities; and
- A comprehensive network of water management infrastructure.

The Coronation and Coronation North projects commenced in 2015 and 2017 respectively and are located on the Taieri Ridge. Mining consists of the Coronation and Coronation North Pits and associated waste rocks stacks. Coronation and Coronation North are linked to the Process Plant via a haul road and a culvert crossing across Deepdell Creek.

The Frasers West Project commenced in 2020 and consisted of establishment of a new 16.5ha Frasers West Pit, disposal of waste rock in Frasers Pit and Frasers South Pit; backfilling of the newly established Frasers West Pit using waste rock from the neighbouring Innes Mills and Frasers Slip Pits; and establishment of a new noise bund between the Frasers West Pit and Macraes Flat Township.

The Deepdelll North Project area commenced in 2020 and involves re-mining the Deepdell North Pit and expanding it from 18.7ha to 38ha, creation of the Deepdell East Waste Rock Stack and backfilling of the existing Deepdell South Pit.

The Top Tipperary Tailings Storage Facility is located to the east of the present mining activity and is the current operational facility for deposition of tailings. The Mixed Tailings Impoundment and the Southern Pit 11 tailings storage are currently in the process of being rehabilitated, whilst also providing some water storage.

The processing plant is centrally located on the south side of Deepdell Creek and below the Southern Pit and Mixed Tailings facilities.

The Deepdell Pit, Round Hill/Golden Point Pit, the associated waste rock stacks, the Southern Pit 11 and Mixed Tailings Storage Facilities and sections of Coronation Pit and Waste Rock Stack lie in the Deepdell Creek Catchment, whilst the Frasers Pit and associated rock stacks lie predominantly in the North Branch of the Wakouaiti River catchment. The Top Tipperary Tailings Storage Facility and a small portion of Frasers East Waste Rock Stack lies in the Tipperary Creek Catchment. Coronation North Pit and Waste Rock Stack and sections of Coronation Pit and Waste Rock Stack lie in the Maori Hen Creek and Trimbells Gully Creek (tributaries of the Mare Burn in the Taieri River catchment).

The mine site occupies an area of approximately 1500 hectares.

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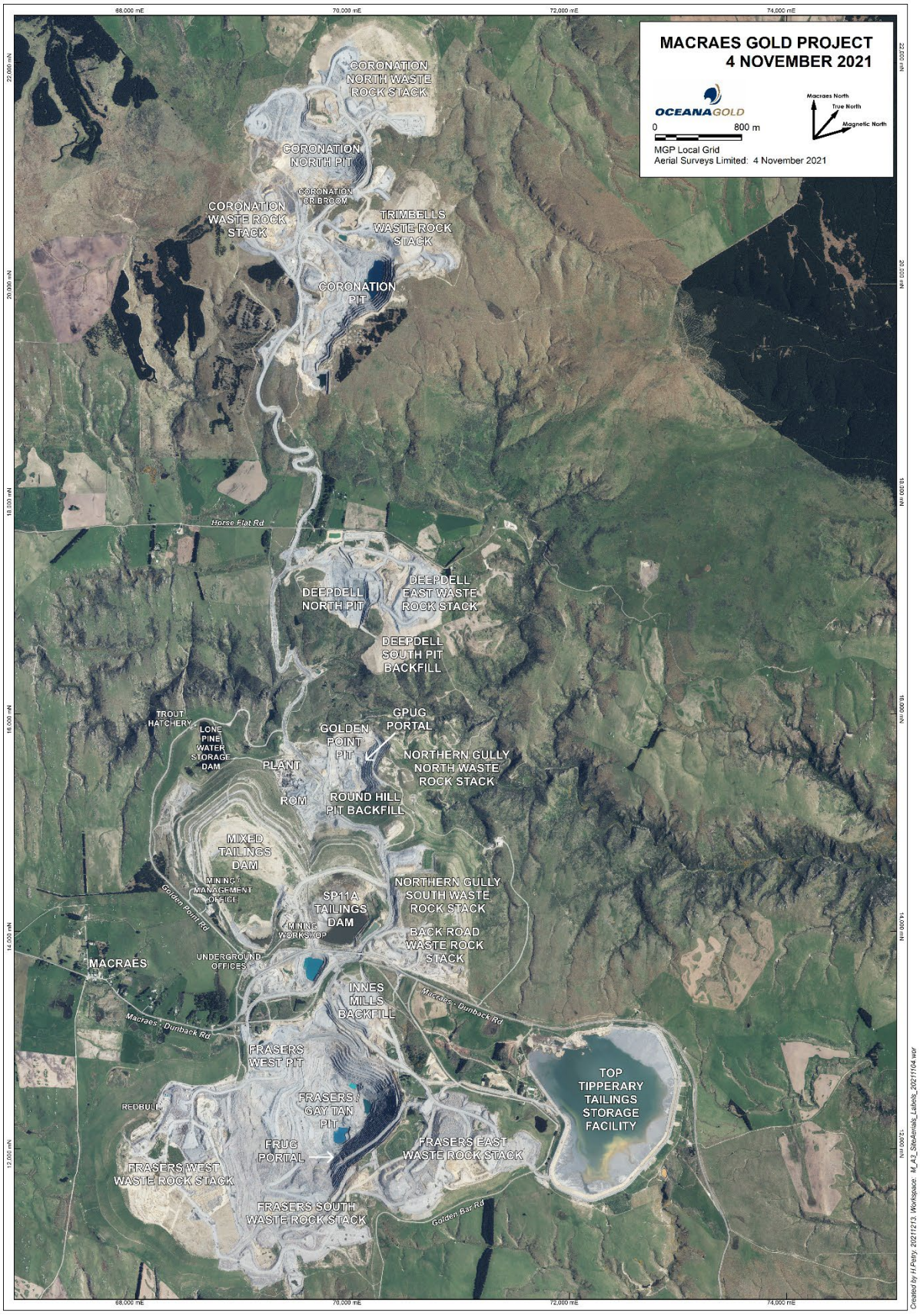


Figure 2-1 Macraes Gold Project Mine Elements

2.2.2 Local Environment

The land in the vicinity of the Macraes Mine is rural and is of a similar character to the land surrounding the existing mine. The topography of the area is dominated by the large waste rock stacks and mine pits. Rehabilitated waste rock stacks have been shaped so that their profile, contours, skylines, and transitions blend with the surrounding natural landforms. The land to be mined is all owned by OceanaGold, except for the Camp Creek Reservoir (yet to be constructed) site.

Figure 2.2 shows the areas of land in the vicinity of the mine which are owned by OceanaGold, including areas of land leased and the boundaries of land owned by neighbours. The map also shows the locations of the existing and proposed mine activities and demonstrates the distances from the mining activities to the boundaries with neighbouring properties.

