Before the Hearing Commissioners
appointed by the Grey District Council and
West Coast Regional Council

Under	the Resource Management Act 1991
In the matter of	Resource consent applications by TiGa Minerals and Metals Ltd to establish and operate a mineral sands mine, on State Highway 6, Barrytown (RC-2023-0046; LUN3154/23)

Statement of evidence of John Eric Berry

19 January 2024

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Qualifications and experience

1 My full name is John Eric Berry.

2 I am the Project Manager for the TiGa Minerals and Metals Limited's (**TiGa**) Barrytown Project and have held that position since September 2020. I am authorised to give this evidence on behalf of TiGa.

3 I have worked in the mining industry for over 30 years in various management roles for companies across a broad spectrum of commodities. In my work, I have undertaken grassroots exploration for gold, iron ore, lead, zinc, and copper. Further, I have been involved in the construction of operating mines and associated infrastructure for lead, zinc, and copper, as well as managing existing mining operations producing gold, copper and mineral sands.

4 I have been overseeing the development of all plans and coordinating with experts and consultants for over 3 years. As the project manager, I will be responsible for supervising the construction of the mine, along with the operations manager, who will be appointed once all necessary approvals are obtained. We have received local interest for this role. The operations manager will oversee all ongoing activities at the mine once it is constructed.

5 I have ensured that TiGa possesses the required expertise and experience, both internally and externally, to design, construct, and operate the mining project while also complying with any proposed consent conditions. I have visited the Application Site and the surrounding area numerous times and participated in several discussions with the neighbours, Ngāti Waewae, community members and other concerned parties.

Scope of evidence

6 I have prepared evidence in relation to:

(a) Amendments and improvements to the project;

(b) Freight transport;

(c) Employment;

(d) Hazard assessment and lighting;

(e) Consultation;

(f) Dust Management Plan; and

(g) Bond.

Amendments and improvements to the Barrytown Mineral Sands Project

7 The Barrytown Mineral Sands Project has changed significantly since its first proposal (and community consultation) over 4 years ago.

8 The JORC 2012 compliant resource completed in 2023 resulted in the reduction of the mine footprint (115ha to 63 ha) to the delineated and confirmed economic mineable resource.

9 The project has been an iterative process and refined in response to feedback, including from mana whenua, community members, submitters and expert advice.

10 TiGa has engaged a variety of experts to assess all relevant environmental effects of the proposal on the environment. Where mitigation measures and conditions of consent have been recommended, these have been accepted.

11 TiGa has committed to upgrading and connecting to the electricity grid (so diesel will not be used to generate power to run the processing plant). It has offered further limits on operations, limiting mining operations and the transport of heavy mineral concentrate so these activities will only occur during daylight hours. TiGa has offered to purchase a clarifier at a significant cost to be positioned on site from mining commencement to ensure that if such a system is demonstrated to be required (for water quality purposes) then commissioning can occur within a very short timeframe.

12 Improved draft management plans have been prepared for dust, water monitoring, transport, noise, erosion and sediment control, avian management, landscape planting, riparian planting and site rehabilitation.

13 Conditions have been strengthened and improved based on extensive baseline and method testing work that has occurred. I am confident that TiGa can operate within the proffered conditions of consent, and that the Barrytown Mineral Sands Project can be a success for the local community and West Coast.

Freight transport

14 A logistics' study has been completed for TiGa, but it has not yet confirmed where the HMC will be finally transported - north or south. There is a potentially suitable port locally on the West Coast (Westport or Greymouth), as well as options on the East Coast (Lyttelton or Timaru) for exporting in either bulk or package product in container for export.

15 All of these ports have been considered either direct by road or by a mix of road and rail options, investigating the transport of mineral sands in bulk, bulk 20-foot

containers or packed in 1 to 2 tonnes bulk bags into 20-foot General Purpose containers.

16 Activities built-into the operational and cost optimisation include product loading at the mine site, road and rail transport, product unloading and stockpile management at the ports, container lift-on lift-off, wharfage, and ship-loading.

17 There are four outbound logistical options:

(a) Option 1 –Bulk Road from Barrytown to a rail loading site, then rail to port.

(b) Option 2 –Bulk Road from Barrytown to Westport Port.

(c) Option 3 - Bulk Road from Barrytown to a rail loading site, then rail to Westport Port.

(d) Option 4 - Bulk Road from Barrytown to a rail loading site into bulk/packed 20-foot containers on rail to Lyttelton or Timaru Port.

18 Given our current understanding of the timetable for completion of the Westport and Greymouth Ports, and considering the limited space at Lyttleton Port, in the immediate to short term the likely route for the heavy mineral concentrate is from Barrytown to a rail loading site, then rail to Timaru Port. When either of the West Coast Ports become fully operational for bulk and container export then the logistics options will be reassessed.

Employment

19 A full range of skills and qualifications will be required from qualified engineers, geologists and metallurgists; financial and administrative staff; skilled tradesmen such as electricians, mechanics, and welders; transport and machinery operators; as well as labourers requiring specialist training in mining and mineral processing. For key management roles (such as general manager, mine manager, processing plant manager) and technical specialist roles, TiGa will employ locals where possible. Roles will otherwise be filled by workers committed to moving to the area. TiGa anticipates employing 57 mining jobs and supporting around 80 jobs in ancillary sectors. These jobs will likely include truck drivers, mechanics and engineers. TiGa will not employ personnel on a fly in fly out basis as the point of employment will be Greymouth.

20 Plants will be sourced from local nurseries, and planting services will be sought locally for the substantial planting plan.

21 A list of the positions is attached to my evidence as **Attachment A**.

Hazard assessment and lighting

22 The mine will be subject to a high level of health and safety. TiGa will comply with the Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016 which requires identification of hazards and risk assessment, including preparation of principal hazard management plans. Principal hazards include things such as ground instability and inundation, fire or explosion.[1] It would not be necessary to duplicate these requirements in resource consent conditions by way of a Site Emergency Management Plan as requested for the resource consent process by Fire and Emergency NZ. The duplication could result in confusion if there are two separate plans addressing the same issues.

23 Mr Geddes also recommends a change to the conditions of consent that there be no exterior lighting. TiGa has offered not to mine in the darkness, but this would still require some limited lighting to provide a safe place for staff at the processing plant. Fixed external lights on the Processing Plant would be limited to those necessary for health and safety reasons and the building has been designed without windows or other light sources on the western (coastal) side. There will be some limited fixed lighting necessary on the eastern (inland) side of the building to allow for safe access to toilets, office and crib rooms.

