REPORT

Tonkin+Taylor

Air Quality Technical Assessment

Buller Plateaux Continuation Project

Prepared for
Bathurst Resources Limited

Prepared by
Tonkin & Taylor Ltd

Date
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Terms and definitions

Term	Definition
AEE	Assessment of Environmental Effects
ACML	Ancillary Coal Mining Licence
ASL	Above sea level
BRL	Bathurst Resources Limited, including its subsidiary companies BT Mining Ltd, Bathurst Coal Ltd, and Buller Coal Ltd.
BPCP	Buller Plateaux Continuation Project
BCM	Bank Cubic Metres – one cubic metre of rock in situ
Buller Plateaux	Collective reference to the Stockton Plateau and Denniston Plateau.
Bypass Coal	Coal that does not require crushing or washing to be saleable.
CCC	Christchurch City Council
CHPP	Coal Handling and Processing Plant (at Stockton)
CML	Coal Mining Licence
CO	Carbon monoxide
CDHB	Canterbury District Health Board
CFSF	Coal Fines Storage Facility
DMP	Dust Management Plan
ECan	Environment Canterbury
ESE	Escarpment Extended Project sub-area
FIDOL	Frequency, intensity, duration, offensiveness, location
FTAA	Fast-track Approvals Act 2024
ha	Hectare
IAQM	Institute of Air Quality Management
LPC	Lyttleton Port Company
LOD	Limit of detection
m	Metre
$\mu g/m^3$	Micrograms per cubic metre
mm	Millimetre
m/s	Metres per second
MfE	Ministry for the Environment (New Zealand)
MFS	Mount Frederick South Project subarea.
NES / NESAQ	National Environmental Standards for Air Quality
NOx	Nitrogen oxides
OEHHA	California Office of Environmental Health Hazard Assessment
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
RAQP	Regional Air Quality Plan (West Coast Region)
RCS	Respirable Crystalline Silica – fine particles of crystalline silica (<4 µm) that can be inhaled deep into the lungs.
RoM	Run of Mine – coal as it comes from the mine, prior to processing.

Term	Definition
SO_2	Sulphur dioxide
TBS	Teetered bed separators
TSP	Total suspended particulate
Stockton	Stockton Project sub-area, including the Stockton Mine and associated infrastructure.
UWHR	Upper Waimangaroa Haul Road – a transport corridor connecting Escarpment Extended to Stockton.
VDT	Vegetation Direct Transfer – rehabilitation method involving relocation of intact soil and vegetation mats.
WCRC	West Coast Regional Council
Windrose	A graphical representation of wind speed and direction frequency over a period of time.
WHO	World Health Organization

Executive summary

Bathurst Resources Limited (including its subsidiary companies Bathurst Coal Ltd, and Buller Coal Ltd) and joint venture company BT Mining Ltd (collectively referred to as 'Bathurst') are seeking approvals through the Fast-track Approvals Act 2024 (FTAA) for the Buller Plateaux Continuation Project (BPCP, or the Project).

The Project covers areas on both the Stockton Plateau and the Denniston Plateau (collectively referred to as the Buller Plateaux). The purpose of the Project is to reconsent the existing infrastructure and mining operations associated with the Stockton Mine and provide access to additional coal mining areas across the Buller Plateaux, as the coal resource in the current Stockton operations are close to depletion, and further coal resources for blending are required.

Bathurst operates various coal mines and mining infrastructure facilities across the Buller Plateaux, which are located approximately 15 kilometres (km) north of Westport on the West Coast of the South Island. Bathurst is seeking to extend the life of mining activities at the Stockton mine, continue activities at the Ngakawau Rail Loadout and to commence mining activities within additional mining areas located on the Buller Plateaux for the purposes of blending coal for the export market.

Bathurst proposes to mine approximately 20 million tonnes of coal for export (96% coking coal for steelmaking), with the balance for thermal), utilising the existing workforce and infrastructure facilities at Stockton over a timeframe of approximately 18 years, with an additional 7 years of rehabilitation activities. Mining operations would maintain coal production at a rate similar to its current rate and continue as a 24/7 operation via conventional drill and blast, load and haul open pit mining.

The Project consists of the following five separate, but connected, sub areas:

1 <u>Stockton Mine</u>: this comprises the following:
   - a The existing mining operations within the Stockton Coal Mining Licence and ancillary activities including the Coal Handling and Processing Plant ("CHPP") and the Aerial Ropeway from Stockton to Ngakawau.
   - b Mining of additional areas in the north of the Stockton Mine.
   - c Excavation of aggregate in the A-Drive Borrow Pit.
   - d The Ngakawau Rail Loadout.

2 <u>Mount Frederick South (MFS)</u>: this is a new area that will be accessed via the Upper Waimangaroa Haul Road.

3 <u>Escarpment Extended (ESE):</u> this is located on the Denniston Plateau and will comprise new and existing opencast areas accessed via the Upper Waimangaroa Haul Road.

4 <u>Upper Waimangaroa Haul Road (UWHR):</u> This is a haul road, connecting MFS and ESE to the Stockton Mine, which traverses through the existing Cypress mining area .

5 <u>Cypress: </u>Ongoing mining is authorised under existing consents, the only elements for inclusion in the Project are the renewal of Wildlife Act authorities and a variation to the compensation provisions to integrate with the broader compensation work across the full BPCP.

The main discharges to air associated with the BPCP are particulate matter, including dust. Dust emissions can result in nuisance effects and effects on vegetation. Adverse health effects can also arise from exposure to dust particles smaller than ten microns in diameter (PM_{10}) and especially those that are smaller than 2.5 microns ($PM_{2.5}$), as well as from respirable crystalline silica.

The most significant potential source of dust associated with mining activity arises from the movement of vehicles along unpaved haul routes during dry weather, due to the action of the

vehicle wheels suspending dust. Other lesser sources of dust from the mining activities include the following:

- Blasting of rock and coal.
- Excavation from the mine working face.
- Loading of trucks.
- Trucks and loaders operating on the coal stockpile areas.
- Entrainment of dusty material during strong and dry wind events.
- Uncovered conveyor transfer points.
- Processing of the coal where dry processes take place, such as crushing and screening.

The key factors that influence the amount dust from the above sources are as follows:

- Moisture content of the material.
- Particle size distribution of the material.
- Surface wind speed.
- The area of the exposed surface.

A review of the receiving environment has identified residential dwellings closest to the various Project sub-areas, noting that there a large separation distances to the nearest dwellings. The review has also considered recreational users and ecological receptors.

Dust management measures proposed to be employed for the BPCP are largely derived from those currently employed at Stockton and at the Ngakawau Rail Loadout. Mitigation measures and monitoring have been proposed taking into account the key dust emission sources and their significance to dust discharges from the proposed operations.

A qualitative air quality assessment has been undertaken using Ministry for the Environment (MfE) and IAQM guidance. The assessment has considered site-specific meteorology, topography, existing dust deposition monitoring data, and sensitive receptor locations. It has also reviewed existing and proposed dust mitigation measures and monitoring.

A notable feature that is important to the assessment of potential dust impacts is that the Buller Plateaux (and to a lesser extent Ngakawau) experiences an exceptionally high annual rainfall, which helps to suppress dust emissions and maintain damp ground conditions. This is also combined with large separation distances to sensitive human receptors from dust generating activities on the Buller Plateaux. There is also a low frequency of winds that blow from the existing and proposed mining activities towards those receptors. The exception to this is the Wooffindin residence located close to the Stockton Mine. However, its elevated position and dense vegetation separating it from dust sources help to minimise effects. This is confirmed through historic dust deposition monitoring. Given this context, it is expected that potential dust effects on the Wooffindin residence will remain low, provided that existing dust suppression measures are continued. A review of the potential climate change scenarios does not alter the conclusions regarding rainfall and wind conditions at both Ngakawau and on the Buller Plateaux. Consequently, it is very unlikely to change the overall conclusions regarding potential dust effects reached by this assessment.

A review of Council's/Bathurst's historic complaints data also confirms no recent complaints (i.e., since 2010) relating to existing Stockton mining operations and a very small number of isolated complaints (two) relating to the Ngakawau Rail Loadout associated with trucking operations due to the interruption of the rail service.

Consistent with comparable monitoring undertaken at similar operations, potential health effects associated with PM_{10}, $PM_{2.5}$ and respirable crystalline silica emissions are very unlikely to approach relevant human health-based guideline values.

The potential air quality effects on recreational users of the area have been assessed as being negligible to low, with additional mitigation set out in the recreational and tourism assessment prepared by Rob Greenaway & Associated (2025).

The potential effects on vegetation and ecological receptors are expected to be limited to areas immediately adjacent to key dust sources such as haul roads, and these will be further reduced through progressive rehabilitation and ongoing surface stabilisation measures. Additional mitigation is described in the ecological assessment report (Ecological Solutions, 2025), which includes the use of setback distances (of between 10 m and 30 m) to disturbance areas.

Given the above findings, the assessment has determined that the proposed BPCP can be undertaken in a manner that appropriately manages and minimises discharges to air to ensure that adverse effects on the surrounding environment, including sensitive human, recreational and ecological receptors, will be negligible or low.

Continued dust deposition and meteorological monitoring is recommended, with new dust deposition monitoring sites to include representative locations at Denniston and other areas of importance from an ecological perspective. The use of continuous dust monitoring instruments is not recommended because of known issues such instruments have with operating in high humidity/rainfall environment, but also because of the large separation distances to sensitive receptors. Routine visual inspections to confirm the effectiveness of dust mitigation measures will continue.

Given the above, and subject to the continuation of the mitigation and monitoring measures outlined in this report, the BPCP is consistent with the relevant objectives and policies of the West Coast Regional Air Quality Plan and the requirements of the Resource Management Act 1991. The proposed operations are expected to maintain existing good practice standards and achieve air quality outcomes that protect human health, amenity, and the wider receiving environment over the life of the BPCP.

1 Introduction

Bathurst Resources Limited (including its subsidiary companies Bathurst Coal Ltd, and Buller Coal Ltd) and joint venture company BT Mining Ltd (collectively referred to as 'Bathurst') are seeking approvals through the Fast-track Approvals Act 2024 (FTAA) for the Buller Plateaux Continuation Project (BPCP, or the Project).

The Project covers areas on both the Stockton Plateau and the Denniston Plateau (collectively referred to as the Buller Plateaux). The purpose of the Project is to reconsent the existing infrastructure and mining operations associated with the Stockton Mine and provide access to additional coal mining areas across the Buller Plateaux, as the coal resource in the current Stockton operations are close to depletion, and further coal resources for blending are required.

Tonkin & Taylor Ltd (T+T) has been engaged by Bathurst to prepare this air quality assessment to assess the effects of the Project on air quality. This report has been prepared in accordance with the scope of work set out in our letter of engagement dated 31 November 2024 (T+T ref 1096446.0000).

1.1 Background

Bathurst operates various coal mines and mining infrastructure facilities across the Buller Plateaux, which is located approximately 15 kilometres (km) north of Westport on the West Coast of the South Island. Bathurst is seeking to extend the life of mining activities at the Stockton mine, continue activities at the Ngakawau Rail Loadout as well as commence mining activities within additional mining areas located on the Buller Plateaux to supply blended coal for the export market.

Bathurst proposes to mine approximately 20 million tonnes of coal for export (96% would be for steel making (coking), with the balance for thermal use), utilising the infrastructure facilities at Stockton over a timeframe of approximately 18 years, with an additional seven years of rehabilitation activities. Mining operations would maintain coal production at a rate similar to its current rate and continue as a 24/7 operation via conventional drill and blast, load and haul open pit mining. All coal produced by the Project will be exported, primarily for use in the steelmaking process.

The Project is a 'Listed Project' under Schedule 2 of the FTAA.

The mining operations will be by opencast methods and generally include the removal of surface vegetation and overburden, the extraction crushing, screening and washing of coal, and stockpiling and transport of materials in heavy vehicles. Upon completion of the mining operations, the areas will be rehabilitated to self-sustaining landscapes and ecosystems.

1.2 Objective and scope

The purpose of this report is to describe the activities associated with the Project that have the potential to result in discharges to air, and to provide a technical assessment of their actual and potential effects. The assessment includes consideration of both direct and cumulative impacts.

In particular, the report:

- Describes the Project and its associated activities with potential to generate airborne contaminants.
- Characterises the environmental context, including sensitive human and ecological receptors, local meteorology, and topography, as well as background air quality conditions.
- Identifies the resource consent requirements under applicable legislation for discharges to air from the Project.

- Assesses the potential effects of the Project's air discharges, including:
  - Dust and nuisance effects;
  - Potential human health effects; and
  - Potential ecological effects.
- Outlines the mitigation and monitoring measures proposed to avoid or minimise adverse effects.
- Considers alternative methods for managing or reducing air discharges.
- Presents conclusions regarding the significance of potential air quality effects and the Project's overall consistency with relevant planning objectives and policies.

This scope covers the Project in its entirety, including associated infrastructure, and relevant operational activities over the proposed life of the Project.

2 Project description

2.1 Project sub-areas

2.1.1 Overview

The Project consists of the following five separate, but connected, sub areas with further description of each sub area provided in the following sub-sections and their locations shown in Figure 2.1. The existing and proposed areas of disturbance are shown in Figure 2.2.

1. the Stockton Mine: this comprises the following:
    a. The existing mining operations within the Stockton Coal Mining Licence and ancillary activities including the Coal Handling and Processing Plant ("CHPP") and the Aerial Ropeway from Stockton to Ngakawau.
    b. Mining of additional areas in the north of the Stockton Mine.
    c. Excavation of aggregate in the A-Drive Borrow Pit.
    d. The Ngakawau Rail Loadout.
2. Mount Frederick South(MFS): this is a new area that will be accessed via the Upper Waimangaroa Haul Road.
3. Escarpment Extended (ESE): this is located on the Denniston Plateau and will comprise new and existing opencast areas accessed via the Upper Waimangaroa Haul Road. Coal from ESE will be transported to Stockton via the Upper Waimangaroa Haul Road. ESE will also have four primary infrastructure areas to support the mining operations (Gatehouse / Admin Office Area, Central Infrastructure Area, Coal Haulage Infrastructure Area, and a Bulk Explosives Plant and High Explosives Magazine, and also includes the existing Waimangaroa Storage Yard. The Escarpment Extended Borrow Pit will also be established at ESE to provide aggregate.
4. Upper Waimangaroa Haul Road (UWHR): This is a haul road, connecting MFS and ESE, traversing through the existing Cypress mining area to the Stockton Mine.
5. Cypress: The Cypress Mine was consented in 2005, with its air discharge permit (RC03175/19) expiring in 2040. Accordingly, air quality discharges from Cypress are not relevant to the Fast Track application, except to the extent that this results in cumulative effects. Ongoing mining is authorised under existing consents. The only elements for inclusion in the Project are the renewal of Wildlife Act authorities and a variation to the compensation provisions to integrate with the broader compensation work across the full BPCP.

The Waimangaroa Storage Yard will also be established as a laydown area to support the construction of the UWHR. This facility is not expected to give rise to appreciable air discharges and is not considered further in this assessment.