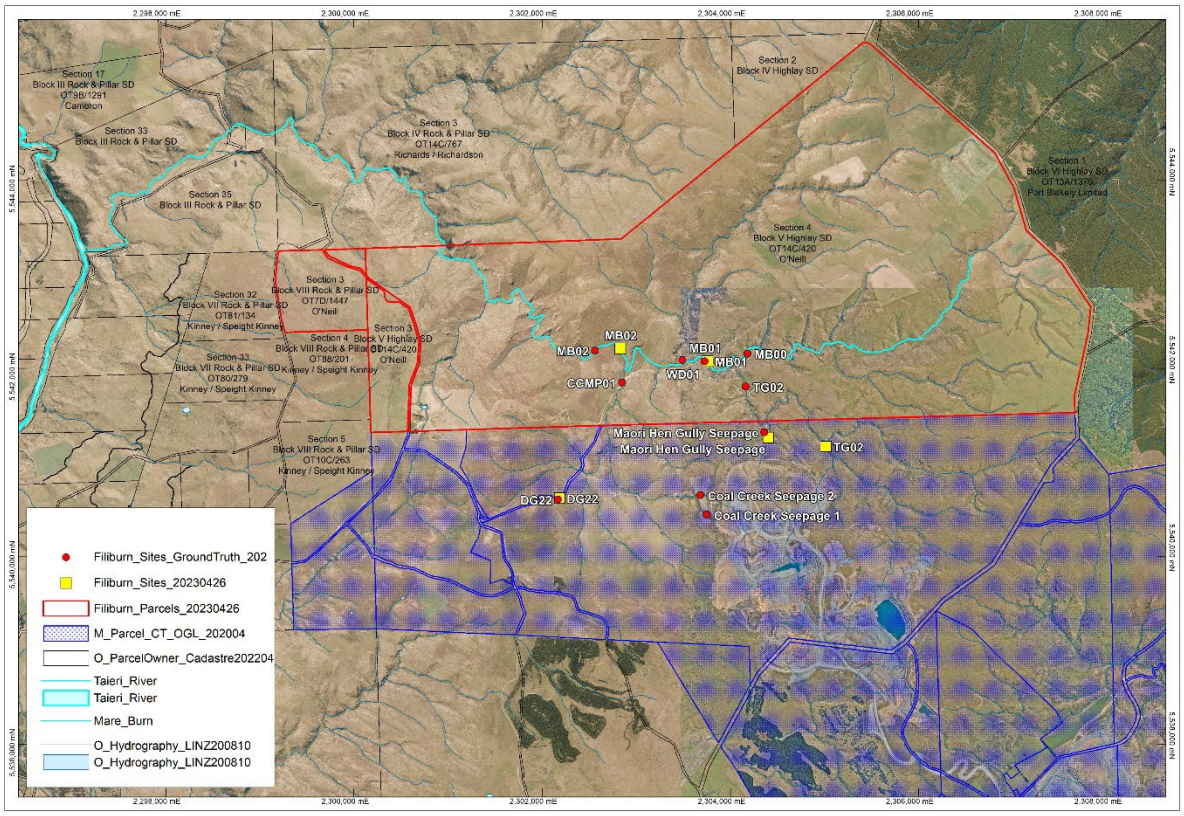


Figure 2-2: Land Owned and Leased by OceanaGold and Locations of Neighbouring Landowners

2.2.3 Site Weather Conditions

The main features of the Macraes Flat climate are the relatively low rainfall (site average annual rainfall is 634mm) and the moderately strong average wind speed of 5.5m/s[1]. Both of these features can contribute to the generation and transport of dust. OceanaGold measures wind speed and wind direction at a weather station located on Golden Point Road and at a second site adjacent to dust monitoring site 15 near the Macraes Village. A windrose for the year 2021 is shown in Figure 2.3. The predominant wind direction was from the northwest.

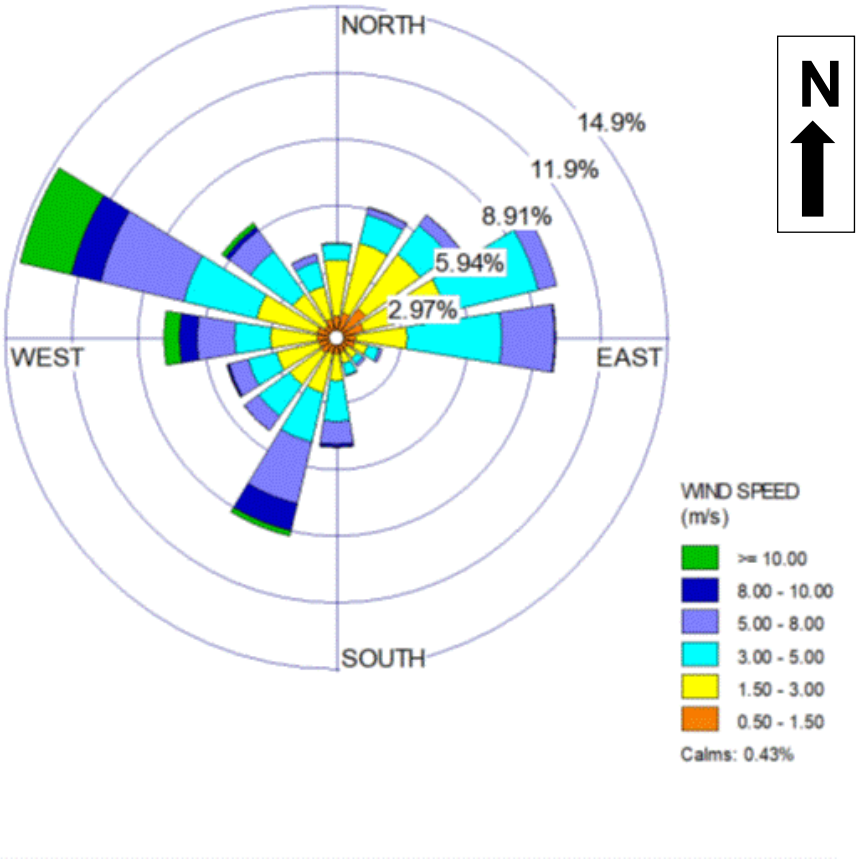


Figure 2-3: Site 3 Annual Windrose (hourly averages), 2021

[1] Macraes Mining Company Ltd. Macraes Gold Project Discharges to Air Assessment of Environmental Effects December 1996.