24 Similarly, there would only be very limited fixed lighting within the area to be mined as required for health and safety reasons i.e. the pump may require lighting in the pit and any such light will be generally below the natural ground level. Head torches may be needed on occasion outside for any maintenance.

25 TiGa remains committed to limiting all outside lighting to only that which is necessary for health and safety, and which complies with the Australian Wildlife Light Pollution Guidelines to ensure that the least amount of lighting is used to comply with these regulations. All lighting will be designed and installed to comply with the design requirements of the guideline, including being angled down and in the required spectrum for minimal interference.

Consultation

26 Written approval has been obtained from the owners of 3261 Coast Road (immediately adjacent land) and Rural Section 6674 (hillside land on the opposite side of State Highway 6) through discussions with both landowners.

27 Robert Brand and I have met with members of the Barrytown Community Group (Now the Coast Road Resilience Group), to hear their concerns and outline the project in detail. I also attended the public information sessions and public meeting

[1] Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016, Section 65.

in the Town Hall. I have met with the Langridge family to explain the project and listen to their concerns.

28 While access hasn't been granted by the immediate neighbours to carry out environmental investigations, we remain open to carrying out environmental monitoring on the adjacent properties throughout mining operations if access is granted.

Dust Management Plan

29 Mining activities have the potential to generate dust and I have been responsible for preparing a Dust Management Plan (**DMP**) for the Application to manage, mitigate, and monitor dust emissions during construction and mining. This DMP, attached as **Attachment B**, will form part of the Annual Work Programme and will be monitored annually for effectiveness.

30 The DMP identifies potential sources of dust, sensitive sites and activities, methods for management, mitigation and monitoring, staff training methods and how complaints will be managed. The DMP also requires that a compliance record be kept. Dust will be monitored at the Canoe Creek Lagoon, Rusty Pond and the closest points of disturbance to neighbouring family homes.

31 The drafting of the DMP has drawn from my own practical experience with the management of dust emissions from other mining projects and from the Good Practice Guide for Assessing and Managing Dust prepared by the Ministry for the Environment (November 2016), particularly Appendix 4 (Dust Management Plans). The DMP is a live document and will be reviewed and updated as necessary to respond to significant changes in construction techniques, mitigation, monitoring results or the natural environment.

Bond

32 TiGa is comfortable with the bond quantum as indicated in conditions. We understand this quantum is similar in value to comparable progressively rehabilitated activities in the region. It is acknowledged that the proposed processing plant and structures are more fixed in nature for the duration of the resource consent.

33 TiGa is also willing to obtain and provide two local quotes to the Consent Authorities for the removal of the processing plant building and ancillary buildings and structures within the processing plant area and reinstatement of this area to pasture. The average of these two quotes will determine an additional bond quantum to reinstate this area. Ms McKenzie has proffered a consent condition to reflect this.

Conclusion

34 TiGa has worked hard to improve the operations proposed as part of the Application, and to ensure that the environment is protected. Changes made reflect learnings from experts, community feedback and significant investment by TiGa.

John Eric Berry

Dated this 19th day of January 2024

Attachment A: Job list

Site Administration	
Operations Manager	1
Site Accountant	1
Accounting Clerk	1
Administration	1
Procurement/Logistics	1
Warehouse	1
IT	1
HR	1
Environmental Superintendent	1
Environmental Officer	1
Community Relations	1
Sub Total	**11**
Technical	
Senior Mining Engineer/Tech Serv Eng / Alt QM	1
Surveyor	1
Survey Assistant	1
Chief Geoligist	1
Mine Geologist	
Grade Control/Field Technician	1
Senior Plant Metallurgist	1
Metallurgist	1
Operations Training Officer	1
Safety Superintendent	1
Safety Officer	1
Mechanical Engineer	1
Mechanical Engineer	1
Sub Total	**12**
Mining	
Mine Superintendent	1
Mining Shift Supervisors	2
Machine Operator - Senior	5
Machine Operator - Junior	5
Sub Total	**13**
Plant Operations	
Plant Foreman/Shift Co-ordinator	1
Shift Supervisors	1
Floor Operators/Labourers	1
Machinery Operators	1
Control Room Operators	1
Central Control Officers	1

General Duties Truck driver	0
Pipeline/Field/Tails Operators	2
Sub Total	**8**
Maintenance	
Maintenance Superintendent	1
Maintenance Planner	1
Mechanical Supervisor	1
Electrical Supervisor	1
Tradesman - Boilermaker / welder	1
Tradesman - Fitter	2
Tradesman - Electrical	2
Trades Assistant - Mechanical	2
Trades Assistant - Electrical	2
Sub Total	**13**
Grand Total	**57**

Attachment B: Dust Management Plan

Dust Management Plan

January 2024

Details			
Prepared by:	John Berry, Project Manager	13th April 2023 (revised January 2024)	
Reviewed:			
Reviewed:			

Revision schedule		
Rev. Number	**Date**	**Description**

0.		

Contents

A. Introduction

This draft Dust Management Plan (DMP) has been prepared for the Barrytown Project (the Project) to control dust as part of the mining operation located at Barrytown flats, 5kms north of Barrytown on the West Coast of the South Island of New Zealand.

A.1 Purpose and objectives of the DMP

The DMP has been prepared to manage, mitigate, and monitor dust emissions during construction and mining. The DMP applies to all personnel on the Barrytown project site, including subcontractors and visitors.

The objective of the DMP is to detail the best practicable option to avoid dust nuisance being caused by construction and mining works and to mitigate any such effects should they occur.

The DMP identifies the following:

- Potential sources of dust that may be created during the mining project.
- Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management.
- Dust management and mitigation methods.
- Monitoring methods.
- Training of staff in relation to dust management; and
- Methods for managing complaints regarding discharges into air and keeping compliance records.

In preparing this DMP, information has been drawn from practical experience with the management of dust emissions from other mining projects, and from the Good Practice Guide for Assessing and Managing Dust, prepared by the Ministry for the Environment (November 2016), particularly Appendix 4 (Dust Management Plans).

This DMP will form part of the Appendix to the Annual Work Program for the Project and will be monitored annually for effectiveness.

A.2 Review and updates to the DMP

This DMP is a live document that will be reviewed and updated during the sites operation to reflect significant changes associated with construction techniques, mitigation, monitoring results or the natural environment. A review process is described in Section 11 of this plan.