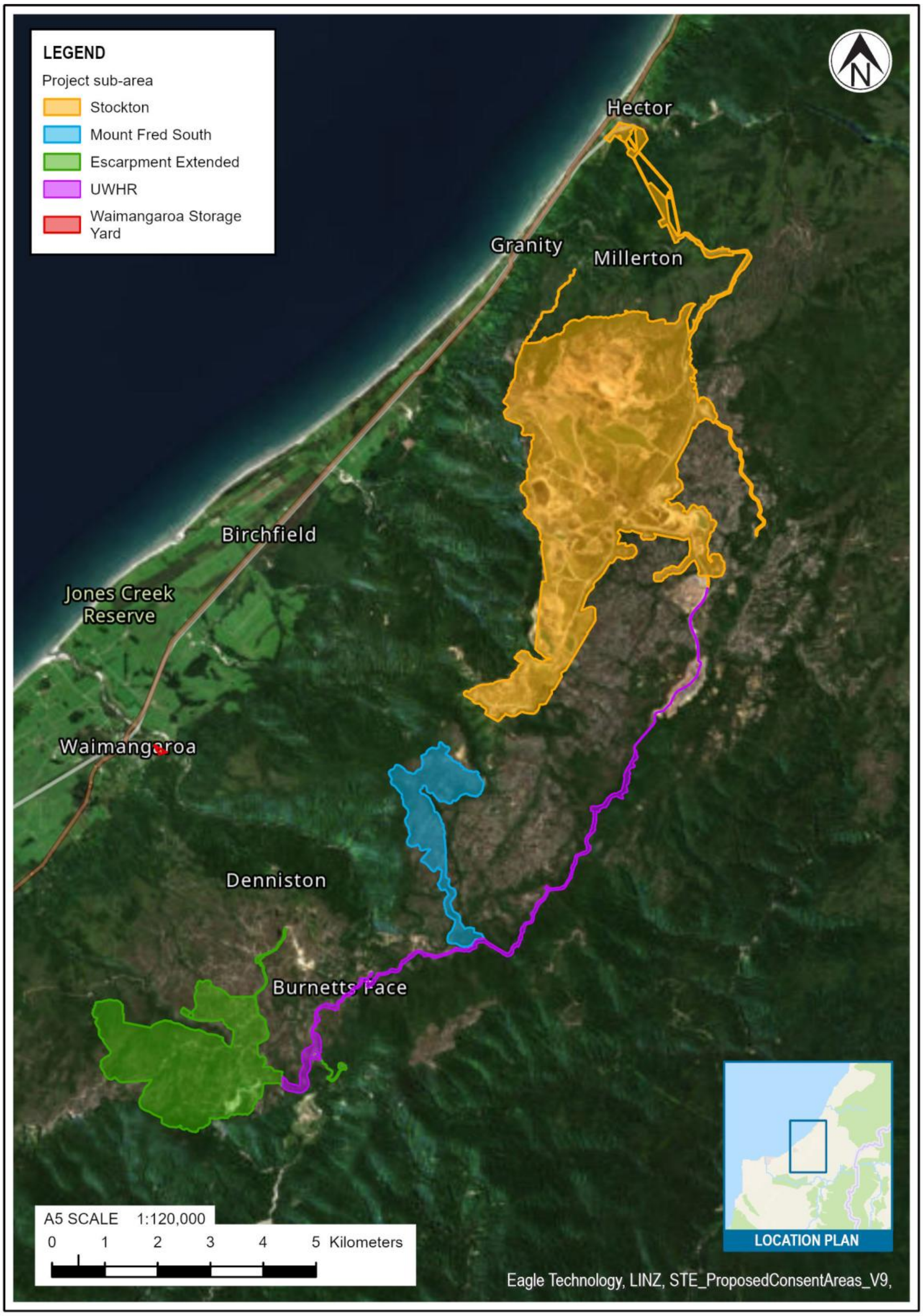

Figure 2.1: Project sub-areas.

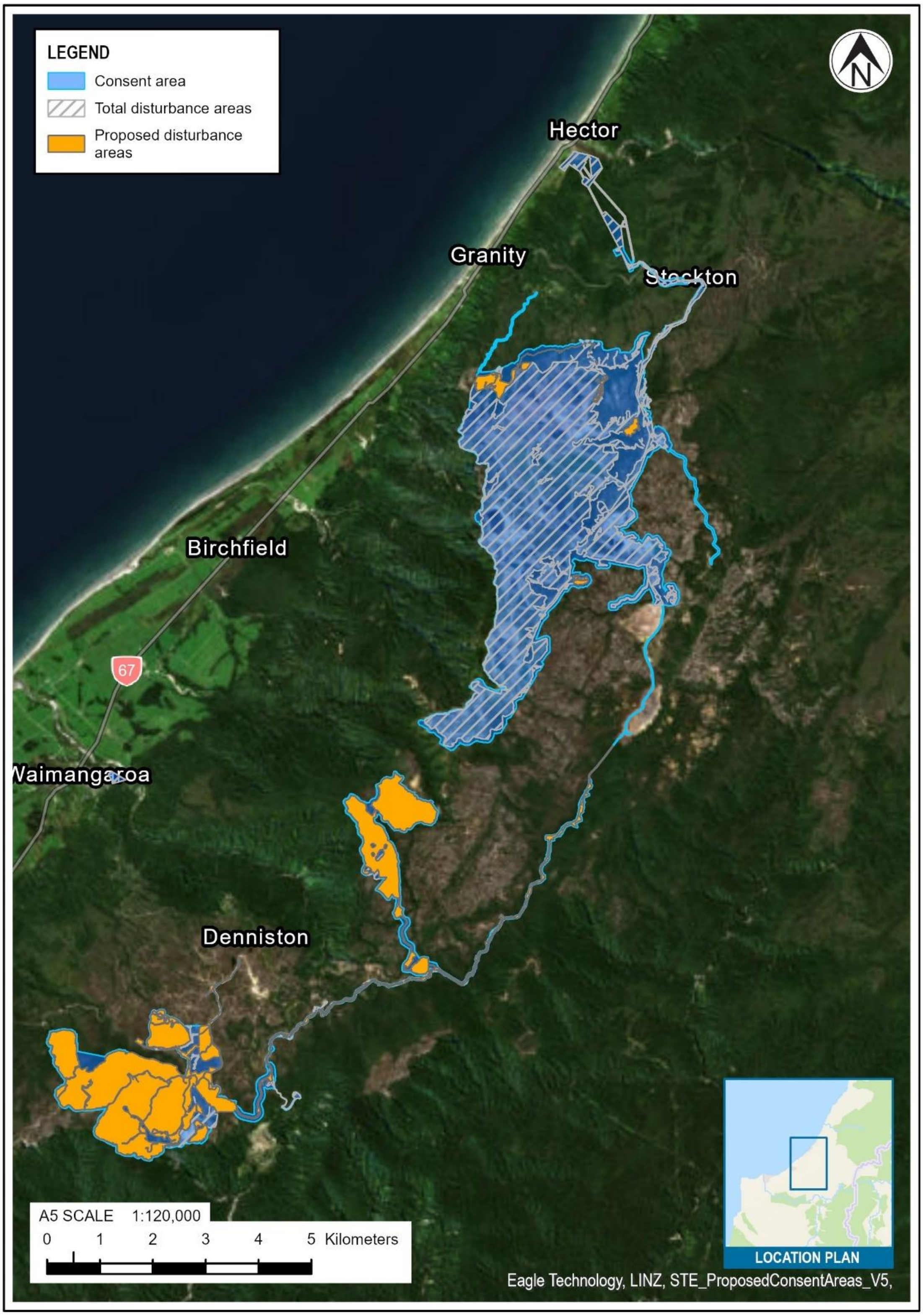

Figure 2.2: Existing and proposed disturbance areas.

2.1.2 Stockton

The Stockton Project sub-area covers existing mining operations and coal handling and processing operations including the Coal Handling and Processing Plant (CHPP) located within the Stockton Coal Mining Licence (CML) and ancillary activities which are provided for under two Stockton Ancillary Coal Mining License (ACMLs), including the aerial ropeway and the Ngakawau Rail Loadout area.

Minimal activity is planned within the existing Mining Permits associated with the Stockton mine. Furthermore, as Stockton is an existing operational mine, much of the Stockton Project sub-area has previously been disturbed.

Notwithstanding the above, Bathurst proposes to continue mining in a number of areas (predominantly at the northern end) of the Stockton Mine to enable blending of the various coal products to meet market requirements. Each stage is mined separately before being rehabilitated, minimising the amount of ground disturbance and exposed area at any given time.

Mining is by conventional drill and blast, load and haul open pit mining. Due to the inherent variability of coal quality across the Stockton mine, coal is mined from multiple areas simultaneously to achieve the required coal quality specifications. The specifications are set by customer requirements.

Infrastructure located at the Stockton Mine that is relevant to the air quality assessment includes the following:

- The CHPP where coal washing takes place, and the Infeed where clean coal sizing and screening takes place.
- Coal storage areas, receiving Run of Mine (RoM) coal to be processed and product coal from the CHPP or RoM coal.
- A coal transport route comprising a 7.4 km haul road and 2.3 km aerial ropeway to Ngakawau.
- Haul roads used for transporting coal and overburden.

A resource consent (RC965002) authorising discharges to air from the Stockton Mine expires in March 2027.

In the Stockton sub-area, Bathurst proposes to mine additional areas to the north of the existing Stockton Mine (refer to the proposed disturbance areas shown in Figure 2.2), continue using the existing infrastructure and facilities, carry out further excavation of aggregate in the A Drive Borrow Pit, and develop three additional Coal Fines Storage Facilities (CFSF).

The aerial ropeway will continue to transport coal from the significantly elevated Stockton mine area down to Ngakawau where the coal is loaded into trains for transport to Lyttelton Port for export. Occasionally, Bathurst is required to truck coal from Ngakawau, for example when the rail line is closed for an extended period.

The Ngakawau facility normally loads 19 trains per week over 6 days, with loading normally occurring between 8 am and 9 pm. Loading of each train typically takes approximately 90 minutes.

Existing dust management at the Ngakawau facility comprises sprinkler systems and wind mesh fences. A resource consent (RC965002) authorising discharges to air from the facility expires in March 2027.

All coal mined in the ESE and MFS Project sub-areas will be transported to Stockton via the UWHR for processing or washing as required at either the Stockton CHPP or the clean coal sizing and handling system and then transported via the haul road and the existing aerial ropeway to the Ngakawau Rail Loadout and from there onto trains to the Port of Lyttelton.

The Stockton Mine uses trucks and excavators for removal of the overburden (or non-coal material) above a coal seam. Coal is loaded using a combination of loaders and excavators with haulage to both the Run of Mine (ROM) hopper (clean coal) and the CHPP (wash coal) using rear dump trucks. The operations are supported by additional equipment, including dozers, graders and watercarts. Existing mining operations are supported by several interconnected haul roads that access the various mining areas. While typically haul roads are semi-permanent features, there is an ongoing need to relocate or extend the haul road network to support operational needs. There are numerous gravel-borrow-areas from which material is sourced for road construction and sheeting to ensure safe access during wet weather conditions.

Approximately 55% of the coal mined at Stockton can be mined cleanly; that is free from contamination from waste rock or non-coal material. This coal is designated “bypass” coal and is directed to the product stream with minimal processing (sizing only). Most contaminated coal is produced during mining at the coal seam interfaces or where coal is mined from areas with historic underground workings. A smaller amount of contaminated coal is sourced from areas with interbedded coal and shales that cannot be separated at the mine face.

All contaminated coal is processed through the CHPP. The yield of product coal from the contaminated coal stream is typically around 60% but ranges from 30-80%. The waste stream from the CHPP consists of coarse rejects (> 45 µm nominal), which are co-disposed with overburden and used to backfill previously mined areas. The fine waste stream (< 45 µm nominal) from the washery is discharged to the McCabes Coal Fines Storage Facility (CFSF) via a pipeline from the CHPP.

Waste material from above the coal seams (overburden) is transported to designated areas for disposal. The most common method is to place it in engineered landforms (ELFs) to backfill previously mined areas, effectively utilising the empty spaces created by earlier overburden removal and coal extraction.

2.1.3 Mount Frederick South

The Mount Frederick South (MFS) area is a new opencast mining area with initial mining through old underground workings, and extension into unmined areas. An access road will be constructed to link the Mount Frederick South mining area with the Upper Waimangaroa Haul Road. Mined coal will be carted approximately 2 km down to the coal transfer pad/stockpile area for the MFS Project sub-area, which is located at the southernmost area of MFS adjacent to the UWHR.

All coal from the coal transfer pad/stockpile area will be transported via the UWHR to a new intermediate stockpile area near the Stockton McCabes CFSF using the haul road trucks. From the intermediate stockpile area, MFS (and ESE) coal will be loaded onto mine trucks and carted to either the CHPP raw coal pad or the infeed ROM pad, and either direct tipped to hoppers, or stockpiled for future plant feed.

2.1.4 Escarpment Extended

The Escarpment Extended (ESE) Project sub-area is located on the Denniston Plateau. This Project sub-area includes the authorised Escarpment Mine, which is an operating mine currently under care and maintenance, with consents expiring in October 2025.

Mining will be open cast and include the recovery of old underground workings (Whareatea) and an extension into unworked areas (West Whareatea). ESE will have four primary infrastructure areas to support the mining operations. The Escarpment Quarry will also be established at ESE to provide aggregate.

Coal mined at ESE will be transported to Stockton Project sub-area via the UWHR for washing, processing and blending as required before being transported to Ngakawau.

Supplies and materials for ESE will be delivered to the site via Denniston Road. which will also be the main workforce access route.

2.1.5 Upper Waimangaroa Haul Road

The Upper Waimangaroa Haul Road (UWHR) will be approximately 19 km in length and will connect Stockton with MFS and the ESE Project sub-areas (Figure 2.1). It will enable operations to avoid using the public road network for transport of coal to the existing Stockton Mine processing facilities. UWHR is a combination of upgrades to existing roads and the development of a new section through the Waimangaroa Valley.

2.1.6 Cypress

The Cypress Project sub-area comprises the existing operating Cypress Mine. Whilst all resource consents are current for the Cypress Mine, the Project will apply for a renewal of the Cypress Mine's Wildlife Authority via the FTAA and some limited variations relating to the compensation provisions of the Cypress consents. The proposed haul road connecting Denniston and Stockton plateaux joins the Cypress Mine at its south margin and will run through the mine to connect with the existing transport route from Cypress to Stockton Mines.

2.2 Project scheduling

Details of the project scheduling are provided in the BPCP Project Description Report. The following provides a summary of that schedule relevant to the air quality assessment.

A key aspect of the Project schedule is the integration of new mining areas with the existing Stockton and Cypress mining operation. This ensures a continuous, consistent volume of export coal to maintain the existing customer base and leverage existing infrastructure.

The ESE Project sub-area and the UWHR will be developed concurrently, to enable the bulk transport of coal to the existing CHPP, and subsequent use of the aerial ropeway and rail loadout facilities at Ngakawau.

Approximately one year after ESE is operational and producing coal, MFS development will begin.

Table 2.1: Indicative project timeline (assuming commencement of new consents by 1 April 2027

Site	Development phase	Operations	Last coal mining	Rehabilitation completion	Rehabilitation monitoring, maintenance and active water treatment	
Stockton	N/A	[redacted]	[redacted]	[redacted]	Ongoing in collaboration with the Crown	**Relinquishment**
ESE	[redacted]	[redacted]	[redacted]	[redacted]	Approximately 15 years	
MFS	[redacted]	[redacted]	[redacted]	[redacted]	Approximately 10 years	
UWHR	[redacted]	[redacted]	[redacted]	[redacted]	Approximately 10 years	

2.3 Mine site activities

2.3.1 Site access and vehicle movements

The Stockton, Cypress and MFS Project sub-areas are interconnected and are accessed via Millerton Road (a public road), approximately 4 km from State Highway 67. Coal is not transported via this public road. Instead, coal is transported from Stockton using an aerial ropeway delivering the coal to the Ngakawau Rail Loadout.

The ESE Project sub-area will be accessed via Denniston Road (a public road).

Haul trucks are used to transport excavated overburden to and from storage areas using formed haul routes. Excavated coal is transported using haul trucks to the Stockton CHPP or Run of Mine (RoM) stockpile. The processed coal is then loaded into haul trucks that follow a 7.4 km long haul route from the CHPP to the headworks of the aerial ropeway.

The interior haul routes within the mining areas are not sealed (see Figure 2.3). In dry conditions, water trucks are deployed to keep the roads in a damp condition in order to minimise dust.