3 DUST SOURCES AND GENERATION

3.1 Potential Dust Sources

The following activities have the potential to generate dust:

- Blasting of rock;
- Excavation, including stripping of overburden and topsoil;
- Vehicle movements on unpaved surfaces (i.e. haul roads);
- Loading and unloading of materials;
- Wind generated dust from dry exposed surfaces such as stockpiles, tailings impoundment surfaces and non-rehabilitated surfaces; and
- Crushing of materials.

Dust emissions from exposed surfaces generally increase with increasing wind speed. However, dust pick up by wind is only significant at wind speeds above 5m/s. The smaller the particle size of the material on an exposed surface, the more easily the particles are able to be picked up and entrained in the wind. Moisture binds particles together preventing them from being disturbed by winds or vehicle movements. Similarly vegetated surfaces are less prone to wind erosion than bare surfaces. The larger the areas of exposed surfaces the more potential there will be for dust emissions.

Vehicles travelling over exposed surfaces (i.e. haul roads) tend to pulverise any surface particles. Particles are lifted and dropped from rolling wheels and the surface. Dust is also sucked into the turbulent wake created behind moving vehicles.

The discharge of dust from haul roads has the potential to have effects on two scales. The first is individually from a source where the effects are localised in the immediate area surrounding the activity. Secondly, cumulative effects may be observed where the dust generated from all of the nearby dust sources (such as machinery operating in the pit and adjacent haul roads) combine to affect the air quality of the area as a whole. Therefore, it is important that all dust sources be minimised as far as practical, including those well separated from sensitive locations, as all dust generated will have an effect on the overall air quality in the area.

3.2 Factors Influencing Dust Generation

There are five major factors which influence the potential for dust to be generated from the site. These are:

- Wind speed across the surface;
- The percentage of fine particles in the material on the surface;
- Moisture content of the material;
- The area of exposed surface;
- Disturbances such as traffic, excavation, loading and unloading of materials and blasting.

Systems for controlling dust emissions need to include methods that modify the condition of the materials so that it has a lesser tendency to lift with the wind or disturbances such as vehicle movements, and methods that reduce the velocity of the wind at the surface.

Watering of exposed surfaces and materials that may be disturbed is a primary method of control. As a general guide, the typical water requirements for most parts of New Zealand are up to 1 litre per square meter per hour.

The dust prevention methods detailed in Section 4 are the methods that have been found to be effective over the last 30 years of operation at the Macraes mine site. They can be used alone or in combination depending on the circumstances.

4 DUST MITIGATION MEASURES AND PROCEDURES

The following measures and procedures are implemented as necessary. Where relevant, the measures and procedures are also incorporated into contractor's responsibilities.

Unpaved Surfaces (haul roads, waste rock stacks, tailings impoundment surfaces, pits)

- Limit the area of exposed surfaces.
- Retain as much vegetation as possible.
- Keep tailings impoundment, pit and haul road maintenance up to date, such as repair of pot holes and the laying of fresh gravel or surfacing material.
- Keep haul road and exposed surfaces damp during dry conditions with water carts or fixed sprinklers.
- Cover exposed fine fill materials with coarse materials where practicable.

Vehicles (light vehicles, dump trucks, earthmoving machinery)

- Minimise traffic movements and control vehicle speeds to a maximum of 60km/h on haul roads.
- Adhere to load sizes to avoid spillages.
- Minimise travel distances through appropriate site layout and design**.**

Stockpiles (topsoil, brown rock, waste rock)

- Limit the height and slope of stockpiles to reduce wind entrainment.
- Orientate stockpiles to maximise wind sheltering.
- Minimise drop heights.
- Vegetate stockpiles of any materials that are to be left undisturbed for more than three months.
- Maximise shelter from winds as practicable.

Miscellaneous

- Revegetate exposed soil with appropriate vegetation as soon as practical.
- Install wind fences or barricades where practicable and appropriate.
- Minimise the area of surfaces covered with fine materials.
- Remove topsoil and loose material covering rock prior to blasting.
- Schedule potentially dusty operations where possible to avoid times of the day and year when conditions are likely to be particularly dry and windy.
- Schedule blasts to take into account wind conditions.

In addition to the above measures, specific dust mitigation methods exist for the tailings impoundment surfaces. These mitigation methods are detailed in the *Southern Pit 11 Tailings Impoundment, Mixed Tailings Impoundment and Top Tipperary Tailings Storage Facility Dust Control Manual presented in Appendix B*. Specifically, the measures outlined in the Tailings Dust Control Manual include:

Tailings Discharge

- Tailings deposition to be sequentially moved around the dam, restricting the likelihood of windborne dust generation created by the tailings beach drying out.

Rock Covering

- If feasible mitigate dust generation from the tailings beach via construction of a rock covering
- Rock mattress construction will commence as soon as practicable after cessation of tailings deposition for impoundments constructed using upstream construction methods.

Tailings Wetting System

- A tailings wetting system can be utilised to keep the tailings surface damp during periods of dry and windy conditions.
- Tailings wetting systems are to have the capacity to be operational at all times when the impoundment is not active,
- Limit traffic on the tailings surface when the impoundment is inactive in order to preserve the crust.
- Ensure tailings wetting system can be mobilised to other areas of the impoundment where necessary to mitigate dust generation.

5 MONITORING

OceanaGold currently holds five air discharge consents: RM10.351.52_V1 (Macraes Phase III and the Frasers West Project), 96785_V5 (covering general mining and processing operations in all areas not covered by Macraes Phase III), RM12.378.15 covering the Coronation area, RM16.138.19 covering the Coronation North area, RM20.024.12 covering Deepdell North Stage III as well as Consent No 2006.689 for the purpose of ventilating the Frasers Underground mine, and RM20.130.01 for the purpose of ventilating the Golden Point Underground mine. Copies of these consents are presented in Appendix A.

Under air discharge consents 96785_V5, RM10.351.52_V1, RM12.378.15, RM16.138.19 and RM20.024.12 the following monitoring is currently undertaken:

- Dust deposition rates at monthly intervals at 16 sites
- Real time total suspended particulate concentrations at site DG15. The ORC gave permission for the concurrently operated High Volume Sampler to be disestablished in May 2015);
- Continuous meteorological monitoring of conditions at two representative locations (Sites DG03 and DG15);
- Real time total suspended particulate matter at DG11 (Macraes Road) and DG07 (Howards) for a period of at least 12 months following commencement of works at Frasers West and Deepdell North Stage III. (Note – after completion of at least 12 months monitoring and review of the data by a suitably qualified expert this monitoring may be amended or suspended with the approval of the ORC) and
- Daily record kept of water used for dust suppression.

In addition to the resource consent monitoring OceanaGold has a process of checking weather forecasts and advising key operational personnel if strong winds are forecast. This process is set out in the *Tailings Storage Facilities Dust Control Manual*, included as Appendix B.