B. Resource Consent Requirements

5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the commencement of these consents, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: o The proposed works to be carried out over the next 12 months including: ▪ Equipment to be used; ▪ Areas of topsoil and overburden stripping and stockpile locations; ▪ New areas of land disturbance that will be mined; ▪ Access tracks; ▪ Drill/prospecting sites and other tracks to be constructed; and ▪ Any other site works within the consent area. o The approximate open volume of the working pit at the start of the year including depth of excavations and the area of the working pit. o The progressive rehabilitation works to be carried out over the next 12 months including: ▪ Areas of unrestored land (i.e. all land not finally topsoiled and revegetated) at the beginning of the new year; ▪ The area that will be fully rehabilitated during the forthcoming year; ▪ Maximum slope angles, bench heights and widths of recontoured ground, if applicable; and ▪ Rehabilitation method and technique including replacement of topsoil and vegetation cover. o Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off before discharge to land. o Measures that must be adopted to ensure soil conservation and slope stability are controlled; o A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, and the steps taken to address the adverse effect. .
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: o A detailed plan or aerial photograph showing: ▪ The open working area at the start of the year; ▪ Proposed mine path for the forthcoming year including haul and access roads; ▪ Rehabilitated ground behind the open pit area; ▪ Location of existing and intended topsoil or overburden dumps and their dimensions; ▪ Location of natural waterbodies;

	▪ Location of present and intended drainage works and settling ponds; and ▪ Any other site works within the consent area. o A Site Specific Erosion and Sediment Control Plan in accordance with condition 23.0. o Results of surface water quality, flow and water level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by condition 26.7. o Any proposed updates to Management Plans submitted in accordance with the respective conditions of consent. o Results of any previous dust monitoring required by Condition 28.5. o A geotechnical report which addresses the potential geotechnical hazards for the following 12 months, and provides recommended mitigations where necessary to address natural hazards such as seismic activity, ground instability and inundation. The geotechnical report should address how monitoring of pit wall stability in panels 1-5 has informed any recommended changes to pit geometry to address identified risks for panels 6-10.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided in a timely manner as required by the Consent Authorities.
6.0 Management Plans	
6.1	The Consent Holder shall operate the site in accordance with the following management plans: • Noise Management Plan • Avian Management Plan • Wetland Construction and Riparian Planting Plan • Dust Management Plan • Rehabilitation Management Plan • Water Management Plan and Monitoring and Mitigation Plan • Erosion & Sediment Control Plan • Landscape Mitigation Planting Plans • Transport Management Plan (collectively Management Plans)
6.2	The Consent Holder may amend the management plans at any time to take into account: a) Any positive measure/s to ensure the stated objectives of the management plans are achieved;

	b) Any required actions identified as a result of monitoring under these consents; and c) Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme. Where management plans require the input of an appropriately qualified person, any amendments to those management plans must also be undertaken by the appropriately qualified person. *Advice Note: Some management plans have ongoing annual review requirements which are required in order to avoid, remedy or mitigate effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.3	Any amended Plans must be provided to the Consent Authorities within 20 working days of their review, for certification in accordance with Condition 6.1.
6.4	The Plans must not be amended in a way that contravenes the matters set out in the conditions for the respective Plans.
6.5	If the Consent Holder has not received a response from the Consent Authorities within one month of the date of submission of any reviewed management plan, the management plan must be deemed certified. If the response from the Consent Authorities is that they are not able to certify the management plan, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.6	A copy of the latest version of the Plans must be kept on site at all times and all key personnel must be made aware of the contents of each Plan and their responsibilities under each Plan.
6.7	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the Plans.
7.0 Method of Operations	
7.1	The mine boundaries must be clearly marked on the ground before any earthworks take place, with a 20m setback from the northern property boundary, the coastal lagoon and Collins Creek.
7.2	The maximum site disturbance must not exceed 8.0 hectares at any one time. Advice note: The disturbed area includes the mine pit, water management infrastructure, processing plant area, active rehabilitation areas and the access road.
7.3	The Consent Holder must strip soil material ahead of operations and stockpile it for progressive and final mine closure rehabilitation purposes. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.

Conditions to Apply to WCRC Air Discharge Permit	
27.0 Dust Management Plan	
27.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by construction and mining works and to mitigate any such effects should they occur. The Dust Management Plan shall include:

	a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Monitoring methods. e. Training of staff in relation to dust management; and Methods for managing complaints regarding discharges into air and keeping compliance records.
27.2	Vehicles shall not exceed 15 km/hr on site at all times to avoid dust generation.
28.0 Air Quality Management and Monitoring	
28.1	There shall be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that results in an adverse effect beyond the legal boundary of the site. ***Advice note:*** *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to* *i) The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *ii) Receipt of complaints from neighbours or the public: or* iii) *Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
28.2	Prior to the commencement of site preparation activities, a meteorological station must be installed at the site with instruments capable of continuously monitoring, logging in real time and reporting agreed representative meteorological data for the site.
28.3	The consent holder shall install, operate and maintain two Dust Deposition Gauges in the locations shown in the Dust Management Plan. Dust recorded in the gauges shall not exceed a value 4g/m^2/30 days above background levels. *Advice note: Background levels are to be determined by data collected prior to the commencement date of this consent.*
28.4	If a breach of Condition 28.3 is detected, the consent holder shall notify the consent authority within two working days of the breach being detected. The consent holder shall investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30 day period.

C. Sources of Dust

The main construction activities that may generate dust are as follows:

- Earthmoving activities, such as creating bunds, site levelling and material transfer, excavation, and trenching;
- Clearing of pasture and topsoil;
- Load and haul operations;
- Vehicle movement on unsealed road and tracks;

- Wind erosion of exposed areas and stockpiles.

A dust and contaminant control program will then be implemented and monitored for effectiveness. The risk assessment will consider:

- Health exposure risks to silica, asbestiform minerals and other inspirable contaminants.
- Potential risks to flora and fauna, wetlands, surface water ways, building infrastructure and the community.
- Ongoing operational costs for dust and contaminant suppression strategies.

A documented review of the workplace survey and risk assessment will occur on a scheduled three-monthly basis, or more frequently where new work fronts or changes to existing mine plans occur. Risk assessment controls will be assessed to ensure their ongoing validity and effectiveness.

Changes to dust & contaminant control strategies will be introduced through a formal documented change management process.