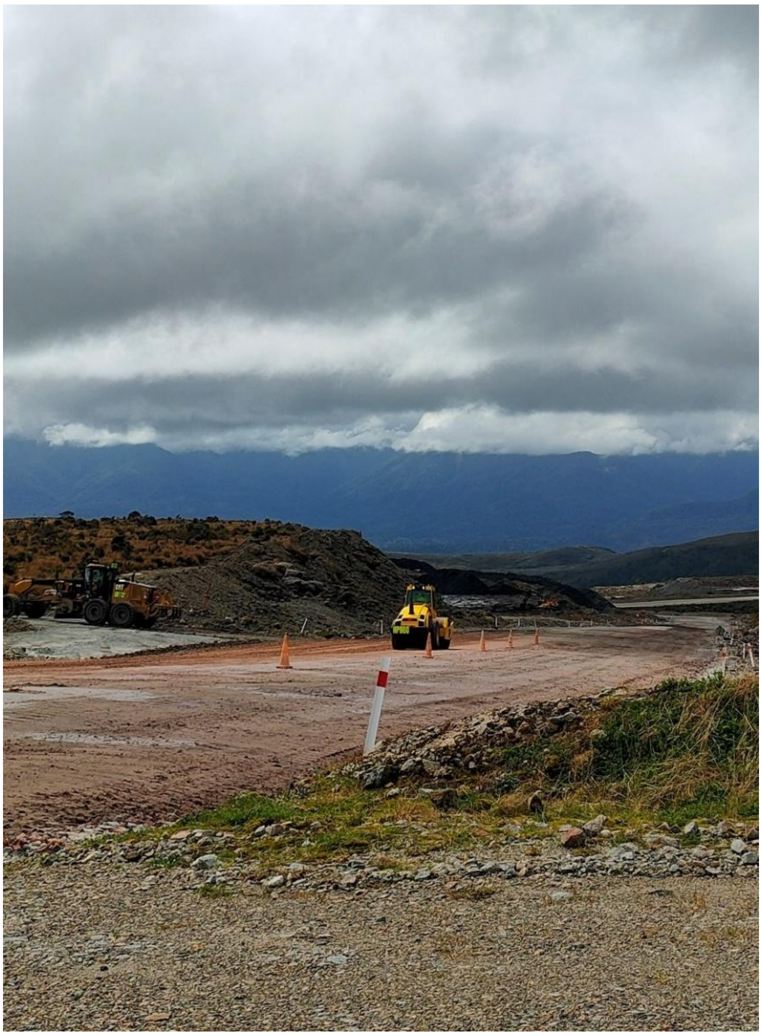

Figure 2.3: A haul road within the Stockton mine, surfaced in compacted sandstone.

As described in Section 2.1.5, the UWHR will be established to transport coal from the ESE Project sub-area to the Stockton Mine, with the route passing through the existing Cypress mine. This haul road will enable large coal haul trucks to transport coal to an intermediate stockpile area located near the McCabes Coal fines Storage Facility. From this facility, the coal will be loaded out, as required, to either:

- The Raw Coal Pad at the CHPP (Stockton Mine) if the coal needs washing; or
- The existing ROM at the Infeed (Stockton Mine) if the coal needs sizing only.

Washed coal from the CHPP product pad, along with sized coal from the Infeed, is loaded out to Station #2 for dispatch to Ngakawau via the existing Stockton haul road, and then onto the aerial ropeway to the Ngakawau Rail Loadout.

The Ngakawau Rail Loadout is accessed via Dole Road only 200 m east of State Highway 67. Coal transported to Ngakawau would typically be loaded onto rail for delivery to Lyttelton Port. However, from June 2024 until January 2025, part of the rail network was closed, and trucks were used instead to transport the coal to be loaded onto rail at Reefton. This is a contingency that would only be used in cases where rail is not available for transporting the coal.

2.3.2 Extraction and blasting

Blasting is routinely carried out to break up the overburden and facilitate its extraction. Contractors with the requisite qualifications for handling and using blasting explosives carry out blasting on approximately a weekly basis, as required.

Blasting involves the drilling of multiple holes into the rock mass to enable the positioning of charges and detonators at an appropriate depth and spacing to facture the rock. Once the drill holes and charges are set, blasting is carried out under appropriate weather conditions. Blasting can give to rise dust emissions, albeit for a very short period of time. Drilling can give rise to dust but is generally very localised and minor by comparison to other sources of dust.

Blasting will be undertaken using electronic detonators, emulsion bulk explosive and small charge weights. Maximum explosive quantities per blast hole will vary depending on operational requirements. Standard practices will be followed with respect to controlling potential effects, including fly rock.

Following blasting, excavators and loaders are used to remove overburden, loading material into haul trucks for transport to storage areas which will be developed in 2 m to5 m lifts. Bulldozers are used to assist the forming and shaping of the waste rock stockpiles. The same approach is used for excavating and transporting the coal resource (albeit generally without the need for drilling and blasting) to either the CHPP for washing or the RoM pad for screening and sizing where the coal is clean.

The number and capacity of machines will vary over time as equipment is upgraded or replaced and are listed here to give an approximation of the scale and nature of activity.

An anticipated list of equipment proposed to be used for the Project is set out in Table 2.2. This list is intended to provide an indication of the approximate sale of equipment used at the site various project sub-areas, which may be subject to change over time.

Table 2.2: Indicative list of equipment

Facility/mine	Equipment	Hours of operation
Ngakawau		
Normal operation +Train loadout	• Train Loadout • Tracked conveyor • 25 tonne Loader	24-hour operation, train loadout during daytime.

Facility/mine	Equipment	Hours of operation
	• Workshop/ Power tools	
Normal operation	• Tracked conveyor • Loader • Workshop / Power tools	24 hours/day, 7 days/week.
Stockton		
Production Fleet	• Drill (Sandvik CUBEX) x 3 • 200 tonne Excavator (EX1900) x 2 • 120 tonne Excavator (EX1200) x 2 • 90 tonne trucks (CAT777) x 17 • Dozers (D8,D10,D11,D375) x 4 • Graders (CAT 16M) x 3 • Hi Impact Roller x 1 • Fuel Truck x 3 • Water Cart x 3 • 777 Transporter x 1 • Drill Transporter x 1	Various shift rosters in operation. Some activity on site assumed 24 hours/day, 7 days/week.
Coal Mining Fleet	• 90 tonne Excavator (EX890) x 1 • 45 tonne Excavator x 3 • 35 tonne Excavator x 3 • 55 tonne ADT (A60H) x 3 • 75 tonne Trucks (CAT773) x 3 • Loader (CAT988,992,982) x 4	
Civils/Rehab	• 35 tonne Excavator x 2 • 55 tonne ADT x 9 • Dozer (D65) x 1	
Denniston, Escarpment extended, and Transport corridor		
Production Fleet	• Drill (Sandvik CUBEX) x1 • 200t Ex (EX1900) • 90t trucks (CAT777) x 6 • Dozers (KOM D275AX) x 2 • Graders • Vibratory Roller • Fuel Truck • Water Truck x 1	24-hour operation
Mining Fleet 1	• Drill (Sandvik CUBEX) • 400 tonne Excavator • 180 tonne haul trucks x 6 • Dozers (KOM D375AX) x 2 • Water cart	
Hauling/Transport	• Kenworth C509 prime mover truck and trailer units x 6	
Coal Haul Road maintenance fleet	• 90 tonne Excavator (ZX890) x 1 • Articulated Haul truck (A60H) x2 • Dozer (KOMD65ex) x1	Day shift only 5 days per week.

Facility/mine	Equipment	Hours of operation
	• Wheel Loader (CAT980) x 1 • Water cart x 1 • Mobile crusher x 1	

2.3.3 Coal handling and processing plant (CHPP)

The CHPP processes coal that is contaminated with waste rock or non-coal material. The location of the CHPP is shown in Figure 2.5 and a photograph of the plant is provided in Figure 2.4. Most contaminated coal is produced during mining at the coal seam interfaces or where coal is mined from areas with historic underground workings. A smaller amount of contaminated coal is sourced from areas with interbedded coal and shales that cannot be separated at the mine face. The CHPP separates the coal from waste rock and shale contaminants by using wet processes taking advantage of the density difference between the two (coal is low density, contaminants are high density). Consequently, it is not a significant source of dust.

Raw coal is fed over a grizzly (a grate to screen out large items) to a hopper. The oversize rock is retained and removed by a wheel loader for disposal on site.

The raw coal is then fed to a vibrating screen which discharges to a rotary breaker to further size the coal and remove oversize, harder stone. The reject material is loaded out by wheeled front end loader and trucked to waste dumps. The sized coal is then transferred by conveyors via a surge bin to the CHPP. The coal is 'deslimed' by another vibrating screen to separate coarse (>2 mm) coal from fine (<2 mm) coal. The coarse coal is mixed with a fine magnetite slurry and pumped to a dense medium cyclone to separate out by density into coal that is sent to the product stockpiles and high ash rejects which is sent to the reject stockpile. The magnetite is recovered via a wet drum magnetic separator for reuse in the process.

Figure 2.4: Coal handling and processing plant components (source: Bathurst).

Fine (< 2 mm) feed to the CHPP is washed in up current water separators to produce clean coal and high ash rejects which are dewatered and sent to the coarse reject stockpile for disposal with the coarse rejects. The coal is dewatered via centrifuges and deposited by conveyor onto the product stockpiles containing the coarse coal.

Key aspects of the coal washing process relevant to dust generation are as follows:

- The high humidity, high rainfall, low average temperature environment helps minimise dust generation from coal handling and processing.
- Coal handling can create dust from breakage of coal due to truck and loader trafficking on the travel surfaces, and this is managed by the application of water using a watercart to working areas as required.
- Breakage of minor quantities of coarse coal in the rotary breaker can generate a small amount of fugitive dust around the breaker. Dust is minimised by the use of a collection hood.
- Conveyor transfer points are equipped with dust spray bars, but their use is not always needed due to the condition of the coal (i.e., the coal is wet).
- The washing process is a wet process and produces a washed, damp product.
- The CHPP is hosed down regularly during shifts to clean up spillage, and minimise dust build up from fines in slurries that may splash or leak from the process.
- Discharge of washed product to the product stockpiles can generate wind induced fugitive dust that escapes from the active stockpile surface or falling coal stream. This dust is minimised as follows:
  - Where wind speeds dictate discharging via a pipe to a low level at Stockpile 5.
  - Reducing the distance from the discharge to the top of the stockpile, by discharging to nearly full heaps.
  - Selecting least wind affected stockpiles where possible.
- Loading out product coal from the concrete stockpile pad by wheel loader can generate minor dust and if required this is suppressed using a water cart.

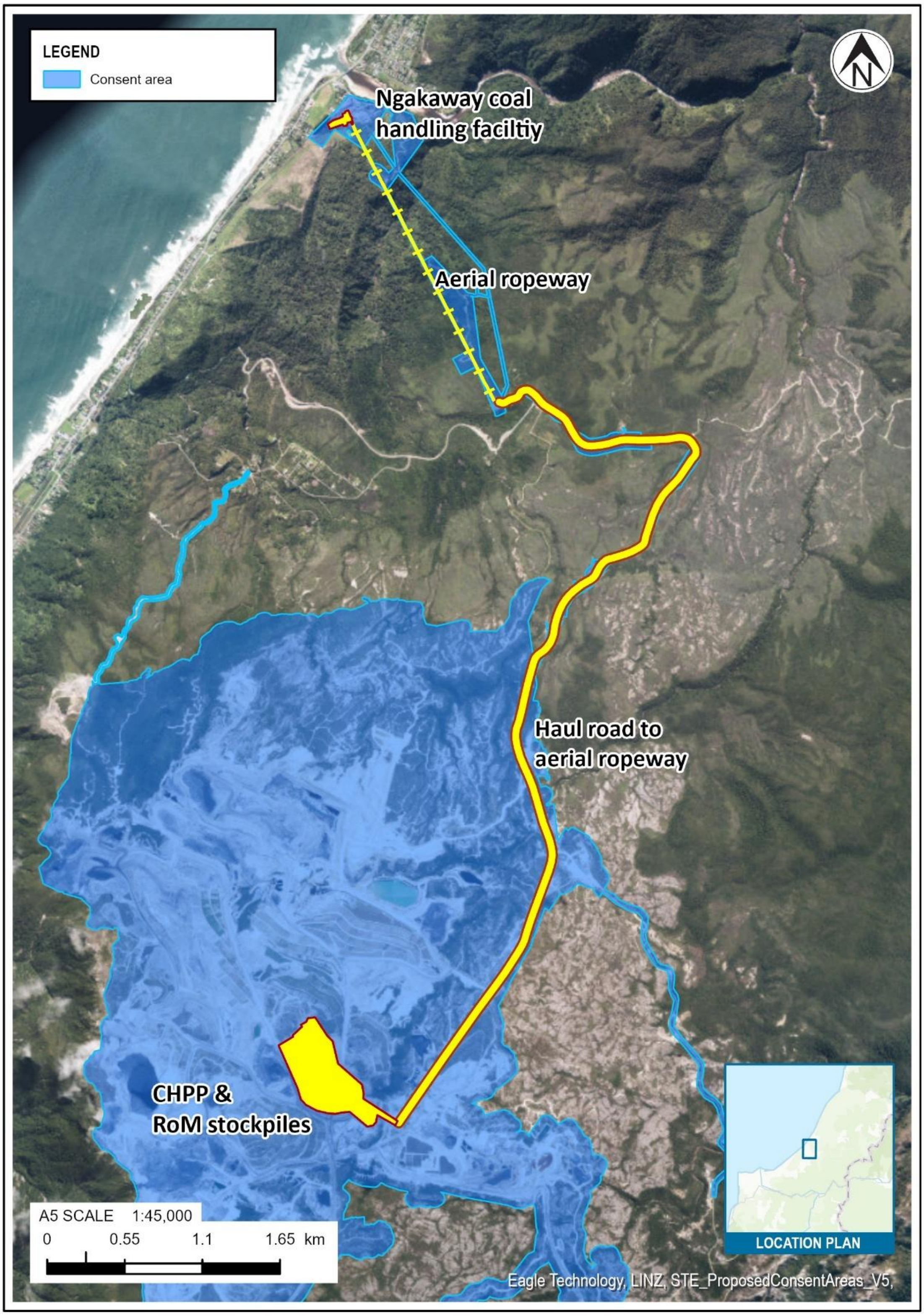

Figure 2.5: Location of key features associated with the Stockton project sub-area.

2.3.4 Coal stockpiles

Coal mined is either processed via the CHPP and then stockpiled on the product pad, or, if the coal does not require washing, it is taken directly to the RoM pad for storage for sizing and loading out via the Station #2 bins along with coal from the product pad. From the Station #2 bins coal is loaded by conveyor into 100 tonne coal haul trucks and transported via the main haul road to the Station 5 (arial ropeway headworks and feed), where it is conveyed to Ngakawau. The general location of the coal stockpiles is indicated Figure 2.5.

2.3.5 Overburden and topsoil

Overburden and topsoil once stripped back to expose the underling coal resource are stored across the mining areas for later use in rehabilitation. Overburden is initially placed in an ex-pit engineered landform (ELF) during the initial period of production until such time that there is adequate backfill room available in-pit. Soil and any suitable non-acid forming (NAF) capping materials are stockpiled until a final landform is available for rehabilitation or where practicable, direct transfer of boulders, vegetation and soil takes place.

2.3.6 Rehabilitation

Rehabilitation at Stockton is undertaken as per the 'Stockton Rehab Design Guidelines' and requirements set out in the Coal Mining Licence. The objective is to leave the site safe and geotechnically stable post-mining, incorporating landforms that are sympathetic to surrounding landscapes, and to encourage an indigenous, self-sustaining and diverse vegetation cover and ecosystem.

Where possible, rehabilitation works generally involve the reshaping of batters, where relevant the back filling with overburden, followed by the replacement of soil cover and re-establishment of native vegetation.

Subject to suitable conditions, rehabilitation of the terrestrial ecology in the mining areas can be undertaken using a technique developed by Bathurst called 'Vegetation Direct Transfer' (VDT), which involves removal and relocation of intact mats of soil and vegetation.

2.4 Ngakawau Rail Loadout

The location of the Ngakawau Rail Loadout is described in Section 2.1.2. The purpose of the facility is to receive coal that is transported by the aerial ropeway from the headworks at the top of the Stockton Plateau to be subsequently loaded into rail wagons (or trucks) for transport to Lyttelton Port.

The coal buckets received via the aerial ropeway are unloaded within a building from which the coal is conveyed to an outdoor storage area. During loading of rail wagons (or trucks) the coal is transferred from the stockpiles using a front-end loader to a bunker where it is then transferred via a covered conveyor to a building where rail wagons are filled. The dispatch of coal via rail wagons typically occurs each day of the week.

A perimeter sprinkler system is used to suppress dust from the outdoor coal stockpile area. The stockpile area also has wind-break fencing (a tall fence that uses wind break cloth – see Figure 2.6) surrounding the perimeter of the stockpile area that helps to minimise wind exposure of the stockpiles and the potential for wind entrainment of dust.

Figure 2.6: View of wind break fence.

3 Nature of discharges

3.1 Introduction

The main discharge to air associated with the activities undertaken at the BPCP areas is particulate matter, including dust. Combustion emissions from vehicles and equipment and machinery working within the mine also occur, but at comparatively low levels.