To ensure that controls are implemented and are effective in minimising dust emissions, OceanaGold monitors weather conditions, the condition of potential dust generating areas and undertakes depositional dust and total suspended particulate monitoring.

Table 5.1 below outlines the current dust monitoring programme.

Table 5.1: Existing Dust Monitoring Programme

Monitoring Activities	Frequency
Check weather forecasts for strong winds and send electronic alerts to key personnel.	Daily
Observe weather conditions, wind via observations (Beaufort Scale)[2].	Daily and as conditions change.
Inspect all haul road surfaces for dampness and general condition.	Daily and as conditions change
Inspect all exposed surfaces for dampness and to ensure that surface exposure is minimised.	Daily and as conditions change.
Inspect tailings impoundment surfaces for dampness.	Daily and as conditions change.
Inspect tailings impoundment dust suppression systems.	Twice daily during extended periods of no deposition
Monitor dust deposition rates in 16 gauges surrounding the mine site.	Monthly

[2] A description of the Beaufort Scale can be found in Appendix C

Monitoring Activities	Frequency
Monitor real time Total Suspended Particulate (TSP) at Dust Site 15 using a Nephelometer.	Continuously
Monitor real time TSP at DG07 (Howards) and DG11 (Macraes Road) (note as per the consent condition ths may be suspended on review by a suitable expert and approval of the ORC).	Continuously
Monitor meteorological conditions at Dust Sites 3 and 15.	Continuously

The locations of the depositional and total suspended particulate monitoring sites are shown on Figure 5.1.

5.1 Monitoring Equipment Specifications

Specifications of the equipment used to undertake these monitoring activities can be found in Tables 5.2 to 5.4 below.

Table 5.2: Monitoring Equipment at Site DG15

Monitor Type	Monitor Specifications
Nephelometer (real time total suspended particulate monitoring)	Met One E-Sampler-9800.
Atmospheric monitoring site	Temperature sensor: Campbell Scientific 107 Anemometer: Vector A101M Wind Vane: Vector W200P Rain Gauge: TB3-0.2/P
Dustfall Gauge	Standard Dust Deposition Gauge. Dust gauges are analysed using the Horizontal Deposit Gauge Method.

Table 5.3: Monitoring Equipment at Site DG07 (Howards) and DG11 (Macraes Road)

Monitor Type	Monitor Specifications
Nephelometer (real time total suspended particulate monitoring)	Thermo ADR-1500 Area Dust Monitors

Table 5.4: Monitoring Equipment at Site DG03

Monitor Type	Monitor Specifications
Atmospheric Monitoring Site	Temperature Sensor: Campbell Scientific 107 Temperature and RH Sensor: Viasala HMP50Y Anemometer: Vector A101M Wind Vane: Vector W200P Rain Gauge: Ota Keiki Seisakusho 34-T Solar Radiation: Apogee SP110 Pyranometer
Dustfall Gauge	Standard Dust Deposition Gauge. Dust gauges are analysed using the Horizontal Deposit Gauge Method.

Table 5.5: Other Dust Monitoring Locations

Monitoring Type	Specifications
Dustfall Gauge	Standard Dust Deposition Gauge. Sixteen gauges are positioned in various locations around site (see Figure 5.1 for locations). Dust gauges are analysed using the Horizontal Deposit Gauge Method.

5.2 Data Analysis and Reporting

5.2.1 Dustfall Gauge Data

Data from dustfall gauges is collected, analysed and reported on a monthly basis by Environmental Standards Limited. Dustfall gauges are analysed using the Horizontal Deposit Gauge method. This method is detailed in the Draft International Standard ISO/DIS 4222.2 (‘*Air Quality Measurement of Atmospheric Dustfall – Horizontal Deposit Gauge Method”* 1980).

Depositional dust results are included in the Quarterly Monitoring Reports supplied to the Otago Regional Council.

5.2.2 Atmospheric and Total Suspended Particulate Data

Watercare Services Limited (WSL) undertakes data analysis and reporting for the total suspended particulate monitoring and atmospheric monitoring station. A quarterly summary report is produced once all the data has been collected and analysed. Details of the methods for data analysis can be found in Section 5 of their latest quarterly report, which can also be found in Appendix D of this plan.

Total suspended particulate results are included in the Quarterly Monitoring Reports supplied to the Otago Regional Council.

5.3 Compliance Limits

Under resource consent RM10.352.52_V1 (Macraes Phase III and Frasers West Project) and 96785_V5, the following compliance limits apply:

- Insoluble dust deposition rates at sites DG07, DG20 and DG21 must not exceed 3g/m^2/30days of insoluble dust above background more than twice in any calendar year;
- Insoluble dust deposition rates at sites DG02 and DG15 must not exceed 3g/m^2/30days of insoluble dust above background; and
- 24 hour average total suspended particulate at Site DG15 must not exceed 120ug/m^3.
- A trigger level of 250ug/m3 (1-hour average) and 80ug/m3 (24 hour average) applies to the total suspended particulate readings at Site DG11. Where a trigger level is exceeded a review of dust sources and dust control mist occur.

Background concentrations will be calculated by averaging the insoluble dust deposition rates at sites DG09, DG10 and DG24. In the event that a result for one of these sites is unavailable, the background concentration will be calculated by averaging the remaining sites.

Under resource consent RM12.378.15 (Coronation), the following compliance limits apply:

- Insoluble dust deposition rates at sites DG07, DG20, DG21, DG22 and DG23 must not exceed 3g/m^2/30days of insoluble dust above background more than twice in any calendar year;
- Insoluble dust deposition rates at sites DG02 and DG15 must not exceed 3g/m^2/30days of insoluble dust above background.
- 24 hour average total suspended particulate at Site DG15 must not exceed 120ug/m^3.

Background concentrations will be calculated by averaging the insoluble dust deposition rates at sites DG09, DG10 and DG24. In the event that a result for one of these sites is unavailable, the background concentration will be calculated by averaging the remaining two sites.

Development of the Coronation North Project resulted in DG23 needing to be decommissioned and a new site being established (DG25). This change is reflected in the updated consent RM16.138.15, issued April 2017.

Under resource consent RM16.138.19 (Coronation North), the following compliance limits apply:

- Insoluble dust deposition rates at sites DG07, DG20, DG21, DG22 and DG25 must not exceed 3g/m^2/30days of insoluble dust above background more than twice in any calendar year.
- Insoluble dust deposition rates at sites DG02 and DG15 must not exceed 3g/m^2/30days of insoluble dust above background.

- Twenty-four hour average total suspended particulate at site DG15 must not exceed 120µg/m^3.

Background concentrations will be calculated by averaging the insoluble dust deposition rates at sites DG09, DG10 and DG24. In the event that a result for one of these sites is unavailable, the background concentration will be calculated by averaging the remaining two sites.