Areas of the operations identified as being high risk for the generation of dust will be included in daily shift plans to ensure they are attended to on throughout the course of the shift

The processing plant in this resource consent application is a completely wet process and as such will not generate any dust in the production of the heavy mineral concentrate. Heavy mineral concentrate stockpiles have been enclosed within buildings to ensure dust is minimised.

D. Mining Activities

Topsoil removal

During removal of topsoil, minimal dust is expected due the moist nature of the material even in dry conditions. Tops soil will be removed in small batches to ensure that sand is not exposed for extended durations. Initially topsoil will be removed from the first mining panel and used to create a bund (this will later be recovered). Once rehabilitation starts on the mining panels topsoil will be stripped off and taken directly to rehabilitation areas, where it will be placed contoured and re-grassed.

ROM Sand

Typically, the sand has an inherent moisture content which will limit dust generation during normal excavation activities. It is expected that due to the high-water table that the Rom sand will stay moist. In dry whether the ROM sand may dry out and if this occurs the area can be dampened down with water from the mining void or processing plant. The ROM stock pile at the plant will be in a shed.

Tailings

Once the ROM sand has been processed, the tailings (or sand less the HMC) will be returned to the mining area . All tailings are produced wet and as such have a higher moisture content than raw sand. These tailings will be returned to the mined areas by pump to a dewatering cyclone which will discharge the tailings to the mining void. The cyclone can be moved around to spread the tailings out and then machinery (bulldozer, excavator etc.) will level and contour. If need water can be applied to keep the tailings wet as the mining advances.

Slimes

Slimes are the material less than 45 micron. These are captured and removed as part of the mining process through a desliming cyclone. The slimes will be combined with the tailings and deposited directly into the pit. This material includes fine sand particles and clays and are

always wet.

Topsoil Placement

Once the tailings reach their planned profile, topsoils stripped in advance of mining will be deposited onto these tailings and rehabilitation of this land will commence, as these soils will be removed and placed at the same time, the ability for these soils to dry out is minimal, if required, the soils can be wetted during removal and placement during periods of low rainfall.

E. Background monitoring results

Dust monitors from SGS Westport were placed on the resource consent area and left in situ for a month after which the monitors were collected and the dust collected by the monitors was analyzed by SGS. The results of the dust monitoring is shown in the table below:

Sample ID	Laboratory Id	EGA-ISO4222-2 Install Date	EGA-ISO4222-2 Collect Date	EGA-ISO4222-2 Sampling Period DAYS	EGA-ISO4222-2 TotalInsol Solids MG LOR5.00
Cowans DM 1	WP23-11550-001	16/11/2022	21/12//2022	36	<5
Cowans DM 2	WP23-11550-002	16/11/2022	214/12/2022	36	<5
Cowans DM 1	WP23-11550-001	22/12/2022	17/01/2023	26	10
Cowans DM 2	WP23-11550-002	22/12/2022	17/01/2023	26	14
Barrytown DM!	WP23-1183.001	16/02/2023	22/03/2023	34	13
Barrytown DM2	WP23-11831..002	16/02/2023	22/03/2023	34	13

The total rainfall recorded during the above sampling periods is as shown in the table below:

Station	Date	Amount (mm)	Deficit (mm)	Period per day (Hrs)	Frequency
23934	16/11/2022 – 21/12/2022	315.2	372.7	24	D
23934	22/12/22 - 17/01/2023	66.8	1608	24	D
23934	16/02/2023 -22/02/2023	307.8	1461.7	24	D

F. Dust Mobilsation Via Wind

Dust can be created on site from a number of activities. But only certain conditions will result in dust becoming or remaining airborne and transported around the site or off site.

The three different types of dust movement from wind are described below.

Creep – (wind of approx. 16km/h)

The largest, heaviest, particles remain stable or creep along the soil surface. Generally they do not travel very far. Larger particles (1.1mm – 2mm+) only creep regardless of wind velocity. Between 8% and 14% of the sand is in this category.

Saltation – (Wind of approx. 21km/h)

The medium sized particles (500 micron to 1.1mm) account for 50-80% of soil movement, through a process known as saltation. Wind causes medium sized particles to vibrate, then bounce from the soil surface. Too big to remain suspended they are carried short distances (1m -10m), they fall to earth and dislodge other particles that repeat the process in a snowballing effect. This creates soil avalanches - thick soil clouds up to two metres deep moving down wind. Approx. 90% do not reach a height of 30cm and move between 0.5 – 1m along the ground. Sand in the size range 5-500 microns, can be moved both further and higher but is proportional to wind speed and sand sizes.

Suspension – (Wind above 21.6km/h)

The smallest particles are picked up and suspended in the wind, causing very visible dust clouds. The particle size to be less than 5 microns (dust). Between 2% and 4% of the sand is sized less than 45 microns. The -45 micron fraction will be removed via desliming cyclone while wet then little dust will be generated.

Wind direction

The wind rose below and table show the predominant wind direction and mean wind speed at the Westport weather station.(NIWA The climate and weather of the west coast 2016) With the prevailing wind from the southwest and mean wind speed of 13.7km/h. Its acknowledge that as there is no weather station at Barrytown, actual wind patterns may vary a little from those shown below. Residents of the Barrytown area report that there weather patterns are more closely aligned with Westport weather observations than those of Greymouth.

Table 1. Mean monthly and annual wind speed (km/hr) for selected West Coast locations, from all available data.

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Westport	13.8	12.8	12.4	12.2	12.5	13.2	12.9	12.9	14.9	16.0	15.6	14.7	13.7
Greymouth	13.5	11.1	12.0	13.4	13.6	14.5	14.7	12.7	14.0	14.5	13.7	12.7	13.4
Hokitika	11.7	10.5	10.3	9.8	9.9	10.1	9.6	10.2	11.7	13.2	12.9	12.2	11.0
Haast	9.2	8.4	8.9	9.5	10.7	11.1	11.6	10.7	11.0	11.8	11.2	10.1	10.3
Franz Josef	8.5	7.8	7.4	7.4	7.2	7.3	7.2	7.3	8.3	8.5	8.4	8.4	7.8
Reefton	6.6	5.8	5.4	4.8	4.4	4.1	3.9	5.0	6.0	6.5	6.6	6.5	5.4

Table 2. Seasonal distribution and frequency (mean number of days) of strong winds (daily mean wind speed > 30 km/hr) recorded at selected West Coast locations, from all available data.