Given the nature of activities carried out and the receiving environment, odour emissions are not expected to be a concern for the Project and therefore have not been considered further in this assessment.

The following sets out the nature of discharges into air and describes their sources.

3.2 Dust

3.2.1 Sources of dust

The most significant potential source of dust associated with mining activity arises from the movement of vehicles along unpaved haul routes during dry weather, due to the action of the vehicle wheels suspending dust. Dust from vehicle movements can occur irrespective of wind speed but depends on the moisture content and proportion of fine material in the haul road, as well as the number of wheels and speed of vehicles. The second largest source of dust for mining activities is typically from the crushing and processing of materials, where water suppression or wet processes are not used.

The removal of topsoil and overburden which requires blasting, excavation and cartage of the material to new locations can result in dust discharges during dry weather.

Other lesser sources of dust from the mining activities include the following:

- Blasting of rock and coal to loosen it for extraction produces some fugitive dust, albeit for short periods of time and relatively infrequently.
- Excavation from the mine working face.
- Loading of trucks from the loader where an excessive drop height is used.
- Trucks and loaders operating on the coal stockpile areas.
- Wind erosion of dusty material from bare exposed areas on dry days.
- Entrainment of dusty material from exposed surfaces during strong and dry wind events. This includes topsoil and overburden stockpiles prior to the establishment of a vegetation cover, and the ROM stockpile. In practice, while strong wind events are relatively frequent at the Site (see Section 4.4), surfaces are either damp due to the very high rainfall or will typically crust quickly minimising the likelihood of any significant wind erosion.
- Uncovered conveyor transfer points.
- Processing of the coal where dry processes take place, such as crushing and screening.

The key factors that influence the amount dust from the above sources are as follows:

- Moisture content of the material – Moisture binds particles together and prevents dust from being generated through surface wind or disturbances such as vehicle movement. Consequently, the application of water is a key measure for controlling dust emissions from mining operations, which is discussed further in Section 6. A particularly significant consideration in relation to the Stockton Plateau and the Denniston Plateau is the exceptionally high annual rainfall, which is far in excess of most areas of New Zealand, with the possible exception of Fiordland. This is discussed further in Section 4.4.3.

- Particle size distribution of the material – Fine particles are more easily entrained in wind or lifted via mechanical disturbance.
- Surface wind speed – The generation of dust emissions through wind erosion of exposed surfaces and the propagation of suspended dust generally increase with wind speed. Dust pick-up by wind typically becomes significant at hourly average wind speeds of greater than 7 metres per second (m/s) (AQMA 2000), and show increased surface pick up with wind speeds greater than 10 m/s (Watson et al, 2000). Propagation of dust suspended in air through mechanical disturbance towards downwind locations may occur at lower wind speeds.
- The area of the exposed surface – The greater the area of exposed surface, the larger the potential for dust generation will be during strong wind events. Stabilisation of surfaces, which includes progressive rehabilitation activities, significantly decreases the potential for generation of dust by binding surface particles and reducing surface wind speeds.

3.2.2 Nuisance effects

The main effects of dust emissions relate to nuisance effects and property soiling. These effects include impacts on amenity, visibility and impacts on structures, such as abrasion.

The Ministry for the Environment MfE (2016) describes that dust deposits inside the homes are often greatest concern in residential areas, followed by soiling of the outside homes and the effects on paintwork. Some dusts, notably coal dust, are readily visible and will cause visible soiling at lower concentrations than many other dusts.

Significant dust deposition on roofs can also be a concern where that dust accumulates in rainwater tanks with the potential to impact on drinking water quality. However, dust deposition monitoring in and around the site (refer to Section 4.5.2) confirms that the deposition rates are generally low and will be further reduced at the residential dwellings due to the additional separation of dwellings from the dust sources at the BPCP.

Effects on plant life because of dust deposition can occur, but this is typically only an issue where there are very high dust deposition rates and in the immediate vicinity of a source and where vegetation is sensitive to dust deposition. Further consideration of this is provided in Section 7.6.

3.2.3 Health effects

Adverse health effects from dust exposure relate to the fine fraction of particles in dust emissions. This includes the particles smaller than ten microns in diameter (PM_{10}) and especially those that are smaller than 2.5 microns ($PM_{2.5}$) – although $PM_{2.5}$ particles are largely associated with combustion processes. The comparative size of PM_{10} and $PM_{2.5}$ particles to a grain of sand is illustrated in Figure 3.1. The effects of high PM_{10} and $PM_{2.5}$ exposure relates to aggravation of existing respiratory and cardiovascular disease, and can lead to restricted activity days, hospitalisation and increased mortality.

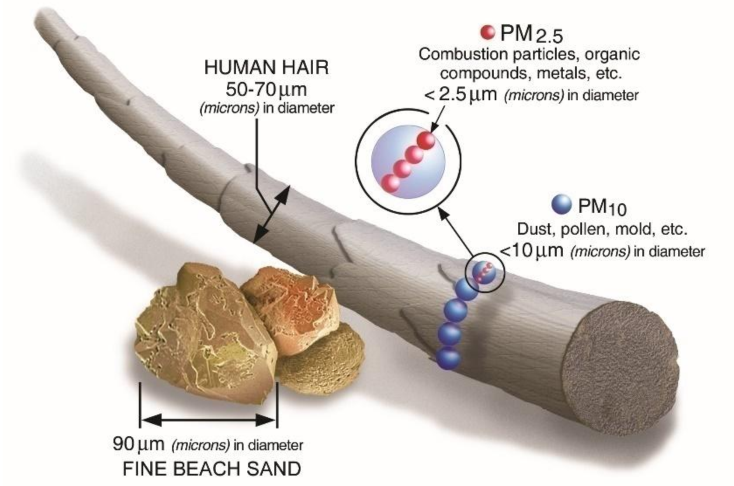

Figure 3.1: Size comparison of particles (source: USEPA).

Dust emissions from mining activities can also contain crystalline silica, depending on the nature of the overburden rock. Silica is the term for a group of minerals, of which quartz is the most commonly found in most rock types (WHO 2012). It accounts for approximately 12% of the land surface and 20% of the earth's crust and is therefore generally ubiquitous in nature. Quartz is also used in many commercial products, including cleansers, cosmetics, art clays and glazes, pet litter, talcum powder, caulk, putty, paint, and mortar (WHO 2012).

Potential health effects associated with crystalline silica relate to the fine fraction of rock dust that can be inhaled and is respirable – this is referred to as 'respirable crystalline silica' (RCS). In relation to the relevant standard and guidelines, RCS are those particles that are four microns (4 µm) or less in diameter. Health effects of RCS can include silicosis, lung cancer and chronic obstructive pulmonary disease (Worksafe, 2017).

3.3 Combustion emissions

Combustion emissions will occur from machinery and vehicles operating within mine pits, haul roads, tip-heads, and stockpile areas, as well as from lighting towers, pumps and generators used for mains power supply. These emissions include oxides of nitrogen (NO_X), carbon monoxide (CO), PM_{10} and $PM_{2.5}$, and sulphur dioxide (SO_2).

The proposed generator capacity for the ESC Project sub-area is expected to be approximately 2.5 MW, with less the 1 MW for the MFS Project sub-area. Electricity supply for the Stockton Mine is principally via mains power. Occasionally, generator sets are used at the Stockton Mine to supply electric pumps, and on mobile lighting towers, welders etc, and for back up electrical supply.

The combustion emissions from on-site vehicles, machines and generators associated with the proposed mining operations and associated activities are low when compared to those that occur in urban areas where ambient combustion contaminants levels may be elevated. The remote setting of the BPCP Project sub-areas means that background contaminant levels are also relatively low. This means that the cumulative effects of combustion emissions beyond the Project areas will be very low compared to applicable standards and guidelines. Accordingly, no further consideration is given in this report to combustion emissions.

4 Environmental setting

4.1 Overview

As discussed in Section 2, the Project sub-areas (with the exception of the Ngakawau Rail Loadout) are situated inland from the coast and in elevated sub-alpine areas, occupying significant parts of the Denniston and Stockton Plateaus. The area has had a long history of coal mining, with many of the nearest residential dwellings originally established to support mining activities.

The following sections describe sensitive receptors in relation to human and ecological receptors, meteorological and terrain considerations, and background air quality.

4.2 Sensitive receptors

Regarding 'human' receptors, the sensitivity of the receiving environment to the effects of dust reflects the amenity expectations that people occupying certain areas are likely to have. The sensitivity considers the characteristics of the land use, the time-of-day people are expected to be at the location, and the reason people are likely to be at the location. For example, residential homes are regarded as having high sensitivity as people have high amenity expectations associated with occupying their home. Furthermore, people of all ages will inhabit a residential home and can be present for prolonged periods, at any time of the day. Comparatively, public roads are regarded as having low sensitivity as people are not expected to be there for prolonged periods of time.

Figure 4.1 shows the Project sub-areas in the context of the surrounding sensitive human receptors, notably residential dwellings and areas, that are located within relevant separation distance criteria (the yellow buffer area shown in Figure 4.1 comprises 2 km for the mining activities and 1 km for the Ngakawau Rail Loadout – further discussion of the separation distance criteria is provided in Section 7.2.1).

[redacted]

Figure 4.1: Sensitive receptor locations.

Recreational areas, such as walking and cycling tracks are also located near to, or within, the BPCP consent Area. Recreation users are described in the Recreational Assessment prepared by Rob Greenaway & Associated (2025), and are summarised as follows:

- Heritage/short walk visitors.
- Walkers, trampers and trail-runners.
- Mountain bikers and cyclists.
- Four-wheel-drive users.
- Motorbike riders.

Recreational users in general will have a high amenity expectation in wilderness and conservation areas. However, the duration and frequency that persons are likely to be present at a given location is expected to be low. Walking and mountain biking tracks[1] that run close to and or pass through the BPCP Project sub-areas are shown in see Figure 4.2. Notable named tracks near to each Project sub-area are listed as follows:

- Stockton:
  - Millerton Bath House Track.
- Escarpment Extended:
  - The Waimangaroa to Lyall Track.
  - The Denniston Bridle Track.
  - The Denniston Township Walk.
  - Denniston Historic Walks.
  - The Denniston Incline.
  - Coalbrookdale Walk.
  - Myra's Track.
- Mount Fred South:
  - Britannia Track.
  - The Waimangaroa to Lyall Track.
- Ngakawau Rail Loadout:
  - Charming Creek Track.

[1] As identified in the LINZ dataset: NZ Walking and Biking Tracks, 2024: https://data.linz.govt.nz/layer/52100-nz-walking-and-biking-tracks/

Figure 4.2: Location of nearby walking and cycling tracks relative to the consent areas.

4.3 Ecological receptors

The Project spans the Denniston and Stockton plateaux, which support nationally significant coal plateau ecosystems. Ecological values are described in the Ecological Assessment prepared by Ecological Solutions (2026) and include threatened bryophytes and lichens, nationally critical land snails, indigenous herpetofauna, native birds, and diverse invertebrates.

Key ecological receptor groups that are relevant to air quality effects include the following:

- Threatened and 'At-Risk' bryophytes.
- Threatened and 'At-Risk' lichens.
- Lizards.
- Avifauna.
- Other invertebrates, including endemic snails

With regard to potential air quality impacts from the Project, the above ecological receptors are most sensitive to particulate deposition on vegetation (especially bryophytes/lichens) and potential indirect habitat effects near unsealed roads, haul routes, and materials handling areas.

4.4 Meteorology and Topography

4.4.1 Topography

The exposed topography has a significant bearing on meteorological conditions, especially winds and rainfall (both important considerations when assessing dust effects), which are discussed further in the following section.

The BPCP Project sub-areas are generally in the sub-alpine environment of the elevated Buller Plateaux, apart from the Ngakawau Rail Loadout. The following describes the general topography of the Project Areas associated with the Buller Plateaux:

- The Stockton Mine covers an area from 400 – 1,100 m above mean sea level (ASL).
- The Ngakawau Rail Loadout lies at the foot of the hills adjacent to the Ngakawau River inlet.
- The Mt Frederick South areas are at approximately 800 m ASL. Mount Frederick itself is north of the proposed mine areas and has a peak of 1,053 m ASL.
- The Waimangaroa River forms a gorge in between the Stockton Plateau and the Denniston Plateau to the southwest.
- The Escarpment Extended mine areas lie at approximately 600 – 800 m ASL. They are fringed by peaks of the Mount William Range to the southeast and Mount Rockfort (1,040 m ASL) located approximately 1.5 km southwest of the proposed mine operation areas.

The nature of the geology and shallow soils of the Buller Plateaux means that water drains from the area quickly resulting in areas drying out rapidly during periods of prolonged dry weather.

The Ngakawau Rail Loadout is located approximately 270 m from the coast, with the land immediately behind it on the landward side rising significantly in elevation. The Ngakawau River flows to the immediate north of the site, and the river has a significant influence on localised winds as is discussed below in Section 4.4.2.

4.4.2 Wind

Meteorology, particularly the presence of both strong winds and warm, dry conditions, can exacerbate dust emissions (the main air discharge) from open-cast mining operations. Therefore, it is important to have a good understanding of the local wind conditions associated with the Project sub-area to assess potential air quality effects.

There are several meteorological stations operated by Bathurst across the Buller Plateaux that measure wind speed, wind direction and rainfall amongst other things. The locations of these meteorological stations are presented in Figure 4.3. T+T has reviewed the data from these various stations, with the most robust and complete data sets being available for the Ngakawau, Stockton, and Burnett's Face Road monitoring sites. The most recent data periods available for these three sites are as listed in Table 4.1. The Millerton and Lake Brazil datasets were not used due to data or instrumentation issues, and the Cypress site was not used as it is less relevant to this assessment.

Table 4.1: Summary of meteorological stations and data used in this assessment

Station	Monitoring period data used	Measured parameters	Dated used for Project sub-area
Ngakawau	1/9/2020 to 1/1/2024	Wind speed Wind direction Rainfall Humidity Temperature	Ngakawau Rail Loadout
Stockton Office	1/1/2019 to 1/1/2024	Wind speed Wind direction Rainfall Humidity Temperature	Stockton Mount Frederick
Burnett's Face Road	18/9/2012 to 10/3/2020	Wind speed Wind direction Rainfall	Escarpment extended UWHR*

Note: * the nearest receptors to the UWHR are located in Denniston, making the Burnett's Face Road met station the most relevant for this UWHR.

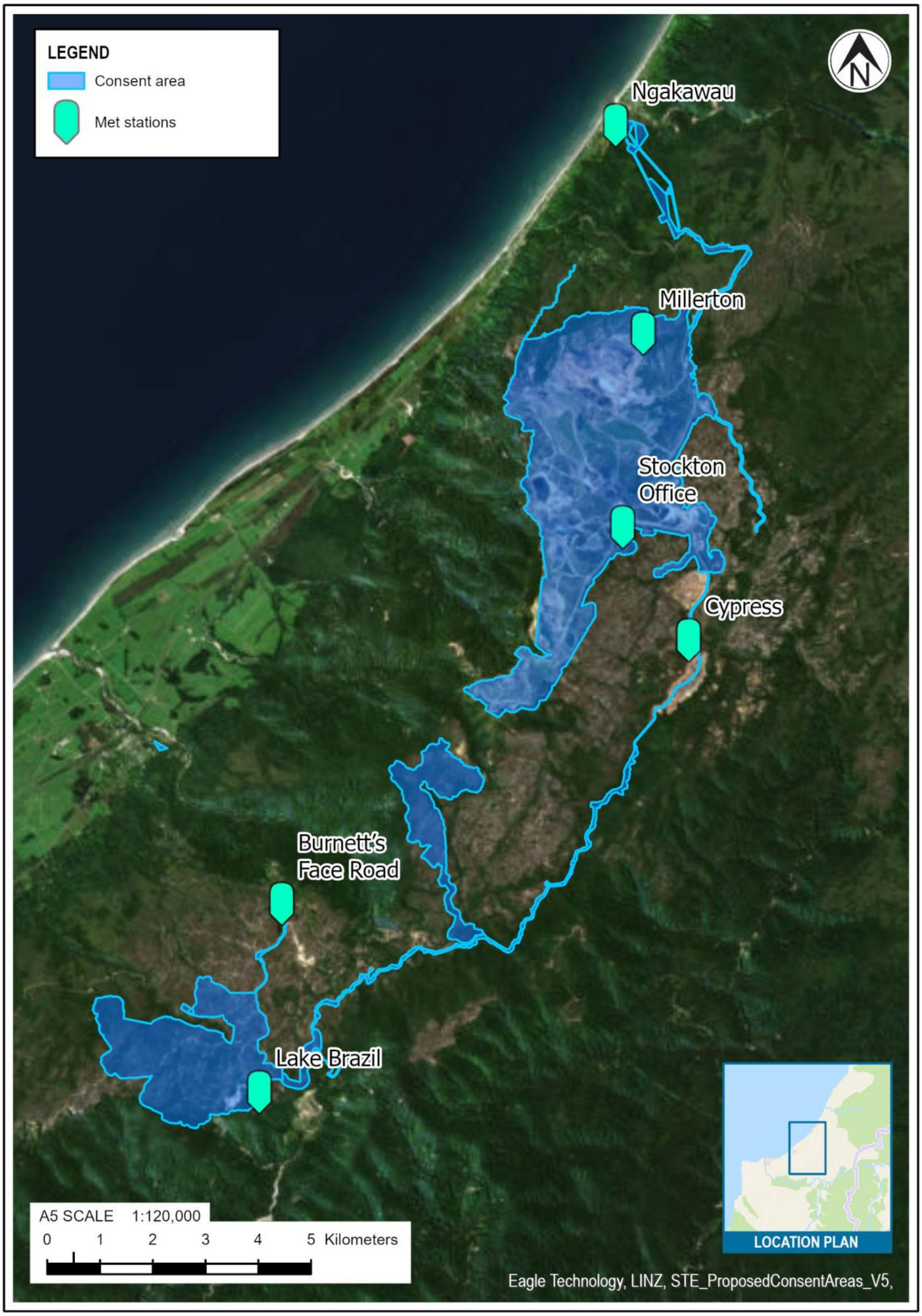

Figure 4.3: Meteorology stations operated by Bathurst where data is available and is used in this assessment.