Under resource consent RM20.024.12 (Deepdell North Stage III), the following compliance limits apply:

- Insoluble dust deposition rates at sites DG07 and DG17 must not exceed 3g/m^2/30days of insoluble dust above background more than twice in any calendar year.
- Insoluble dust deposition rates at sites DG02 and DG15 must not exceed 3g/m^2/30days of insoluble dust above background.
- Twenty-four hour average total suspended particulate at site DG15 must not exceed 120µg/m^3.
- A trigger level of 250ug/m3 (1-hour average) and 80ug/m3 (24 hour average) applies to the total suspended particulate readings at Site DG07. Where a trigger level is exceeded a review of dust sources and dust control must occur.

Background concentrations will be calculated by averaging the insoluble dust deposition rates at sites DG09, DG10 and DG24. In the event that a result for one of these sites is unavailable, the background concentration will be calculated by averaging the remaining two sites.

5.4 Exceedance of a Compliance Limit

If a consent limit for depositional dust or total suspended particulate at DG15 is exceeded, OceanaGold will undertake an immediate review to determine the likely cause of the exceedance. The Otago Regional Council will be notified within a 24 hour period of the exceedance becoming apparent and depending on the nature of the incident, a report detailing the findings of the investigation will be forwarded to the Otago Regional Council within one month, or follow up comment will be made in the Quarterly Monitoring Report (in the event of clear indication that the exceedance is not a result of OceanaGold operational activities). If it is found that activities of OceanaGold were the cause of the exceedance, then dust mitigation measures shall be reviewed by an independent consultant and a report prepared summarising the cause of the exceedance and recommending measures to improve dust mitigation so the exceedance does not occur again. The report will be forwarded to the Otago Regional Council within two months of the exceedance being identified.

Where a total suspended particulate trigger level is exceeded at either the DG07 or DG11 sites, a review of dust sources and dust control must occur. If the exceedance is likely to have been caused or contributed by onsite activities, then dust control management shall be revised and/or additional dust control measures implemented. Written notice of an exceedance that is caused or contributed to by site activities must be provided to the ORC within 10 working days of the exceedance.

5.5 Annual Dust Review

An annual summary of the ambient air monitoring results is to be forwarded to the ORC by 30th April each year. This report reviews and assesses the results for the previous calendar year and is to be undertaken by a suitably qualified independent reviewer. OceanaGold engage Beca Limited for this report. The relevant qualifications and experience of the reviewer can be found in Appendix B of *"Macraes Mine – Summary of Ambient Air Monitoring Results for 2021".*

The report shall include the following:

(a) The name, qualifications and experience of the reviewer;

(b) The methods used and the investigations undertaken for the review;

(c) Interpretation of the monitoring data reviewed;

(d) An assessment of the quality of the monitoring data;

(e) An assessment of the monitoring regime;

(f) A description and evaluation of each of the dust mitigation measures used;

(g) Recommendations on whether:

i) The monitoring of dust is adequate or should be changed, and if changed the changes that are recommended;

ii) The dust mitigation measures used by the consent holder are adequate, or should be changed, and the changes that are recommended; and

iii) Any changes that should be made to the conditions of this consent.

(h) Any other matters that the reviewer considers should be drawn to the attention of OceanaGold or the Otago Regional Council.

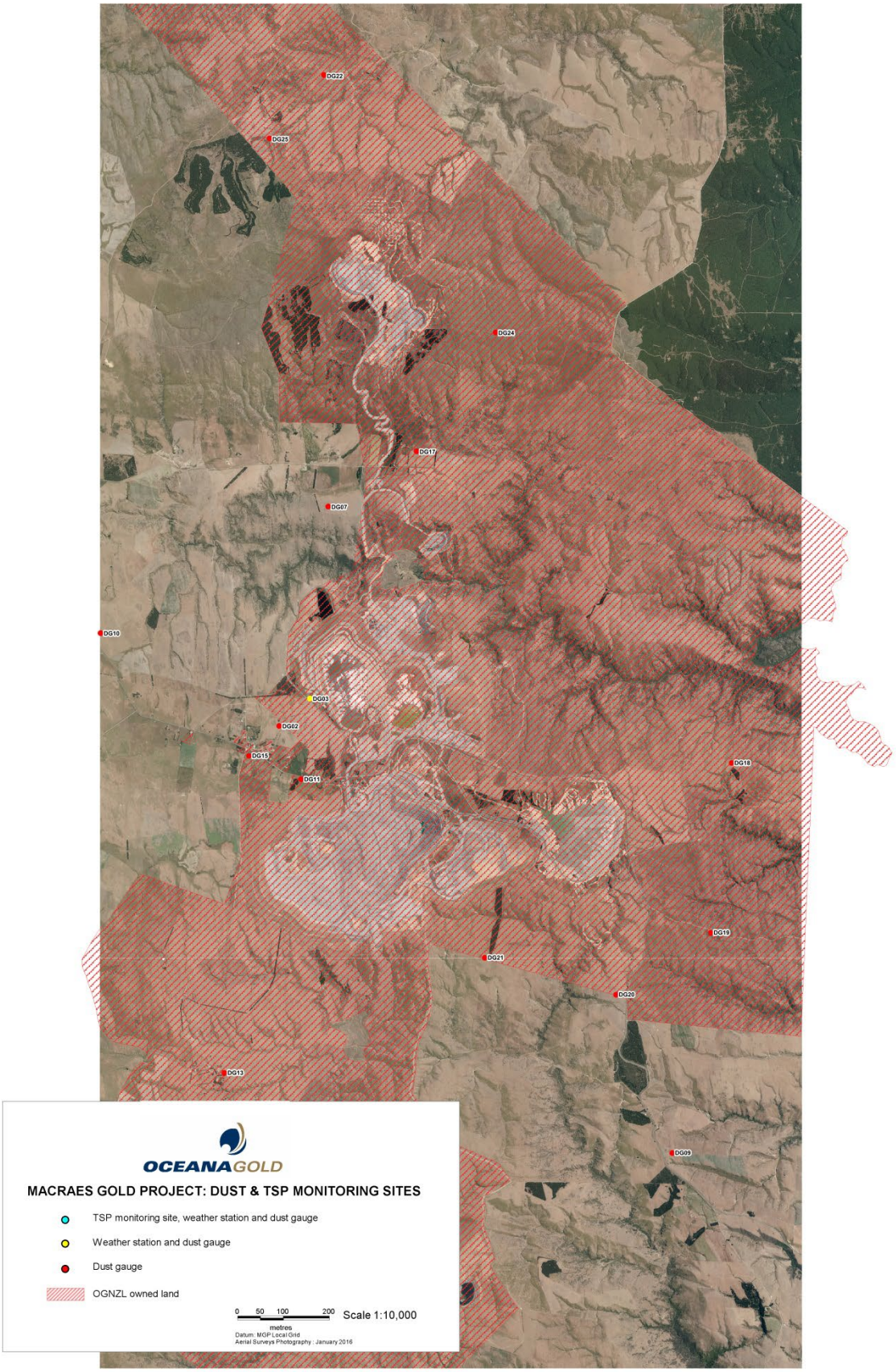


Figure 5-1: Depositional Dust and TSP Monitoring Sites

6 COMPLAINTS

Complaints may be referred by one or more of the regulatory authorities, a member of the public or an OceanaGold employee or contractor. It is the responsibility of the Environment and Community Manager to respond to and follow up all complaints regarding dust. The Environment and Community Manager is responsible for ensuring suitably qualified personnel are available to respond to complaints at all times.