Location	Summer		Autumn		Winter		Spring		Annual Frequency
	Distribution	Frequency	Distribution	Frequency	Distribution	Frequency	Distribution	Frequency	
Greymouth	18%	5	26%	8	30%	9	26%	8	31
Haast	16%	4	27%	7	29%	8	28%	7	26
Westport	19%	4	21%	4	27%	5	33%	6	19
Hokitika	24%	2	21%	2	20%	2	34%	4	10
Reefton	32%	3	24%	2	11%	1	32%	3	8
Franz Josef	22%	1	23%	1	34%	1	21%	1	3

Mean annual wind direction and speeds.

The average annual (13.7km/h) and monthly mean wind speeds for Westport is max 16km/h, this is below the speed required for dust to become airborne and suspended.

Wind can exceed 30km/h at Barrytown and this occurs throughout the year as is shown in the above table at an average of 2-3 days per month. Due to the size distribution of the sand particles, this will only carry sand particles short distances due to their mass and will not be carried over the site boundary.

G. Particle size analysis

Particular size analysis completed as part of exploration work in 2017 is outlined below. Shows particle size distribution from four composite samples.

Particle Size Distribution	Average Grade Sample Feed			High Grade Sample Feed		
	Retained	Cum. Retained	Passing	Retained	Cum. Retained	Passing
Micron	%	%	%	%	%	%
5000	6.1	6.1	93.9	0.2	0.2	99.8
2000	3.1	9.2	90.8	0.3	0.5	99.5
1000	1.4	10.6	89.4	0.2	0.7	99.3
850	0.7	11.3	88.7	0.0	0.7	99.3
710	0.3	11.7	88.3	0.1	0.8	99.2
600	0.5	12.1	87.9	0.1	0.8	99.2

500	0.4	12.5	87.5	0.1	1.0	99.0
425	0.7	13.2	86.8	0.1	1.1	98.9
355	1.2	14.4	85.6	0.2	1.2	98.8
300	2.5	16.8	83.2	0.2	1.4	98.6
250	5.1	22.0	78.0	0.7	2.1	97.9
180	26.4	48.3	51.7	17.5	19.6	80.4
125	24.1	72.4	27.6	50.1	69.7	30.3
90	11.0	83.4	16.6	26.5	96.3	3.7
53	2.5	85.9	14.1	2.2	98.4	1.6
0	14.1	100.0	0.0	1.6	100.0	0.0
Total	100.0	-	-	100.0	-	-

Based on this information and there is potential for airbourne sand to be generated at the site, but will likely not become suspended due to the size and mass of the particles. -45 micron particles are removed in the desliming process and remain wet and pumped back to the mining void.

H. Truck Loading and Vehicle Movements

All trucks will access the site via a newly constructed entrance way on the state highway (shown on attached plans) which will be sealed to a minimum of 15 metres into the site.

All unsealed roads will have the ability for dust suppression to be undertaken via the application of water through a sprinkler system or water cart, or by the application of dust suppression sealants

Truck loading will occur at the plant site where the HMC is stored inside a building and will be damp due to the retained moisture from processing. Loading will occur via front end loader. Where the drop height will be minimised to reduce the likelihood of dust generation.

All trucks leaving the site will have:

- Covers over truck and trailer units,
- Tail doors and hatches locked.
- Any excess sand removed from mud guards, drawbars etc.

Should truck driver or other persons on site notice dust is being generated on the roads, this will be reported to the site manager to implement dust suppression measures.

Light vehicles operated by employees, delivery drivers and contractors will also use this entrance. Speed limits will be in place and dust suppression employed as necessary and as outlined above.

I. Sensitive receptors

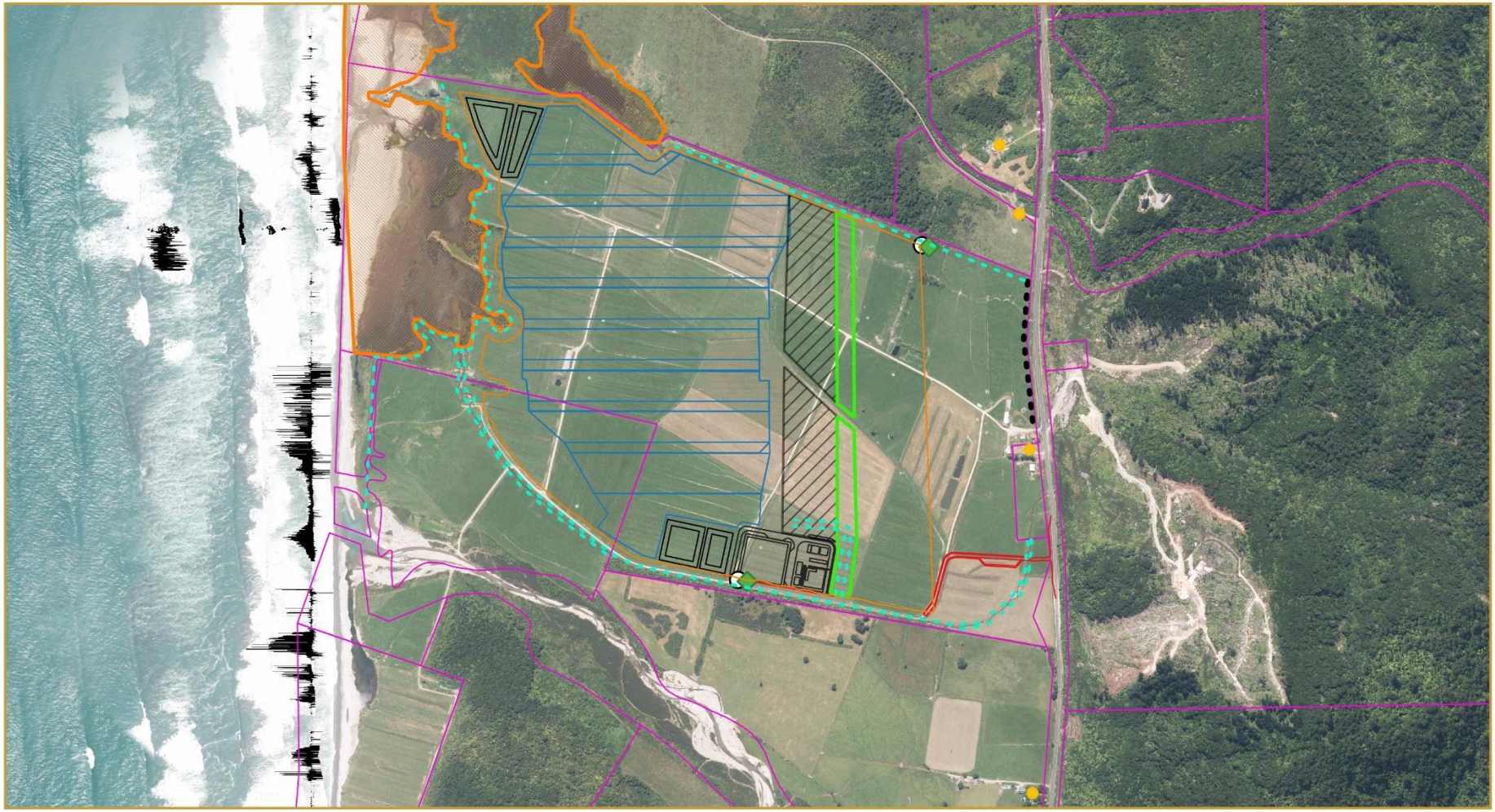
Works will occur on farmland but sensitive receptors to dust emissions during construction and mining activities will include residential houses located north east and south east of the of the proposal and sensitive ecosystems in particular the coastal lagoons and associated wetlands west and north to North West of the proposal.