Windroses for each monitoring site are presented in Appendix A. A windrose is a useful way of summarising wind data, with the petals indicating the direction that winds come from, and the length of each petal representing the frequency of time that winds come from the given direction.

The different colours of each petal indicate the different wind speed bands, and the proportion of the colour conveys the frequency of time that winds of that strength are experienced from each direction. The windroses are also provided in Appendix A for different times of the day, comprising early morning, daytime and sunset to sunrise. This helps to illustrate diurnal variations that occur.

Further analysis has been undertaken of the wind data for each monitoring site to understand the frequency of strong winds that occur on dry days, as these conditions are most conducive to dust propagation. This would usually consider rainfall and evaporation data to determine a 'dry day' (i.e., when rainfall is likely to be less than the rate of evaporation). However, in this instance evaporation data is not available so a conservative approach has been used whereby a 'dry day' is = taken to be where rainfall is less than a value determined for each month but varying between 10 mm/day in summer through to 5 mm/day in winter. The value used for a given month is scaled from monthly average measured temperature, as illustrated in Figure 4.4, the use of temperature is likely to closely approximate the higher evaporation rates that will occur in summer and lower rates in winter.

A summary of the analysis of the windroses for each location is provided in Table 4.2.

Table 4.2: Wind patterns by location

Station [application location]	Analysis
Ngakawau [Ngakawau township]	• Winds are significantly influenced by channelling down the Ngakawau River valley, with a very high prevalence of winds from the east-southeast. • There is a distinct diurnal pattern to winds, with daytime winds being predominantly from the west, but sharply changing to the east-southeast following sunset. • Moderate to strong winds (winds ≥ 5 to 7 m/s) are relatively infrequent and occur from both the west and east-southeast. Winds from the east-southeast are more frequent. The pattern of winds is similar when considering dry days that have strong winds. • There is a low frequency if winds above 7 m/s and an absence of a signature of very strong winds above 10 m/s.
Stockton [Stockton Plateau, including Mount Frederick and UWHR]	• Prevailing winds are from the north through west to south. • Winds from the east, northeast and southeast are very infrequent, reflecting the effect of the local high-altitude terrain. • There is a diurnal profile of winds, with daytime conditions tending to be more from the west and north, whereas nighttime and early morning winds are more variable from north through west to south. • Moderate to strong winds (winds ≥ 5 to 7 m/s) are relatively frequent, and mostly occur from the north to west quadrant, with higher windspeeds (>10 m/s) more common from the north. • Winds from the south and southwest are frequent but typically lower strength (<5 m/s). • The frequency of strong winds on dry days is significantly reduced, indicating that a large proportion of strong wind conditions are

Station [application location]	Analysis
	associated with wet weather. Furthermore, strong winds on dry days tend to only occur from the west and from the south.
Burnett's Face Road [Denniston Plateau]	• Prevailing winds are from the northwest and to a lesser degree from the south-southeast. • Winds from the north through to east are very infrequent – similar to that experienced at Stockton. • Winds from the southwest are relatively infrequent. • There is a clear diurnal profile of winds, with daytime conditions being dominated by winds from the northwest, whereas nighttime and early morning winds tend more to southeast. • Moderate to strong winds (winds ≥ 5 to 7 m/s) are relatively frequent and mostly occur from the north-northwest and to a lesser extent from the southeast. Higher windspeeds (>10 m/s) more common from the north-northwest. • The frequency of strong winds on dry days is slightly reduced, indicating that a small proportion of strong wind conditions are associated with wet weather. The same general pattern is seen regardless of whether there is dry or wet weather.

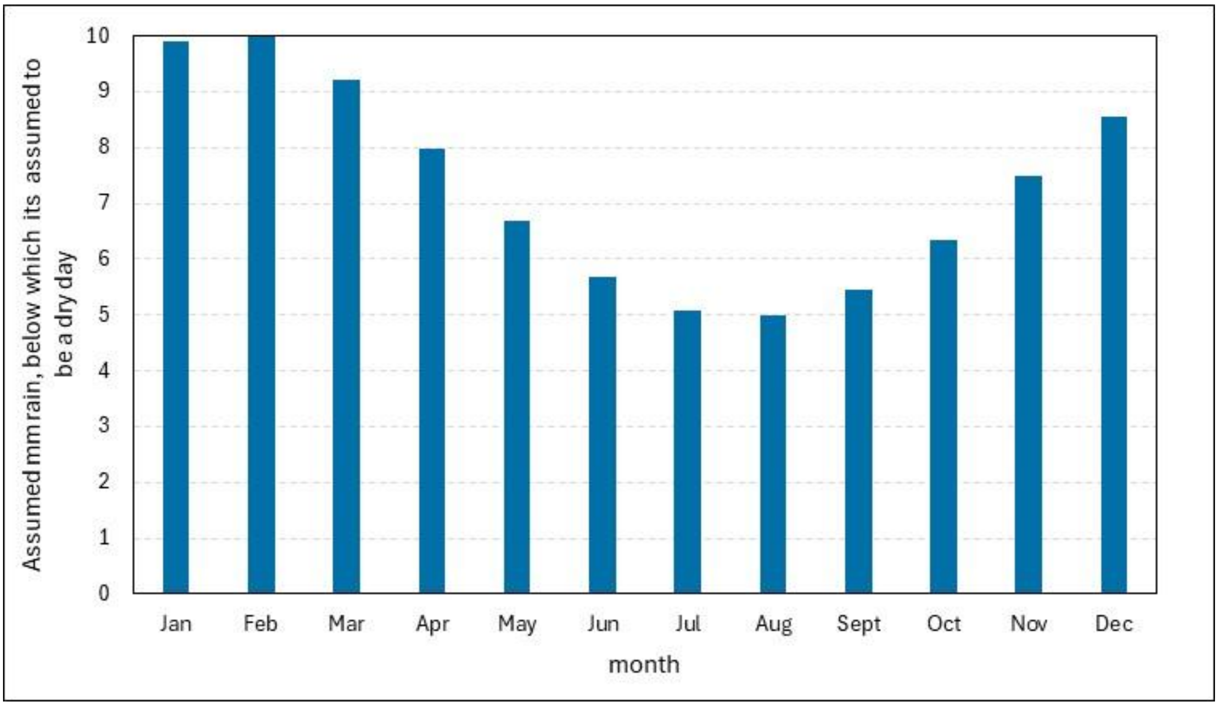

Figure 4.4: Rainfall per day (mm) in each month below which a day is classified as 'dry'.

4.4.3 Rainfall

Rainfall generally suppresses dust emissions from mining operations. This is because damp exposed ground will not generate dust emissions, and wet material (i.e., overburden, soils and col) will produce little dust when processed or handled. Conversely, high evaporation rates that occur during periods of warm weather act to dry out surfaces and aggregate, increasing the risk for dust emissions. Given this, the greatest risk for dust emissions is typically during the warmer, drier summer and autumn months, with a comparatively low risk during winter months.

The average annual rainfall recorded at the Stockton office from 2019 to 2023 was 6,210 mm. Figure 4.5 shows that Stockton experiences year-round heavy rainfall, although the driest months are typically from January to March. For context, Christchurch's average annual rainfall is 618 mm[2], which is shown to be exceeded in some months at the Stockton office.

The average rainfall recorded at the Burnett's Face Road station (i.e., Denniston Plateau) from 2010 to 2023 is slightly less than Stockton, being 5,450 mm, reflecting similar topographical conditions on the Denniston Plateau to those of the Stockton Plateau. The overall pattern of monthly rainfall at the Burnett's Face Road station is provided in Figure 4.6, which similar shows the months of January to March as being the driest.

Despite the generally high rainfall, the Buller Plateaux is known to experience dry periods over a number of weeks with little or no rainfall during summer months. Given the topography and the ability of the shallow soils to dry rapidly (as discussed in Section 4.4.1), there is a strong focus on dust mitigation measures during these conditions.

The average annual rainfall recorded at Ngakawau from 2019 to 2023 was 2,450 mm – notably less than recorded for the Stockton or Deniston Plateaux, but is still relatively high compared with other regions of New Zealand. The overall pattern of monthly rainfall for Ngakawau is provided in Figure 4.7, which shows a similar pattern to that measured for Stockton, whereby the driest month is January.

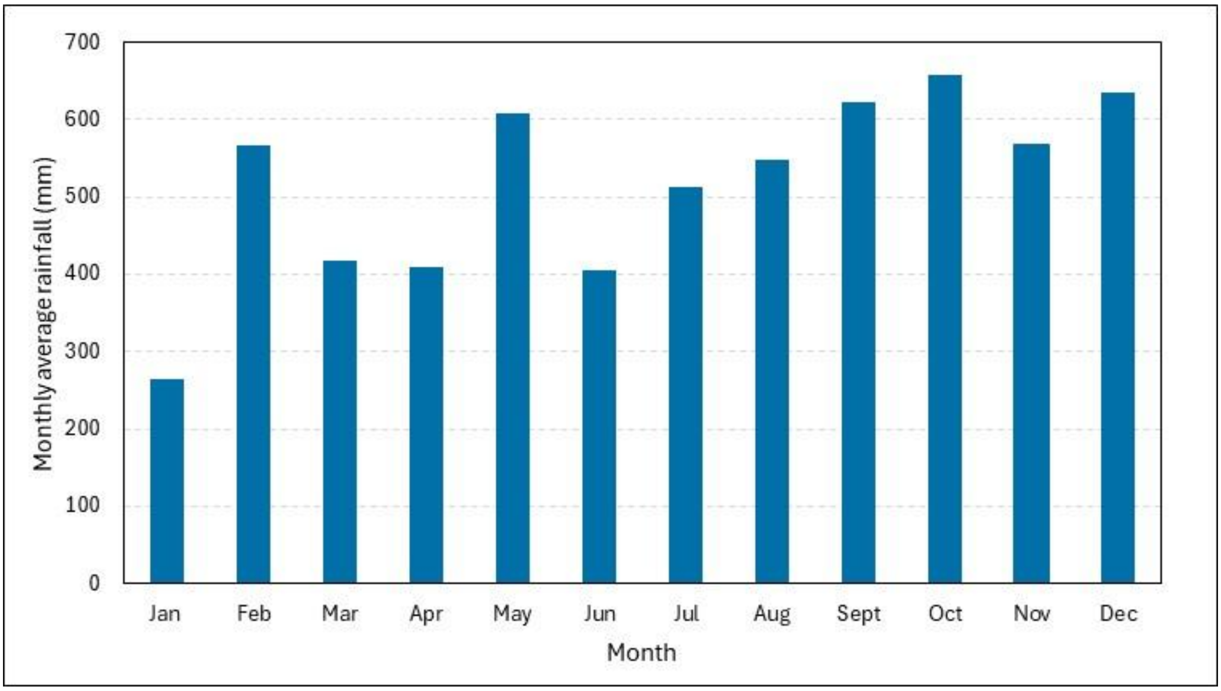

Figure 4.5: Average monthly rainfall recorded from 2019 – 2024 (inclusive) at the Stockton office.

[2] Table 6 Monthly and annual rainfall normal (a; mm), and monthly distribution of annual rainfall (b; %) at selected Canterbury locations, for the period 1981–2010 of The Climate and Weather of Canterbury (2nd Edition). NIWA 2016.

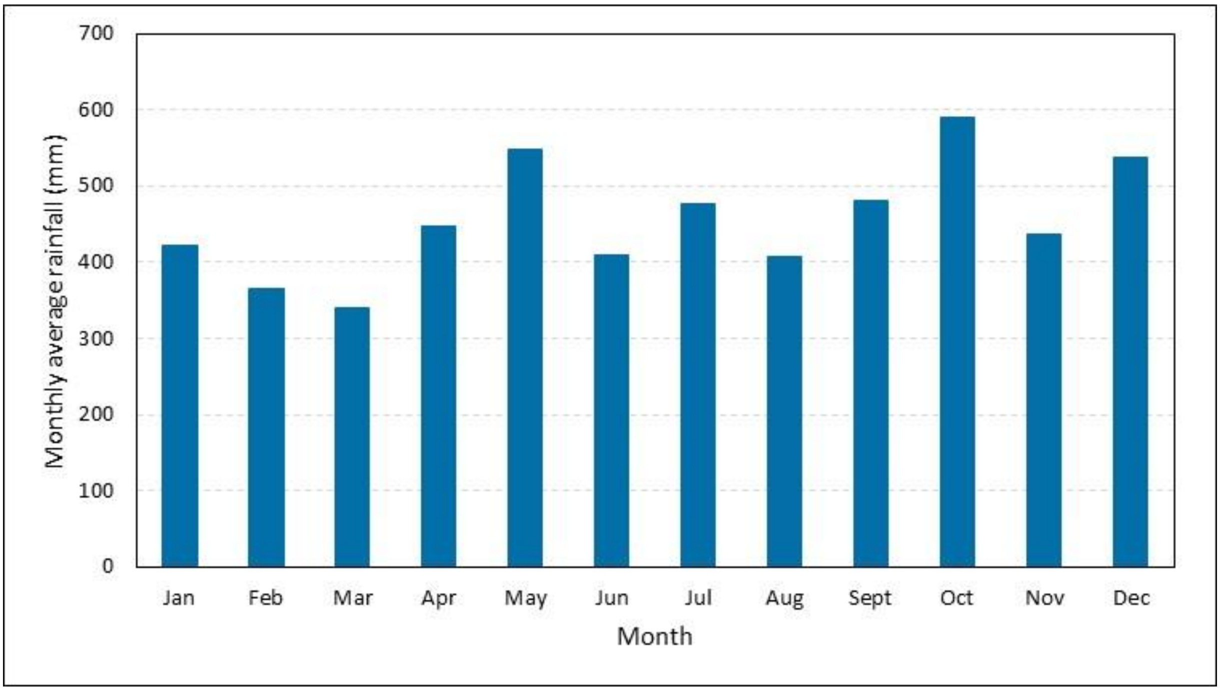

Figure 4.6: Average monthly rainfall recorded from 2019 – 2024 (inclusive) at Burnett's Face Road meteorological station*.*

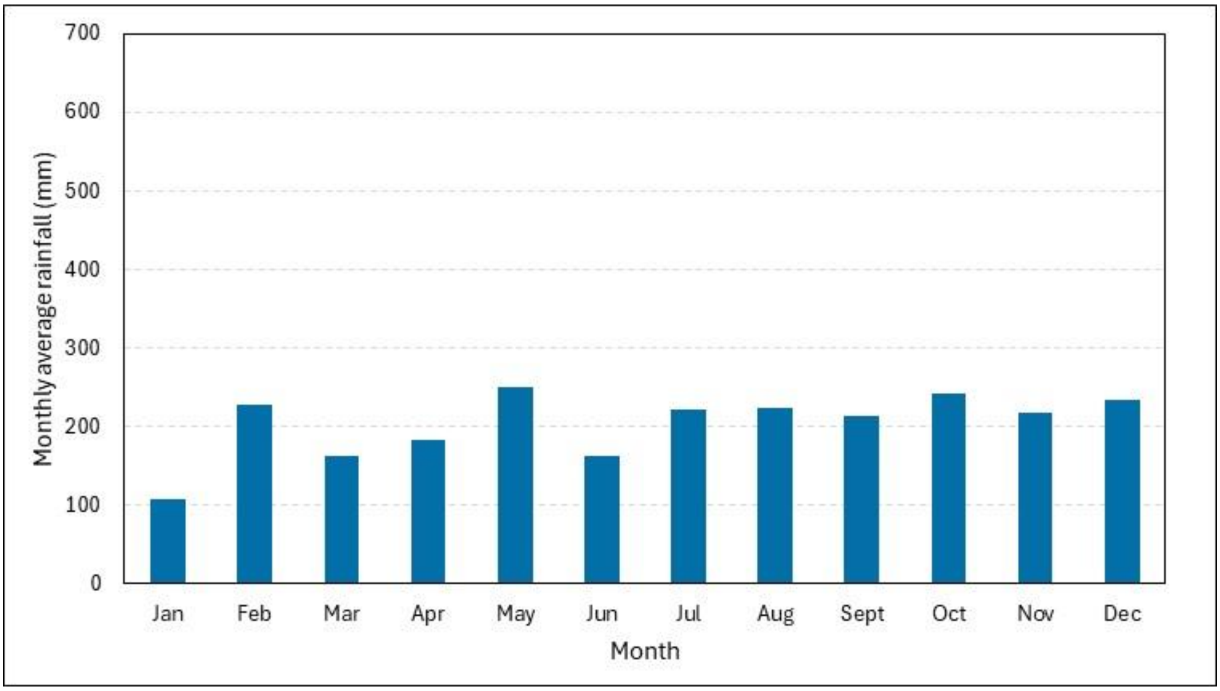

Figure 4.7: Average monthly rainfall recorded from 2019 – 2024 (inclusive) at Ngakawau.