Actions to be taken as soon as possible by the Environment and Community Manager

- All complaints are logged in the InForm Stakeholder data base.
- Note the time, date, identity and contact details of complainant. Wind direction, strength and weather conditions are to be recorded. Note if complaint has been referred from a Consent Authority.
- Ask the complainant to describe the dust emission; whether it is constant or intermittent, how long it has been going on for, is it worse at any time of day, does it come from an identifiable source.
- As soon as possible after receipt of a complaint undertake a site inspection. Note all dust producing activities taking place, which staff member or contractor is responsible for the site and the dust mitigation methods that are being used. Order any remedial action necessary. If the complaint was related to an event in the recent past, note any dust producing activities that were underway at that time, if possible.
- As soon as practical (preferably within two hours) 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 activities at Macraes Gold Mine causing the dust nuisance it is important to verify this. Photograph and document the source and emissions.
- If complaint is received more than 12 hours after the event, conduct investigation including collecting relevant weather data, identifying operational activities at the time of the incident, collecting camera footage and interviewing operational staff. Investigations should endeavour to identify root cause and contributing factors.
- As soon as possible after the investigations have been completed contact the complainant to explain what has been found and remedial actions taken.
- If necessary, update any relevant procedures to prevent any recurrence of problems.
- Complete complaint form and file on complaint register.

Follow Up Actions

- Advise the Otago Regional Council as soon as practical that a complaint has been received and what the findings of the investigation were, and any remedial actions taken.

7 RESPONSIBILITIES

OceanaGold as the holder of consents for Macraes Gold Mine site has the ultimate responsibility to ensure that all statutory requirements and conditions of consent are complied with and mining activities are carried out in accordance with the DMP.

Specifically, the following roles share operational responsibility for ensuring mining activities are carried out in accordance with the DMP:

- General Manager Macraes Operation
- Open Pit Mine Operations Manager
- Process Manager

These roles will have the following responsibilities:

- Overall responsibility at the site for ensuring that the dust control and mitigation measures and procedures outlined in Section 4 of the DMP are implemented effectively.
- Overall responsibility to ensure that dust emissions are avoided and mitigated as far as is practicable.

The Environment and Community Manager will have the following associated responsibilities:

- Responsibility to ensure that the dust monitoring programme is carried out as required.
- Responsibility to ensure that complaints are received and investigated as outlined in Section 6 of the DMP.
- Responsibility to ensure the DMP is current and reviewed at least annually.

All contractors and staff working on site are to ensure that their activities comply with the requirements of the DMP.

8 CONSULTATION, REPORTING AND REVIEW

8.1 Neighbours

OceanaGold will consult with the Macraes Community Incorporated (MCI) regularly, as part of the bi-monthly meeting process, to inform them of any issues relating to dust control at the Macraes Gold Mine site that may be of interest to the community and to obtain feedback from the community.

OceanaGold will advise the Macraes Community through MCI of the contact phone numbers to be used to advise OceanaGold of a complaint.

The contact phone numbers and email addresses to be used for registering a complaint are included in **Appendix E**.

8.2 OceanaGold to Otago Regional Council

OceanaGold will maintain a regular and formal reporting regime with the Otago Regional Council (ORC) to inform them of any issues regarding dust control at the site that may be of interest to them and to obtain feedback on compliance and performance.

OceanaGold will provide the ORC with contact numbers to be used to advise OceanaGold of a dust complaint. The contact phone numbers and email addresses to be used for registering a complaint are included in **Appendix E**.

OceanaGold will inform the ORC of the following:

- Any complaints received regarding dust as soon as practical after receipt of the complaint.
- Of any non-compliances with monitoring as outlined in Section 5. Any non-compliance will be reported to the ORC through the nominated compliance contact (currently Rachel Brennan) or via the compliance email address (compliance@orc.govt.nz).
- Provide ORC with a copy of the DMP if any significant revisions of the DMP are made during the year.

8.3 Otago Regional Council to OceanaGold

OceanaGold requests that the ORC advise them of any complaints they receive regarding dust from the Macraes Gold Mine site immediately after the complaint has been lodged.

8.4 DMP Review Procedure

The DMP shall be reviewed regularly and at least annually preferably during the winter period and prior to the next dry season. The review shall take into account the following:

- The outcome of any reviews completed as the result of any non-compliant results;
- The outcome of the annual review of all dust monitoring data; and
- Whether management practices are resulting in compliance with the conditions of the relevant air discharge consents.

A copy of any updates to the DMP will be forwarded to the Otago Regional Council within one month of any update occurring. Confirmation of the review and any revisions will be included in the Project Overview and Annual Work and Rehabilitation Plan.

9 EXCESSIVE DUST ACTION PLAN

In the event that personnel are unable to control dust adequately on the mine site and additional measures are required in order for OceanaGold to comply with the provisions of the resource consents OceanaGold shall initiate an emergency action plan. OceanaGold will maintain an in-house register of persons and contractors who have suitable equipment and personnel available that can be contacted at short notice in the event of a dust emergency occurring.

The emergency procedures may include, but are not limited to, the following:

- The use of additional water carts and irrigation systems; and
- Stopping work on areas of the site that are sources of excessive dust, where practical.

The Site Personnel Contacts list is included in **Appendix E.**

Appendix A

Resource Consents Held for Air Discharges

Appendix B

Tailings Storage Facilities Dust Control Manual

Tailings Storage Facilities

Dust Control Manual
April 2023

Table of Contents

1 INTRODUCTION

The Macraes Operation currently has three tailings storage facilities (TSFs). Two of these, Southern Pit Tailings Option 11A (SP11A) and Mixed Tailings Impoundment (MTI), are currently in a resting state. Tailings discharge infrastructure remains at SP11A as contingency, although, minimal storage capacity exists. All tailings discharge infrastructure at the MTI has been disestablished. Tailings is currently being deposited into Top Tipperary Tailings Storage Facility, which has been the active tailings storage facility since October 2013.