Native vegetation, coastal marine area, wetlands, and surface water ways near the Project area should be treated as sensitive to dust, and dust is to be avoided. Activities are to be

set back from these areas by a minimum of 20m.

As outlined in section 4 the prevailing wind at the site is from the southwest. This is likely to take any dust generated on site towards sensitive receptors (dwellings) located east and north of the proposal. This is shown on the map below. Given the distance 200m or more to sensitive receptors, the bunding and planting, grassed paddocks between receptors and the source of dust and mitigation proposed will ensure dust will not be discharged beyond the application area.

Submissions have identified strong easterly winds that occur on occasion throughout the West Coast. This would see any dust generated blown towards the Canoe Creek Lagoon and SNA. As outlined above grassed areas, planting and other vegetation are located between likely dust generation and these areas. This along with mitigation will ensure dust will not be discharged beyond the application area.



Tai Poutini RESOURCES

Dust Management Plan
Sensitive Receptors Map

Produced for: TiGa
by Luke McNeish on 11/01/2024

0 125 250 375 m

1:8,000 @ A3

Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and or TPRL Data

Legend:

- TiGa Application Area
- Mining Disturbance Area
- Property Boundaries
- Mining Strips
- Baseline Dust Monitoring Locations
- Sensitive Environment
- Sensitive receptors (dwellings)
- Radiation Dosimeters

J. Management procedures and mitigation measures

J.1 Overview

The overall approach to dust management for the Project is primarily based on visual monitoring, combined with good management of the processing plant and mine areas and a quick response to triggers in Table 4.2 and complaints received. Taking a proactive approach to dust management will help avoid significant dust emissions or, if dust emissions occur, help mitigate any adverse effects. Additional controls are set out in the Monitoring and Mitigation Plan.

J.2 General dust management measures

The dust management measures outlined in Table 4.1 will be used as applicable across the Project depending on the activity undertaken, weather conditions, and proximity to sensitive receptors. Additional methods may be found to be effective and implemented during construction.

Table 4.1: Dust management measures

Source of Dust	Control
General mitigation measures	• Site personnel trained in dust management controls. • Monitoring of site conditions (weather/soil conditions) to anticipate and prevent dust effects. • Limiting operations which have the potential to cause high dust during high wind events. • Use of water cart and sprays to keep surfaces damp as required near sensitive receptors. A critical part of this control measure is identification of a sufficient water supply at the site for this purpose with adequate volume. • Maintain good grass cover outside disturbed areas. .
Earthworks Activities	• Drop heights of materials to be minimized to reduce dust generation. • Monitoring and managing of earthworks activities to limit dust generation during dry or windy weather conditions in accordance with Section 5 below. • Vegetation clearing will be minimized and areas no longer required will be stabilized and progressively rehabilitated as soon as is reasonably possible within the mine's operations. • The removal of vegetation and topsoil will be controlled and limited to the amount necessary for mining operations. • Soil disturbance during unfavorable meteorological conditions (such as high wind speed events) will be avoided if dust emissions cannot be controlled.

Stockpiles outside buildings (including material placement and removal)	• Making sure stockpiles exist for the shortest possible time. • Stockpiles are positioned as far as practical away from sensitive receptors. • Limiting the height and slope of stockpiles to reduce wind entrainment. • Surfaces of stockpiles to be kept damp to reduce dust emissions (e.g., through wet suppression systems) or covered or stabilized to reduce dust generation in areas adjacent to sensitive receptors.
Unpaved surfaces,such as haul roads and processing plant area	• Unsealed surfaces kept damp to reduce dust emissions in areas near sensitive receptors (e.g. by use of water carts and using water trucks fitted with pumps and sprays to dampen the roads sufficiently enough to suppress dust). • Where practical, compact unconsolidated surfaces to minimize dust. • Stabilization of surfaces when works are completed by grassing, or sealing surfaces to reduce dust emissions.
Sealed surfaces	• Clean excess dirt from vehicle tyres prior to leaving the site and driving onto sealed roads to reduce tracking of soils and re-entrainment of dust.
Vehicle movements	• 15 km vehicle speed limits on unsealed surfaces in areas near sensitive receptors. • Reducing transportation of dust through regular cleaning of vehicles including wheels at site entrance. • Covering truck loads.
Material handling and loading	• Minimising drop height

Contingency measures

A range of standard dust controls will be used to manage and mitigate the effects of discharges of dust during construction and mining. Additional mitigation may also be required in the event that:

- Monitoring indicates that significant dust emissions are occurring;
- Weather conditions are changing such that dust emissions are more likely; and / or
- Complaints are received regarding dust.

If the available mitigation methods are unsuccessful in controlling dust emissions and cause adverse effects on receptors beyond the Project boundary, the activities causing the discharge shall be suspended until adequate mitigation can be put in place.

Proposed contingency measures are outlined in Table 4.2.

Table 4.2: Contingency measures

Source of Dust	Control
Dust discharges cause deposition at sensitive receptors	• Stop activities that are generating dust until mitigation isreviewed and additional mitigation is in place. • Report to Environmental Superintendent to initiate an investigation and any remedial action as necessary.
Equipment Malfunction i.e. breakdown of water cart / sprays	• Assess rainfall and wind forecasts, stop work if forecastconditions are particularly dry or windy. • Repair water cart/sprays as soon as practicable.
Forecast high winds **Wind speed above 20km/h**	• Limit the activities that generate dust downwind of sensitive activities. • Additional visual inspection of exposed areas and activities. • Assess the need for additional controls such as increased water application rates.
Visible dust discharges from stockpiles / areas of uncovered soil	• Dampen stockpile or exposed area of soil. • Cover or stabilize area to reduce dust generation.