4.4.4 Temperature and relative humidity

Temperature and relative humidity can affect the rate that a surface can dry and consequently the potential conditions that dust generation can occur under. However, data for these parameters are not used directly in this assessment and are provided here for general information purposes. For this reason, the following data is presented with regard to measured values at the Stockton monitoring site.

Monthly variation in temperature as measured at the Stockton office is shown in Figure 4.8, illustrating the warmest temperatures (with the greatest potential for drying surfaces and exacerbating the potential for dust emissions) occurring in the summer months (notably January and February). By contrast, temperatures in winter and spring are much lower, and at times below 0°C.

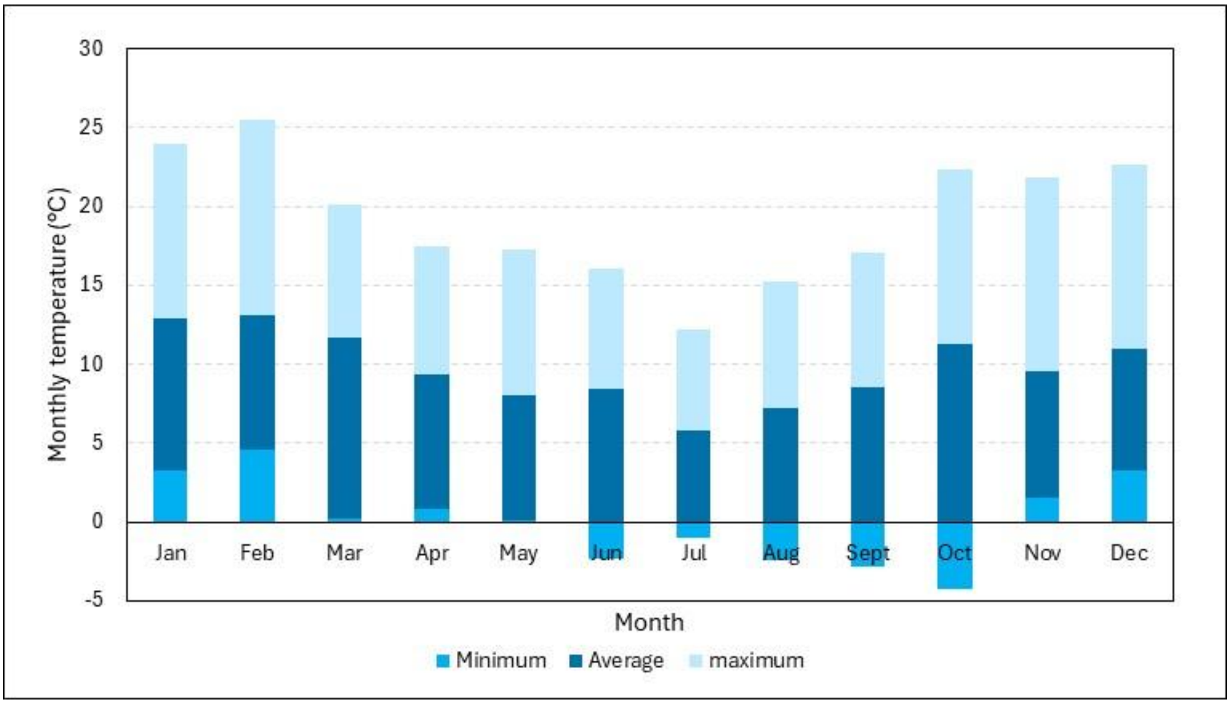

Figure 4.8: Monthly temperatures recorded from 2019 – 2024 (inclusive) at the Stockton office.

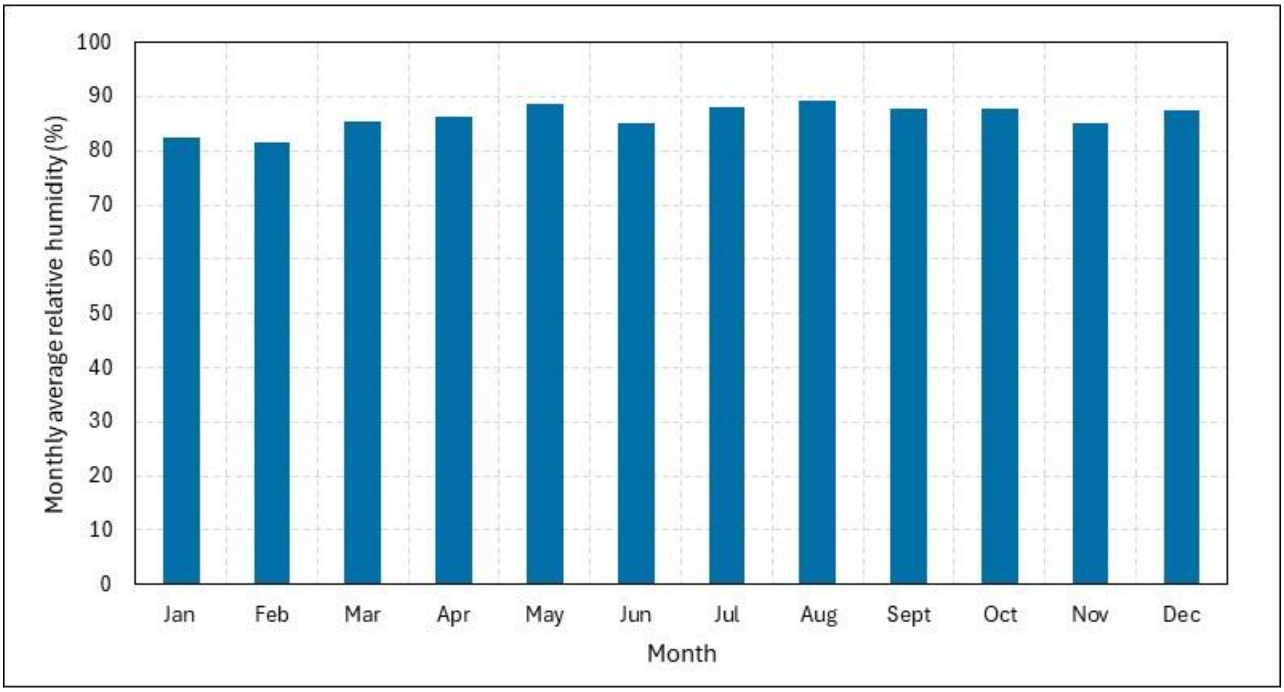

Figure 4.9: Monthly average relative humidity recorded from 2019 – 2024 (inclusive) at the Stockton office.

4.4.5 Effect of climate change on meteorology

Climate projection data published by the Ministry for the Environment (MfE) for the Buller District has been considered to understand the potential change in climate parameters that have the potential to impact on dust generation. Data for changes in the number of dry days, rainfall, average wind speed and temperature have been examined for the three climate change scenarios reported by the MfE (i.e., SSP1, SSP2 and SSP3) comparing the period 1995-2014 period to the projection for the period 2041-2060. This future period has been chosen as it is the most relevant in terms of the period of the consent being sought. The results are presented in Table 4.3. From this table, the following summary of changes in climate are anticipated, along with implications for this assessment:

- Dry days: The number of dry days is in the order of +/- 1 day per year, with less dry days in summer months and more dry days in autumn.
- Rainfall: Rainfall is expected to increase. However, autumn months may experience a reduction in rainfall of between 2.9% and 4.1%.
- Windspeed: Average windspeed is expected to decrease, with the most pronounced decease occurring in summer and autumn months.
- Temperature: Average daily temperatures are expected to increase, by as much as 1.5°C in summer months.

Overall, the general increase in rainfall and decease in windspeed mean that there is likely to be a lower potential for dust emissions. However, autumn may experience a dryer condition than those currently experienced (as much as 4.1% change). This small change does not alter the conclusions regarding the significant amount of rainfall that occurs at both Ngakawau and on the Buller Plateaux and is very unlikely to change the overall conclusions regarding potential dust effects reached by this assessment.

Table 4.3: MfE climate projections for Ngakawau and Buller Plateaux

Parameters	Period	Comparison period: 1995-2014 to 2041-2060		
		SSP1	SSP2	SSP3
Number of dry days (< 1 mm/day)	Annual	0.3	0.2	0.2
	Spring	0.3	0.3	0.2
	Summer	-0.7	-0.5	-0.7
	Autumn	0.7	0.2	1.1
	Winter	-0.1	0.2	-0.8
Total rainfall (% change)	Annual	3.1%	3.4%	2.6%
	Spring	4.5%	7.1%	3.5%
	Summer	2.4%	0.7%	0.6%
	Autumn	-2.9%	-4.1%	-4.1%
	Winter	8.3%	9.2%	10.5%
Average wind speed (% change)	Annual	-1.4%	-1.7%	-2.3%
	Spring	-0.9%	-0.7%	-1.6%
	Summer	-2.4%	-3.2%	-4.2%
	Autumn	-2.4%	-2.6%	-3.3%
	Winter	-0.1%	-0.8%	-0.2%

Parameters	Period	Comparison period: 1995-2014 to 2041-2060		
		SSP1	SSP2	SSP3
Average daily temperature (change in °C)	Annual	0.8	1.0	1.3
	Spring	0.7	0.9	1.1
	Summer	0.9	1.2	1.5
	Autumn	0.8	1.1	0.0
	Winter	0.7	1.0	1.2

Note: data sourced from MfE Climate4 Projects Maps - https://map.climatedata.environment.govt.nz/

4.5 Background air quality

4.5.1 Ambient air quality monitoring

Westport is the nearest urban location to the Project where ambient air quality monitoring has been undertaken. In winter 2023 (Wilton E & Zawar Reza P, 2024), particulate matter (PM_{10} and $PM_{2.5}$) was measured, with the highest 24-hour PM_{10} concentration being 39 micrograms per cubic metre (µg/m³), with no exceedances of the National Environmental Standard for air quality (NESAQ) daily limit of 50 µg/m³. $PM_{2.5}$ concentrations peaked at 17 µg/m³, exceeding the World Health Organisation (WHO) (2021) daily guideline of 15 µg/m³ on five occasions, but remaining below the proposed NESAQ daily limit of 25 µg/m³. Winter average $PM_{2.5}$ was 18 µg/m³.

Monitoring in 2022 and 2023 also included spatial surveys across Westport using portable optical $PM_{2.5}$ monitors. The results showed the highest concentrations in the northern Derby Street area, with peak 24-hour averages up to 45–55 µg/m³ in winter. Source apportionment indicated biomass combustion from domestic heating contributed around three-quarters of daily winter $PM_{2.5}$ (rising to 86 % on high-pollution days), with smaller inputs from marine aerosol (≈ 17 %), soil/dust (≈ 2 %) and motor vehicles (≈ 5 %).

The meteorological analysis found that the highest particle concentrations occurred during calm evening and nighttime conditions with southerly to south-easterly winds, while elevated readings under strong north-westerlies were linked to marine aerosol contributions.

It is unlikely that the results of the Westport studies will be applicable to the receiving environment surrounding the Buller Plateaux or Ngakawau given the absence of significant domestic home heating sources dominating measured concentrations in Westport.

The nearest polluted airshed is in Reefton, approximately 30 km south of the Denniston Plateau. Reefton air quality is principally impacted by home heating in winter[3].

The locations of the BPCP sub-areas are not currently regarded as a polluted airsheds under the National Environmental Standard for air quality (NESAQ)[4]. Regulation 17 of the NESAQ relates to resource consent applications seeking to discharge PM_{10} into polluted airsheds and is therefore not relevant to this application.

In particular, Clause 1 of the Regulation 17 of the NESAQ states the following:

> *"A consent authority must decline an application for a resource consent (the proposed consent) to discharge PM_{10} if the discharge to be expressly allowed by the consent would be likely, at any time, to increase the concentration of PM_{10} (calculated as a 24-hour mean*

[3] Land Air and Water Aotearoa – Reefton. https://www.lawa.org.nz/explore-data/west-coast-region/air-quality/reefton Accessed 20 Nov 2024.

[4] Section 3.2, Auckland air quality – 2022 annual data report (Technical Report 2022/8). Auckland Council. June 2023.

under Schedule 1) by more than 2.5 micrograms per cubic metre in any part of a polluted airshed other than the site on which the consent would be exercised."

The BPCP sub-areas are not located within or near to any polluted airshed. Therefore, Regulation 17 of the NESAQ does not apply to this application.

4.5.2 Deposited dust monitoring

The air discharge permit for the Stockton Mine and Ngakawau Rail Loadout (95002.2 and RC95002.1 respectively) requires dust deposition monitoring (condition 4) as follows:

"In addition to condition 3 the consent holder shall monitor the deposited particulate levels

arising from the exercise of this consent by collecting of samples in at least three dust deposition gauges sited as agreed between the Council and the consent holder. ***If the difference in deposited particulate levels between the deposition gauge at the control site and any of the deposition gauges near the coal handling facilities exceeds 3 grams per square metre in any 30-day period*** *the consent holder in conjunction with the Council shall immediately undertake a review of operating procedures in order to reduce dust emissions."*

Seven dust deposition monitoring sites are installed around the Stockton mine and Ngakawau Rail Loadout as shown in Figure 4.10. Of these, the monitoring site labelled "WR Dust" is referred to as the control site, as it is located in a grassed paddock just off State Highway 63, approximately 1.5 km from any dust generating source.

Condition B2.2 of the air discharge permit for the Cypress mine (RC03175-V8) similarly requires dust deposition monitoring as follows:

"The Consent Holder shall operate mining and associated processes and other operations in such a manner so as to ensure that emission of dust is reduced to a practicable minimum, and in any case does not result in deposited particulate greater than ***4 grams per square metre per 30-day period (as measured by deposit gauges)*** *beyond the boundary of the Consent Holder's Land." [emphasis added]*

Unlike the Stockton consent, the criteria in Condition B2.2 is not expressed as the value above a control site. It is also expressed as a value not to be exceeded beyond the site boundary. A total of six dust deposition monitoring sites are operated at the Cypress mine, the location of which are shown in Figure 4.10. These six sites are all located well within the Cypress mine site boundary.