This manual details dust control methods used to control and minimise the transmission of dust particles around and away from the TSFs.

The design of all three TSFs has been carried out by Engineering Geology Ltd (EGL) and a description of the embankment design is contained in the design report for each TSF.

Details of the operation, maintenance and surveillance of the tailings storage facilities can be found in the respective Operation, Maintenance and Surveillance Manuals.

2 RESPONSIBILITIES

Oceana Gold (NZ) Ltd (OceanaGold), as owners of the TSFs are ultimately responsible for the control of dust.

Supervision and monitoring of the quality of construction is undertaken by OceanaGold staff as is regular monitoring, maintenance and surveillance as detailed in the respective Manuals.

The installation and maintenance of dust control systems is the responsibility of the processing department.

The operation of dust control systems and the tailings distribution system is the responsibility of the Process Supervisor. A Daily Decision Tree (attached) is available to assist with operation of dust control systems.

Whilst the above listed departments are responsible for the control of dust, it is the responsibility of all staff to report when dust control is required. The TSFs are inspected periodically throughout the day, however conditions may change between inspections. Any reports of excess dust should be alerted to the Environmental, Projects or Processing departments.

3 ENVIRONMENTAL CONDITIONS

During spring, the Macraes District is frequently subjected to strong drying winds. Wind gusts in excess of 100km/hr are not uncommon and the winds can continue for several days without ceasing. The strongest winds are often experienced between August and October, although strong winds at other times are not uncommon.

Particles begin to be mobilised at wind speeds of 5m/s. This means that lower winds also influence the tailings surface and can move large quantities of dust. As the wind speed increases, the mobilised particles dislodge other particles and this can result in significant dust generation.

The finer the particles are the more prone to movement they are. At Macraes, tailings discharge occurs sub aerially from the embankment. This results in the coarser material being located closer to the embankment and finer further from the embankment.

When conditions have been dry and windy for extended periods of time, the surface of the embankments becomes dry. This can cause the particles to become more easily entrained by the wind. When moisture is present on the surface, this binds to the tailings and increases the cohesion between particles making them harder to move. Whilst wind speed cannot be controlled, the moisture of the tailings surface can and so this can determine the dust suppression technique used to control dust as seen in the below section.

4 METHODS OF DUST CONTROL

4.1 Tailings Discharge

During and immediately following periods of active tailings discharge the tailings beach surface remains sufficiently damp that the potential for windborne dust generation is very low.

At TTTSF, tailings deposition is via spigots at maximum 50 m intervals. Spigot opening is sequentially moved around the impoundment to decrease the chance that the tailings surface could dry out and become prove to dust creation. Tailings deposition is manually redirected around the impoundment through the use of knife gate valves to direct the tailings to a general area while spigots are used to control localised tailings deposition. This method of deposition also helps to keep the tailings surface level which limits localised drying conditions. Dust control requirements at TTTSF will therefore be minimal as tailings will be continuously discharged to this facility and the beach is unlikely to dry sufficiently to generate dust.

Tailings discharge to TTTSF commenced in October 2013. Both the SP11A and MTI are currently not in use. No further discharge to MTI is expected and discharge to SP11A will only occur into these impoundments at times of maintenance to the Top Tipperary tailings discharge system.

4.2 Rock Mattress Cover

Experience has shown that the area of the tailings surface with the most potential for dust generation is the tailings beach adjacent to the embankment crest.

As construction of both the Southern Pit 11 and Mixed Tailings Impoundments has been completed, capping of the surface has commenced. This involves placing a rock mattress over the tailings surface.

Rock mattress cover at MTI extends over nearly the entire impoundment except for the area at the rear of the facility surrounding the decant pond. At SP11A the rock mattress covers the front portion of the facility. For details of the rock mattress and capping refer to the design documents and closure plan for each impoundment.

4.3 Dust Suppression System

A dust suppression system has been established at SP11A on areas which have not received capping material. This system needs to be operational from August to March each year however it is prudent to continue to have this system in place at all times.

The dust suppression system generally consists of an outer ring main feeding sprinklers laid out over the tailings surface, however various combinations of open ended pipe discharge can be utilised as necessary to ensure good coverage and wetting.

At TTTSF, a dust suppression system should be installed as soon as practicable, once tailings deposition at this facility ceases.

Preservation of the crust on the dam surface is to be maximised by limiting traffic on the tailings surface wherever possible.

5 OPERATION

The tailings distribution system is operated by the Processing Superintendent and follows tailings deposition methodology recommended by the design engineers, EGL.

A site specific model that predicts hourly wind speed, direction and rainfall (provided by the MetService) is used to assist in the prediction of wind events (note – if heavy rain or rainfall warnings are indicated for Fiordland and the West Coast this will often indicate strong winds on the East Coast). It is the responsibility of the Processing Superintendent to initiate action in accordance with the Model predictions.

The tailings or dust suppression system is to be used 12 hours prior to any anticipated high wind event (defined as an event of greater than 40km/hr winds for greater than 4 hours from a west or northwest direction).

Should wind speeds increase without warning then the system will be activated as required by process operations personnel and the Processing Superintendent will be notified.

6 TRIAL DUST SUPRESSION TECHNIQUES

6.1 Vital Bon-Matt Stonewall

Stonewall is a co-polymer that is applied to the surface of the tailings. The product is diluted in water and then applied through a spray by any method. This could be from a water cart or a knapsack sprayer. The product creates a hard surface that is similar to that which would be seen if glue was applied to the surface. The tailings surface then becomes encapsulated underneath the Stonewall surface. This limits the dust generation by removing the potential for wind to erode the surface. Trials of this dust suppression technique occurred in 2015.

6.2 Vital Strike

Strike is a co-polymer based fertiliser to promote the growth of seed below its surface and increase soil stability. After seed has been broadcast, Strike is applied in much the same way as Stonewall. There is however fertiliser incorporated into the product which aids in the germination and growth of the seed. Trials of this dust suppression technique occurred in 2015.