K. Dust inspections and meteorological monitoring

Visual monitoring of dust across all construction areas will be undertaken on a daily basis, or more frequently if conditions change.

Weather forecasts should also be checked daily (wind speed, wind direction and rainfall) from the installed meterological weather station installed onsite to implement the appropriate dust controls.

Table 5.1 below outlines the visual dust monitoring program to be implemented during construction. A daily log shall be kept of dust inspections and weather observations as set out in Appendix A.

Table 5.1: Dust inspection program

Monitoring Activities	Frequency
Check weather forecasts for strong winds and rainfall to plan appropriatedust management response (7-day forecasts available on www.metvuw.co.nz).	Daily
Inspect land adjacent to the site, surface water bodies and wetland areas and associated vegetation, and adjoining SH6 forthe presence of dust deposits caused by Project.	Daily

Observe weather conditions, wind via observations and data outputs from weather stations and presence of rain.	Daily and as conditions change
Inspect all unsealed surfaces for dampness and to ensure that surface exposure is minimized, check for visible clouds being generated on site or carried off site.	Daily and as conditions change
Inspect stockpiles to ensure enclosure, covering, stabilization or dampness. Ensure stockpile height appropriately stabilized.	Daily and as conditions change
Inspect dust generating activities to ensure dustemissions are effectively controlled.	Daily and as new activities commence
Inspect watering systems (sprays and water carts) to ensure equipment ismaintained and functioning to effectively dampen exposed areas.	Weekly
Additional visual monitoring of dust generating activities and water application rate.	In winds over 5 m/s
Ensure site windbreak fences, if used, are intact.	Weekly

L. Dust sampling process

The following diagram summarizes the dust monitoring process

Step 1
Conduct a Risk Assessment

The risk assessment will identify any airborne contaminants and personnel at risk of exposure to the contaminants

Step 2
Complete the Workforce Survey

Workforce surveys must be conducted within the first 12 months of operation
.

Step 3
Complete sampling

Health & Safety Officer to coordinate sampling using Certified Occupational Hygienist

Step 4
Sample Results

Sample results will be documented in the Dust Monitoring Register

6.1 Sample Results

Sample results will be documented in the Dust Monitoring Register and maintained in the Barrytown Management System by the HSEQ team.

Where sample analysis reports levels outside the acceptable limits will provide advice to the HSEQ Manager and Project Manager on the appropriate response with consideration to;

- What has been analyzed;
- The analysis levels reported; and
- Response recommendations to ensure the health and safety of personnel exposed to the airborne contaminant.

The Project Manager and HSEQ Manager will ensure that an appropriate response to levels exceeding those recommended is implemented. This may include:

- Re-testing
- Reviewing existing dust and fiber control measures;
- Implementing controls where existing controls are not adequate;
- Implement an awareness program for personnel who perform tasks in the area where exceedances occurred

6.2 Exceedance Reporting

Where an exposure standard has been exceeded, the Project Manager is to submit a report to NZPAM that details the:

- Contaminant type
- The contaminant exposure limits
- Recorded sample exposure
- Investigation undertaken; and
- The controls implemented to minimize further exposure to the contaminant.

M. Complaints

A record of complaints and remedial actions will be kept and provided to the West Coast Regional Council on request. Complaints are to be addressed as soon as reasonably practicable.

N. Roles and responsibilities

Table 7.1: Roles and responsibilities

Role	Responsibility
Mining Superintendent **Plant Superintendent**	• Identify the resources and equipment required for the management of dust • Ensure supervisors are aware of the DMP and operations are performed in accordance with it; • Incorporate dust management strategies into project mine planning; • Ensure the effective implementation and ongoing review of the

	DMP for continuous improvement.
Line Management	• Implement the DMP; • Ensuring personnel under their control are trained in, aware of and abide to the requirements of the DMP; • Undertake daily inspections to identify and control potential sources of dust • Be responsible to ensure any proposed changes to the work environment comply with the DMP through a formal change management process.
All Personnel	• Comply with the provisions of the DMP • Proactively assist in the application of strategies to prevent dust • Participate in dust and other contaminant health monitoring programs as directed.
Health & Safety Superintendent	• Dust Monitoring sample results are reported to the Mine Manager and recorded in the dust monitoring register.
Environmental Superintendent	• Environmental training (see section 8 below) • Review and updating DMP annually • Reporting to site management and Councils • Management of complaints.

O. Training

Environmental training for all staff will be undertaken as part of the site induction program prior to the commencement of work on the mine site. The environmental induction and training will include the following information specific to the DMP:

- Information about the activities and stages of construction or mining that may cause dust
- Consent requirements;
- Complaints management procedures;
- Dust management procedures;
- The requirement to participate in dust minimization strategies;
- Dust monitoring and reporting of incidents.

Personnel carrying out duties specific to dust management and monitoring will be specifically trained in relation to their roles and responsibilities in addition to the project induction.

P. Reporting

The procedures for recording daily dust inspections are as follows:

- The mining superintendent or duty manager will fill out a daily dust inspection log form (Attachment A) each day and maintain the record on site.
- The following information will be recorded:

- Any dust control equipment malfunctions and any remedial action(s) taken;
- Results of the visual inspections of dust emissions;
- General weather conditions during the day (i.e. windy, calm, warm, rain, etc.);
- The frequency of watercart and/or water sprinkling system use; and
- The date and signature of the person entering the information.

Q. Review

Q.1 Review process

A review of the DMP will be undertaken at least annually by the Site Management team. The review will take into consideration:

- Compliance with the DMP and consent conditions;
- Any significant changes to mining activities or methods;
- Key changes to roles and responsibilities within the management team.
- Results of inspections, monitoring and reporting procedures associated with the management of dust.'
- Any comments from the West Coast Regional Council or Grey District Council;
- Any complaints received and remedial actions.

The outcomes of this review will be provided to West Coast Regional Council.

Where the DMP is updated as part of a review, the on-site version shall also be updated.

Q.2 Reasonable amendment

In accordance with the consent conditions, reasonable amendments may be made to the finalized DMP at any time. Reasonable amendment is any amendment where the adverse environmental effect arising from the amendment is the same or less than the effect anticipated in the final DMP.