There is an absence of human receptors (i.e., residential dwellings) in vicinity of the Cypress mine. Instead, it is inferred that the purpose of the dust deposition limit criterion is for managing the potential dust impacts on the "red tussock and herb-field" that is referred to in Condition B2.5.

While the Cypress mine is not part of this application, the extensive deposition monitoring data provides a useful basis for evaluating the degree of dust control being achieved by mining practices the same as those proposed for the BPCP. For this reason, the Cypress results are presented here. It should be noted that the monitored values for the Cypress Mine forms part of the existing background as the Cypress Mine is already consented.

The deposition rate criteria set out in the air discharge permits is very similar to the dust nuisance trigger value described by the MfE in its 'Good Practice Guide for Managing Dust' (MfE 2016), which is set out in Table 4.4. However, the MfE trigger value importantly makes an allowance for the measured deposition rate to be above background levels.

Table 4.4: MfE recommended trigger level for deposited dust (reproduced from MfE 2016)

Trigger	Averaging period	Trigger level (above background concentration)*
Monthly	30-days	4 g/m^2/30-days

Note: * MfE 2016 (Section 4.5) notes that "General background dust levels measured in New Zealand range from about 1-4 g/m^2/30 days. Background concentrations are usually less than 1 g/m^2/30 days.

The MfE trigger value is intended for the management of dust nuisance impacts on human receptors and is not intended as a threshold above which effects would occur but rather where action should be taken to minimise dust.

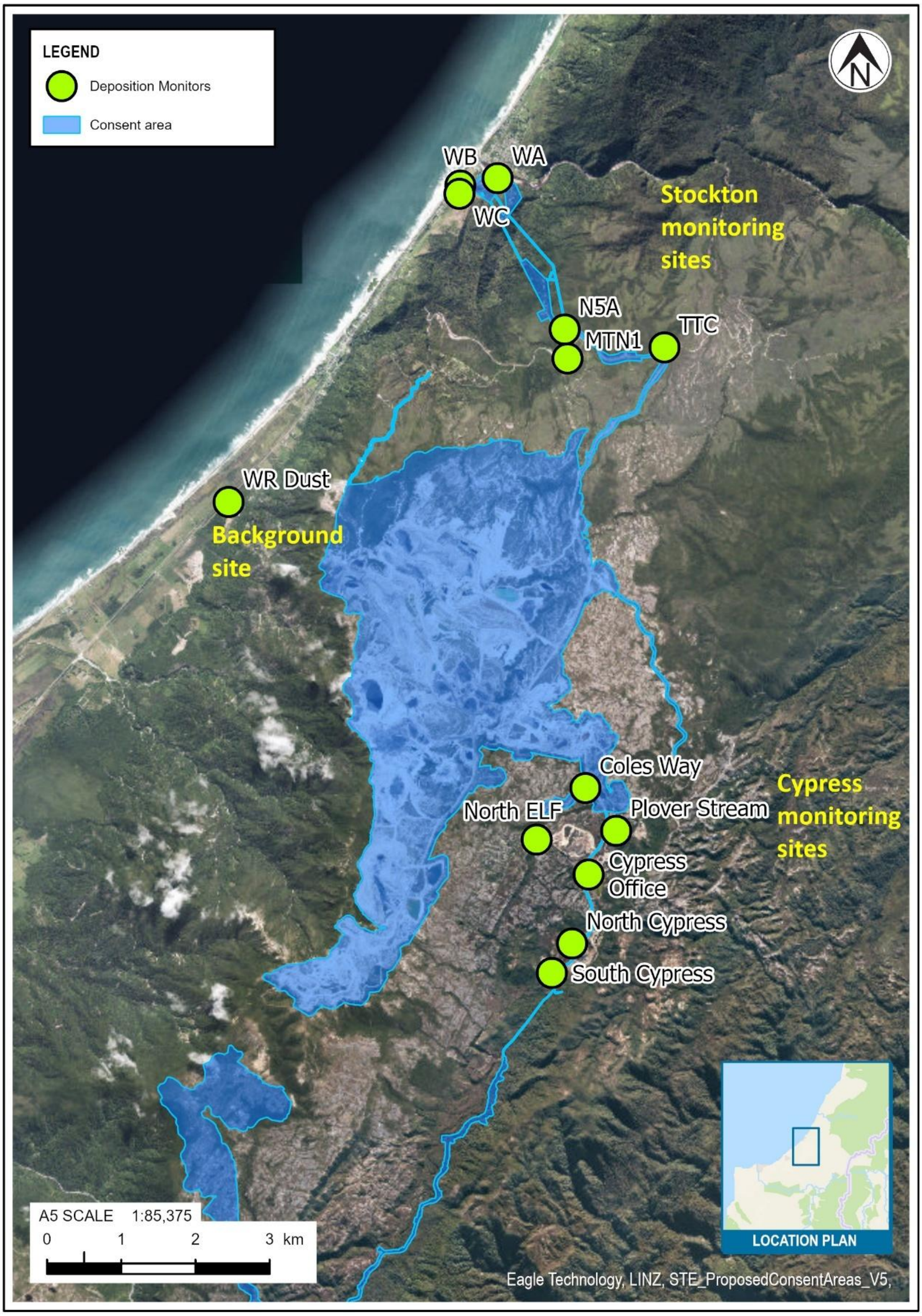

Figure 4.10: Deposition monitoring sites.

The dust deposition monitoring data for each of the monitoring sites is summarised as 'box and whisker' plots on a monthly basis for the Ngakawau Rail Loadout and Stockton and Cypress mines in Figure 4.11, Figure 4.12 and Figure 4.13 respectively. A 'box and whisker plot' is a simple way of summarising data, whereby:

- The upper and lower bounds of the box represent the upper and lower quartile of measured values (i.e., the 25th and 75th percentile);
- The line through the middle of the box represents the median measured deposition rate;
- The whiskers represent the maximum and minimum recorded deposition rate; and
- Statistical outliers are shown as dots above or below the box – these dots represent unusually high or low values in the dataset.

The results for the monitoring sites located at Ngakawau and Stockton are compared against the consent trigger criteria of 3 g/m²/30-days limit above that measured at the control site (WR Dust) required for the Cypress sites.

The three Stockton monitoring sites are located near to the main haul road through to the headworks of the cable way, with the N5A site being located immediately beside the headworks. The Ngakawau site (except for the 'WR' site) are located approximately 150 – 210 m from the Ngakawau Rail Loadout.

As expected, the Stockton and Ngakawau monitoring sites results show a general trend of higher deposition rates during the summer months. For the Stockton monitoring sites, all results are within the 3 g/m²/30-day above the control site criteria. For the Ngakawau site, the significant majority of the results are within the 3 g/m²/30-days above the control site criteria, with some isolated instances (comprising two over a five-year period) that exceed the criteria for the WA and WB sites.

The results for each of the Cypress monitoring sites exhibit seasonality (Figure 4.13), with deposition rates being very low in winter months, and highest deposition rates in drier summer months, most notably January and February. Of the six Cypress monitoring sites, results for the 'Office' and 'Plover' monitoring sites are the only ones where deposition rates have approached and occasionally exceeded a deposition rate criterion of 4 g/m²/30-days, which has only occurred in the month of January (typically the driest month of the year). The Office site is located approximately 80 m to the east of the main haul road, while the Plover site is approximately 130 m east of the main haul road. The Cypress North and Cypress South monitoring sites are similarly close to the main haul road, although on the western side of the main haul road (i.e., predominantly upwind of the haul road). Given these monitoring sites are centrally located within the Cypress site, it is very unlikely that off-site deposition rates would exceed the 4 g/m²/30-days criteria.

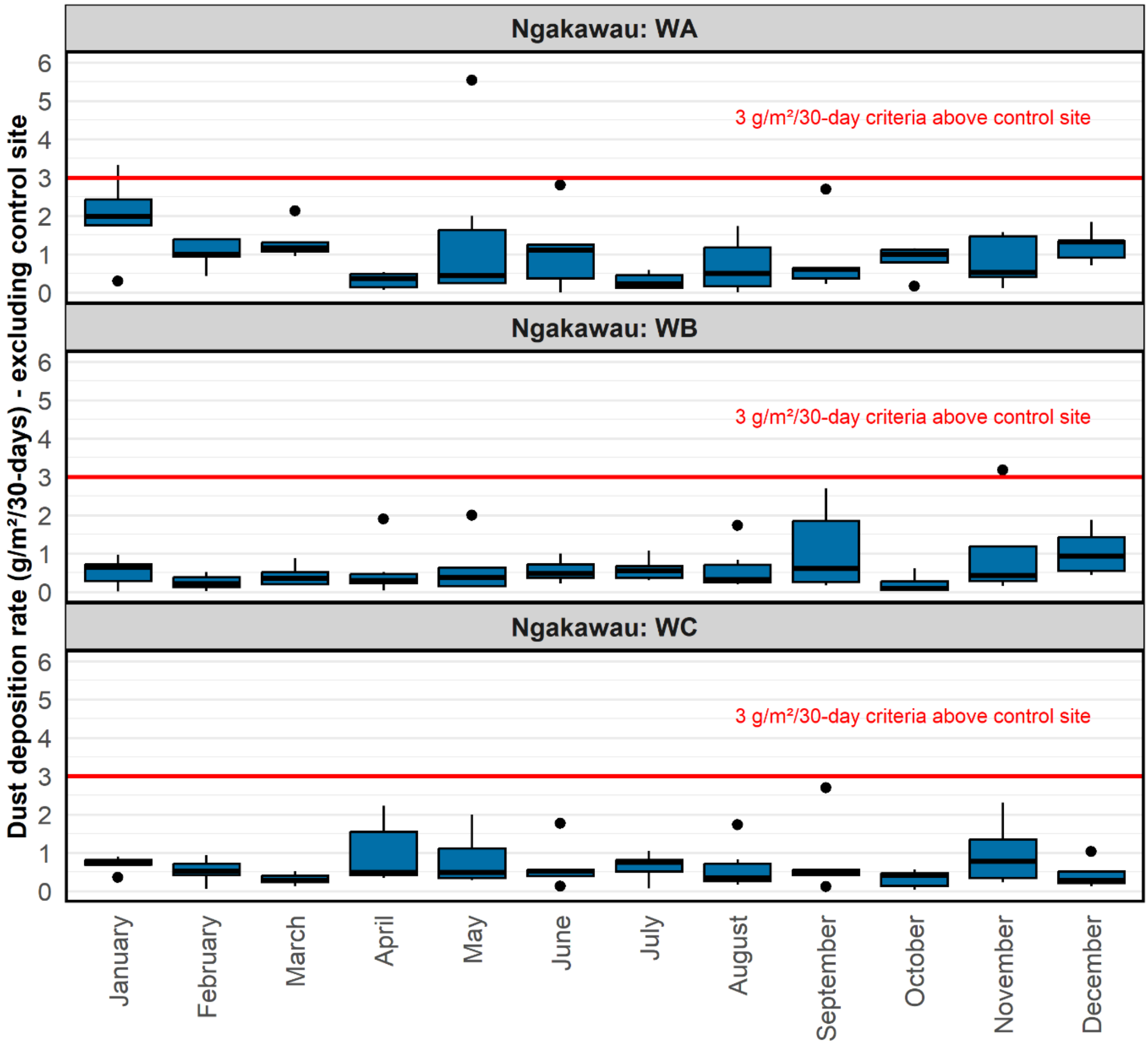

Figure 4.11: Box and whisker plots summarising dust deposition gauge monitoring data by month for the Ngakawau sites (above control background) for the monitoring period from January 2019 to August 2024.

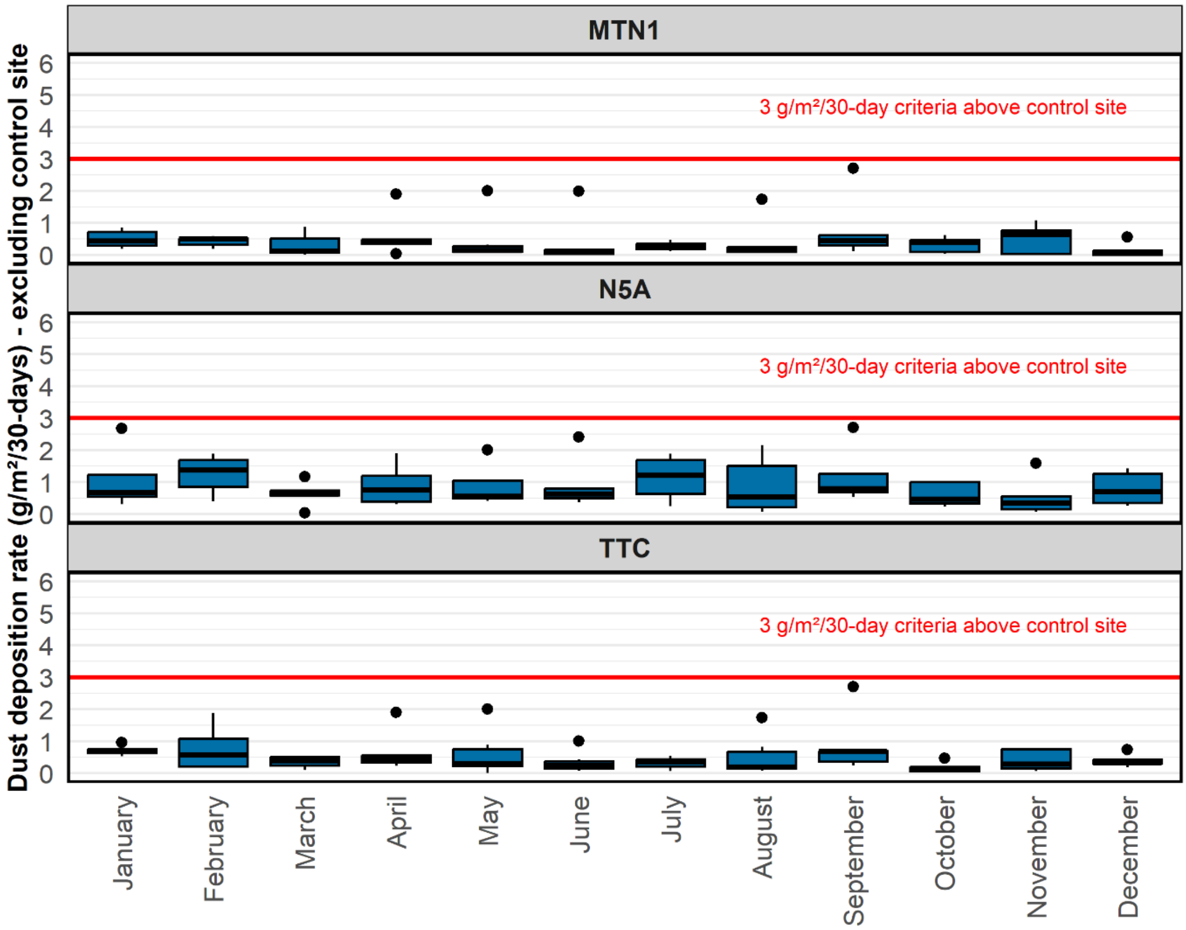

Figure 4.12: Box and whisker plots summarising dust deposition gauge monitoring data by month for the Stockton mine monitoring sites (above control background) for the monitoring period from January 2019 to August 2024.