6.3 Atomiser

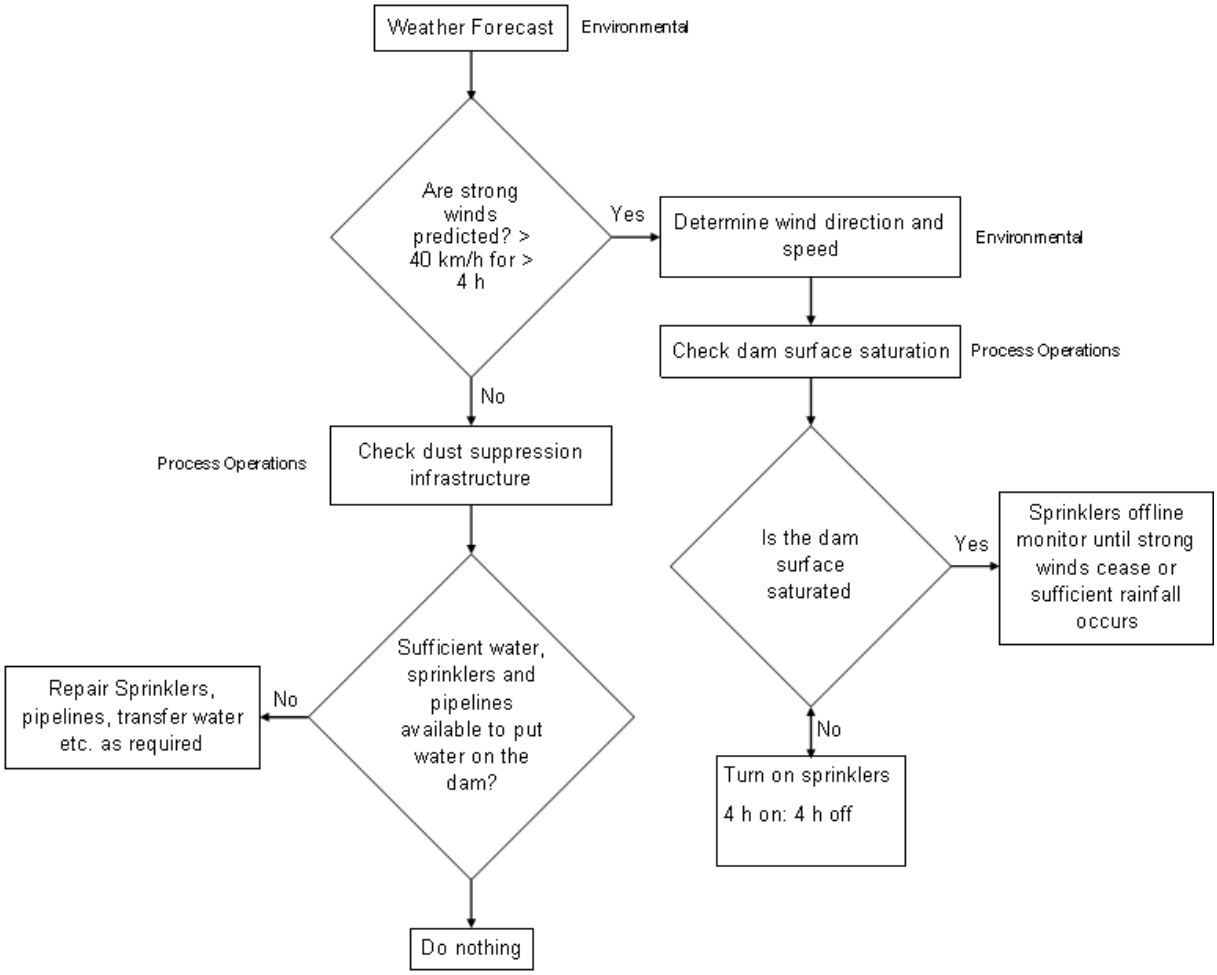
There have been many investigations into atomisers that can generate fog or mist using the process water available inside the impoundment. The aim of these investigations was to try to keep the tailings surface wet, act as a dust curtain, and evaporate any excess water that is inside the impoundment when there is a surplus. To date no trials have been undertaken.

7 MAINTENANCE

Inspections, monitoring and maintenance activities of dust suppression infrastructure is the responsibility of process operational personnel.

It is also the responsibility of all staff to report breakages or leaks in the pipes to their supervisor or the environmental team. Reports also need to registered as an environmental incident through INX InControl.

8 DUST SUPPRESSION DAILY DECISION TREE



Appendix C

Beaufort Wind Scale

The Beaufort Wind Scale (Land)

The Beaufort scale was long in use as a system for estimating wind speeds. It was introduced in 1806 by Admiral Sir Francis Beaufort (1774-1857) of the British navy to describe wind effects on a fully rigged man-o-war sailing vessel, and it was later extended to include descriptions of effects on land features as well. Today the accepted international practice is to report wind speed in knots (1 knot equals about 1.85 km, or 1.15 mi, per hour).

The Beaufort scale is divided into a series of values, from 0 for calm winds to 12 and above for hurricanes. Each value represents a specific range and classification of wind speeds with accompanying descriptions of the effects on surface features, as follows:

Beaufort	Avg miles per hour	Avg km per hour	Knots	Surroundings
0 (calm)	0	0	0 – 1	Smoke rises vertically.
1 (light air)	1 – 3	2 – 5	1 – 3	Smoke drift indicates wind direction.
2 (light breeze)	4 – 7	6 – 12	4 – 6	Wind felt on face; leaves rustle.
3 (gentle breeze)	8 – 12	13 – 20	7 – 10	Leaves, small twigs in constant motion.
4 (moderate breeze)	13 – 18	21 – 30	11 – 16	Dust and leaves raised up, branches move.
5 (fresh breeze)	19 – 25	31 – 40	17 – 21	Small trees begin to sway.
6 (strong breeze)	26 – 31	41 – 50	22 – 27	Large branches of trees in motion/
7 (moderate gale)	32 – 38	51 – 61	28 – 33	Whole trees in motion; resistance felt walking against wind.
8 (fresh gale)	39 – 46	62 – 74	34 – 40	Twigs and small branches break from trees.
9 (strong gale)	47 – 55	75 – 89	41 – 47	Larger branches break from trees.
10 (whole gale)	56 – 64	90 – 103	48 – 55	Trees broken and uprooted.
11 (storm)	65 – 74	104 – 119	56 – 63	Widespread damage.
12 (hurricane)	75+	120+	64+	Violence and destruction.

2004, Jeffers Petroglyphs Historic Site

from http://www.kites.org/jo/beaufort.html
and http://www.mountwashington.org/discovery/arcade/wind/beaufort.html

Appendix D

Watercare Services Limited Ambient Air Quality Monitoring Methods

Appendix E

Site Personnel Contact Details

Site Personnel Contact Phone Numbers

(Complaints and Emergencies)

General Manager Macraes Operation

Mike Fischer

Mobile: 03 479 4629

Email: mike.fischer@oceanagold.com

Open Pit Mine Operations Manager

Pieter Doelman

Mobile: 03 4715 737

Email: pieter.doelman@oceanagold.com

Process Manager

Quenton Johnston

Mobile: 021 248 8195

Email: quenton.johnston@oceanagold.com

Environment and Community Manager

Role currently vacant