Any changes to the DMP shall remain consistent with the overall intent of the original version of the finalized DMP, as described in the relevant consent condition.

R. Dust monitoring

Monitoring of dust will be undertaken throughout the duration of the mining activity. Samples will be recorded monthly and reported yearly to the consent authorities as part of annual work programme requirements. Exceedances will be notified to the consent authority within 10 working days of the company becoming aware of the exceedance.

Monitoring will only be conducted by an authorized and competent person. Monitoring results will be submitted to the Health and Safety Superintendent for recording in the register.

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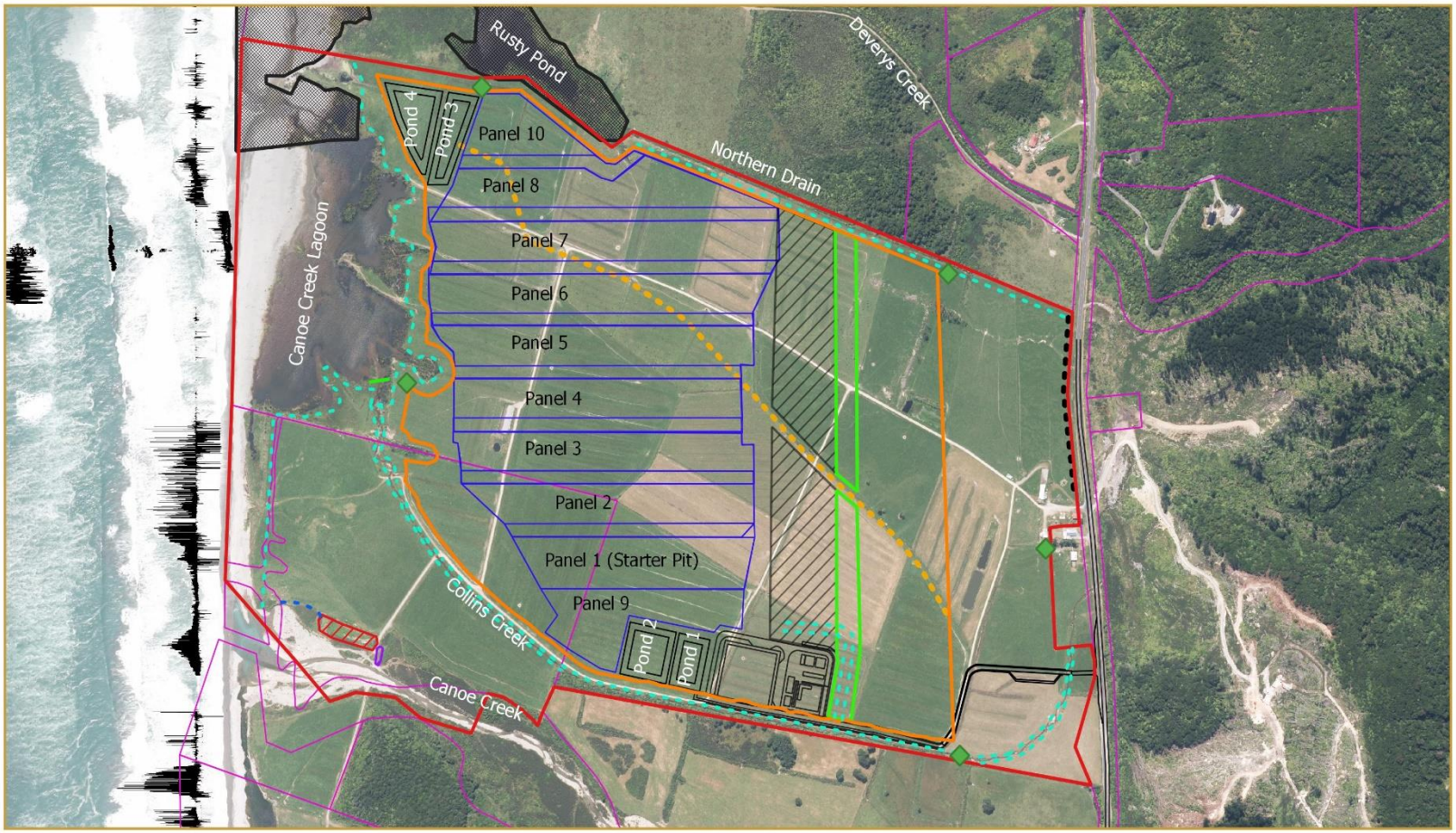
Attachment A: Dust and Radiation Monitoring Locations (baseline)



Tai Poutini RESOURCES

TiGa
Consent Application

Produced for: TiGa
by Luke McNeish on 18/01/2024

0 125 250 m

1:8,000 @ A3

Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and or TPRL Data

Legend:

- Planting
- Stockpile Area
- Mining Disturbance Area
- TiGa Application Area
- Bund
- Gallery Water Take
- Premining ore stockpile
- Overflow Channel
- Canoe Creek Infiltration Basin
- Bund and Planting
- Central Drain
- SNA
- Property Boundaries
- Mine Infrastructure
- Overflow Path
- Dust Monitoring Locations

Note: Refer to Landscape Mitigation Plan for detailed information on planting and bunds.

Attachment B: Daily dust inspection log

Date: ……... **Time:** ……

Inspection by………

Current Weather Condition (e.g. sunny, cloudy, rain):
……

Wind Direction / Strength (e.g. strong, moderate, light, still)
……

Area(s) Inspected:
.....

SCOPE OF INSPECTION	Circle the relevant item	COMMENTS
Is there visible dust from site work activities, stockpiles, earthworks areas or haul roads?	Y N N/A	
Are haul roads visibly dry and need spraying with water truck?	Y N N/A	
Are any exposed earthworks or stockpile areasvisibly dry and need water spray?	Y N N/A	
Stockpile heights Dampened Stockpiles covered/stabilized where needed?	Y N N/A Y N N/A	
Are there any signs of dust going off site as a result of site activities? Land adjacent to the site to be inspected (including vegetation, residential properties and cars), and adjoining SH6 for the presence of dust deposits.	Y N N/A	
If wind speeds are strong are additional inspection and mitigation measures being put in place? (e.g. increase water application, restrictions on dusty activities)	Y N N/A	
Are watering systems (e.g. water carts, wheel wash) operating effectively to minimize dust?	Y N N/A	
Are trucks covered before entering or leaving the site?	Y N N/A	