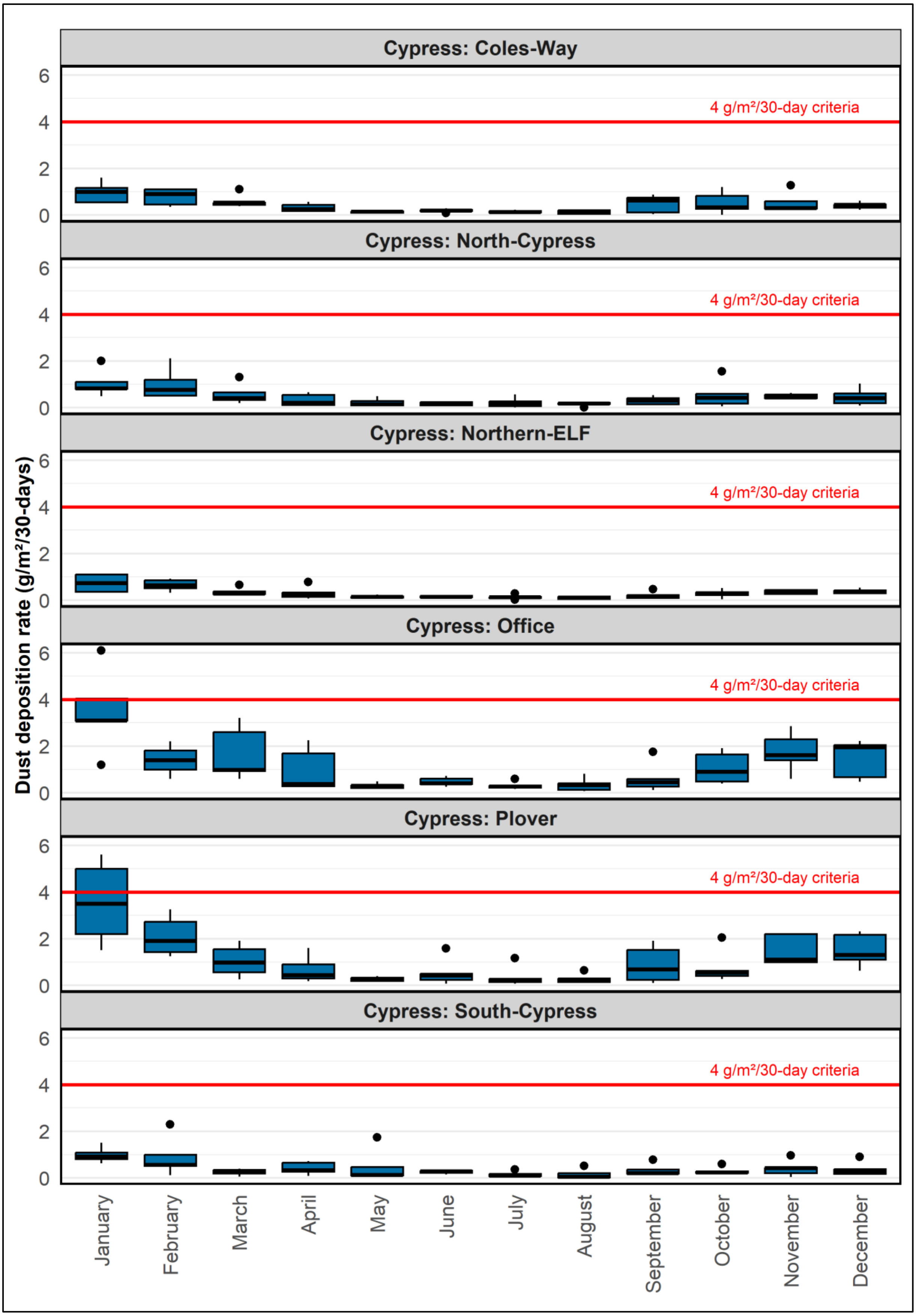

Figure 4.13: Box and whisker plots summarising dust deposition gauge monitoring data by month for the Cypress Mine sites for the monitoring period from January 2019 to August 2024.

5 Resource consent requirements

The Regional Air Quality Plan (RAQP) for the West Coast Region was made operative on 31 July 2022 and amended in 2024 and 2025. The RAQP is divided into key topics with objectives and policies for each topic – this includes the following chapters that are relevant to this application:

- Chapter 7 – Dust
- Chapter 8 – Products of combustion

Rules relating to various activities are set out in Chapter 10.

The relevant objectives and policies relating to dust (Chapter 7) are listed below.

- Objective 7.3.1: The protection of human health, property, structures, and ecosystems from adverse effects of discharge of dust to air.
- Policy 7.4.1: Adverse effects of the deposition of dust will be avoided, remedied, or mitigated by ensuring that any discharge of dust does not occur at a volume, rate or in a manner that could cause an offensive or objectionable effect, including the significant restriction of visibility or the soiling of property.
- Policy 7.4.2: Adverse effects of suspended dust will be avoided, remedied, or mitigated by ensuring that any discharge of dust does not occur at a volume, rate or in a manner that could cause an offensive or objectionable effect, including the impairment of human health.
- Policy 7.4.3: In assessing offensive or objectionable effects from discharges of dust, the Regional Council will take into account the following factors:
  - Frequency of dust discharges.
  - Intensity of dust discharges.
  - Duration of dust discharges.
  - Offensiveness of the odour; *[reference to odour in this context is considered to be an error and should refer to dust].*
  - Extent of dust discharges (suspended and deposited).
  - Location of dust discharges.

Chapter 8 targets products of combustion, which can be associated with domestic fires, outdoor burning, vegetation clearance, industrial sources (i.e., boilers). The relevant objectives and policies relating to products of combustion (Chapter 8) are listed below.

- Objective 8.3.1: The protection of human health and the environment from the adverse effects of discharges of products of combustion.
- Policy 8.4.1: To minimise or reduce where practicable the discharge of products of combustion to air at their source.
- Policy 8.4.2: To avoid, and where this is not possible, to remedy or mitigate any offensive or objectionable effect, including any adverse effects on human health, significant reduction of visibility or significant soiling of property, from the products of combustion.

Chapter 10 sets out the relevant rules relating to activities that give rise to discharges to air. Of these the following are considered to be relevant to this project.

- Permitted Activity Rule 5: Earthworks, Quarrying, Mining and Cleanfill operations - Unless covered by another Rule in this Plan, the discharge of any contaminant into air arising from earthworks, quarrying operations, mining, or cleanfill operations is a permitted activity provided that the following conditions are met:
  - (a) any discharge of smoke, dust, gas or odour is not noxious, dangerous, offensive or objectionable beyond the boundary of the subject property; or
  - (b) in the case of public amenity areas, any discharge of smoke, dust, gas or odour is not offensive or objectionable beyond the boundary or beyond 50 metres of the discharge, whichever is the lesser.

    If an activity is unable to meet the conditions of this Rule, then it is a discretionary activity (See Rule 16).
- Discretionary Rule 16: Any discharge of contaminants into air from:
  1. any industrial or trade premises that is not specifically provided for by any rule within this Plan; or
  2. any source (whether moveable or not), which does not comply with any condition of a permitted activity rule or any of the standards and terms of a controlled activity rule within this Plan, but which is not prohibited;

  is a discretionary activity.

The proposed activities described in Section 2 have the potential to fall under Permitted Activity Rule 5. However, this is premised on the continued implementation of dust mitigation measures, combined with large separation distances to sensitive receptors, to achieve the conditions of Permitted Activity Rule 5. For this reason, consent is being sought for the discharge of contaminants into air under Rule 16 as a discretionary activity.

6 Mitigation and monitoring

6.1 Mitigation measures

Dust management measures proposed to be employed for the BPCP have been reviewed and draw on those currently used at the existing Stockton and Cypress mines. The following measures are set out based on the key dust emission sources and their significance to dust discharges from the proposed operations, separated in those activities which will occur on the Buller Plateaux and those occurring at the Ngakawau Rail Loadout.

6.1.1 Buller Plateaux mining operations

Haul roads: Of all the sources of particulate matter from coal mining activities, wheel generated emissions from vehicles travelling on unpaved routes are ranked the most significant in terms of total suspended particulate (TSP) and PM_{10} (Katestone 2011, IAQM 2016). Road design/construction and maintenance have a significant impact on emissions, along with the number, weight and speed of vehicles operating on the road

- The application of water onto the road surface using a water cart when the road surface is dry is the principal method of dust control, especially where water supply is not limited (as is the case in this instance).
- Limit vehicle speeds on unpaved haul roads and other frequently trafficked unpaved areas on dry days as necessary, subject to the application of water for dust suppression (as the primary control measure for dust suppression). Dust emissions from vehicles travelling on dry unpaved haul roads is generally proportional to the speed of the vehicle (NPI 2021).
- Maintain the haul road surface to minimise potholes and corrugations in the road surface that can exacerbate dust generation.
- Road construction materials are sourced within each project sub-area or from the borrow pits and are used to create formed and maintained haul roads. Suitable haul road aggregate is required to provide a stable surface, which is sourced from on-site borrow pits or suitable overburden materials.
- Use of larger haul vehicles and minimising haul distances are also measures used to minimise dust emissions, which also minimise the number trips for material movements.

Chemical dust suppressants are a measure sometimes used in circumstances where water for dust suppression is restricted. This measure is not expected to be required in this instance due to the very high rainfall in the area and availability of water for dust suppression.

Stockpiles and exposed areas: These sources can be a significant source of dust, especially as a result of wind erosion during strong dry wind conditions. Mitigation measures employed include the following:

- Central location for the coal stockpiles, maximising the separation distance from the site boundary and sensitive receptors.
- Revegetation of finished overburden areas as soon as practicable.

Excavation, loading and tipping: The movement of overburden and coal by shovels and excavators is a continuous source of dust, albeit with a much lower degree of discharge when compared with that from haul roads. Mitigation measures employed include the following:

- Minimising drop heights – operators are trained to keep the bucket as low as possible when loading trucks or tipping material, reducing the energy and dust generated by the falling material.

- The material being excavated is often in a damp state given the very high rainfall of the site, helping to significantly minimise dust associated with these activities.

Processing plant: The processing plant in this instance is primarily a wet process using hydraulic cyclones and other wet methods for cleaning and separating coal. Accordingly, the processing plant is not expected to be a significant source of dust. Notwithstanding this, other key mitigation considerations included:

- The central location of the processing plant and surrounding coal stockpiles within the Stockton Mine, maximising the separation distances to sensitive off-site receptor locations.
- Coal that is loaded into the grizzly feed hopper and crusher being predominantly wet or high in moisture content due to the nature of the coal being mined.
- The use of a covered conveyor system.
- Minimising drop-heights associated with conveyor transfer points and from conveyors onto stockpiles.
- The use of a discharge pipe for coal that exits the conveyor system onto Stockpile 5 during windy conditions.
- Where possible, minimising the rehandling of coal in the product stockpile.
- Coal that is output from the plant via conveyors to form stockpiles is in a wet state.
- Tailings from the plant are flocculated and discharged to the fine coal storage facility. By their nature they are wet (25%-30% solids at the point of discharge), with the deposited solids eventually having a solids content of approximately 65%. Accordingly, tailings are considered to have a negligible dust potential.

Drilling and blasting: Drilling and blasting is an intermittent source of dust, with discharges short in duration. Mitigation measures employed include the following:

- Correctly packing the blast hole with inert material to contain the explosive energy and minimise dust ejection.
- Avoid blasting during high winds or when winds are blowing towards sensitive areas (e.g., residential dwellings).
- Operational timing: avoid blasting during high winds (i.e., hourly wind speeds of 7 m/s or more) toward receptors.

Excavation of aggregate from the borrow pits: Excavation of aggregate from the borrow pits will have the same mechanisms for generating dust emissions as many of the coal mining activities, with the same mitigation measures applying in many instances. This includes those measures for vehicles travelling over unpaved surfaces, stockpiles and exposed areas, drilling and blasting, excavation, loading and tipping. Mobile crushing and screening plant may be operated within the borrow pits to produce suitable aggregate. The crushers will be operated with water-spray suppression systems to control dust emissions.

Progressive rehabilitation: Progressive rehabilitation in and of itself will be a form of dust control as it results in the completed area being revegetated.

- As soon as an area is mined out, it is reshaped, covered with topsoil, and revegetated. This permanently stabilises the surface and eliminates it as a dust source.

6.1.2 Ngakawau Rail Loadout

The most significant dust generating source associated with the Ngakawau Rail Loadout is the outdoor coal storage area. This is where coal is stored after being delivered by the Aerial Ropeway. By comparison the receiving of coal from the Aerial Ropeway at and loadout to train coal wagons is undertaken within a building, significantly minimising dust from those activities. The following sets out the dust control measures currently employed.

Number 7 Station: Equipped with water sprays for dust control.

Main stockpile area:

- Concrete nib walls surround the stockpile area, combined with wind-mesh fence at east and west ends of stockpile pad to minimise wind speeds across the stockpile area.
- Water sprays are used when it is not raining to wet the coal and frequently trafficked parts of the stockpile areas:
  - Ten low level irrigator sprays are situated on the western side of the stockpile area.
  - Four high irrigator sprays are situated on the eastern side of the stockpile area.
  - Six boom sprays are situated long the centre of the stockpile area.
  - The gantry conveyor has water sprays to dampen the coal before stockpiling.

Rail and road load-out:

- An irrigation boom spray is situated at the southern end.
- Conveyors are fitted with sprays to dampen the coal before loadout.
- Trucks are required to use covers on both truck and trailer units, covering the coal, prior to departure.

Internal roads:

- Areas not required for traffic, facilities or storage are grassed.
- All remaining areas are sealed, and a vehicle speed limit of 15 km/hr is maintained.

Weighbridge: Three automated irrigator sprays are used for washing down the roadway (these can be manually operated).

River side of loadout bins: Roadside sprays are used to wash down and dampen road when it is not raining.

6.2 Dust management plans

Draft dust management plans (DMPs) detailing the above measures are being prepared and will accompany the application. The draft DMPs follow guidance set out by the MfE (2016a).

6.3 Monitoring

6.3.1 Continuous dust monitoring

The use of continuous dust monitoring for the purpose of proactive dust management has become standard industry practice for a range of dust-generating activities (such as quarries, mines, and earthworks) due to the recent availability of relatively low-cost optical instruments (nephelometers). Such systems are telemetered and used to notify site supervisors of the need for additional or targeted dust mitigation.

MfE (2016) describes the use of continuous dust monitoring and trigger levels as being "… *for the proactive management of dust on site. They are not intended to be used for enforcement because exceedance of trigger levels does not necessarily infer an adverse effect off-site."*

Continuous dust monitors (nephelometers), while commonly used, can be significantly affected by high humidity conditions and rainfall. This is because nephelometers estimate PM concentration by measuring the light scattered by particles and aerosols. At high humidity, hygroscopic particles become larger and more efficient at scattering light, leading to overestimation.

Because of the high humidity and very high rainfall conditions for the Buller Plateaux, the use of continuous dust monitors is not likely to be a reliable monitoring method. For this reason, continuous dust monitoring is not proposed.

Adding further to the above recommendation, continuous dust monitoring is most useful when it is measuring the impact at a sensitive location near to a dust source and informing real-time, on-site dust management decisions. This typically occurs for receptor locations within approximately 250 m of a dust source. In this instance, the nearest high sensitivity residential dwellings and communities are all located well beyond this distance.

6.3.2 Dust deposition monitoring

As described in Section 4.5.2, dust deposition monitoring is currently undertaken for the Stockton Mine, the Cypress Mine (not part of this application) and the Ngakawau facility. This type of monitoring has limited value in terms of day-to-day management decisions. However, it can be useful for examining long-term effectiveness of dust management measures on sensitive receptors. Given this, it is recommended that:

- Dust deposition monitoring be undertaken at locations representing the nearest residential dwellings to Stockton and Escarpment Extended areas. This includes:
  - A location representing the nearest residential dwellings of Millerton (i.e., near to the Stockton Project sub-area).
  - A location representing the nearest residential dwelling of Denniston (i.e., near to the ESE Project sub-area).
  - Location(s) representing the nearest recreational users beyond the boundary of each Project sub-area.
  - Locations of interest[5] regarding the monitoring of potential impacts on sensitive flora or fauna.
- That the monthly results be evaluated against the MfE (2016) dust deposition trigger level of 4 g/m²/30-days above background levels.
- Establishing a suitable background monitoring site that is well removed from dust generating sources to be representative of background levels. In this regard, the background monitoring

[5] Locations of interest have been identified through discussions with Ecological Solutions.

site should ideally be located at least 1 km from dust sources. The existing background monitoring site (WR Dust) is considered to be appropriate for this purpose.

- It is also recommended that dust deposition monitoring be undertaken for on-site locations where there may be concern regarding impacts on sensitive flora or fauna.

The approximate location of the proposed additional dust deposition monitoring sites is listed in Table 6.1 and are shown in Figure 6.1. These locations are in addition to the existing monitoring sites, which we recommend continue to be operated. The proposed new locations are not intended to be precise locations and may be subject to small changes that may arise as a result of practical considerations associated with siting and access to the monitoring locations.

Table 6.1: Proposed additional dust deposition monitoring sites

Monitoring station ID	Receptor type	Project sub-area	NZTM easting	NZTM northing
Millerton	Human	Stockton	1506050	5390000
Denniston	Human / Recreation	ESE	1500400	5377800
UWHR_North_1	Ecological	UWHR	1505750	5379500
UWHR_South_1	Ecological	UWHR	1505850	5379500
UWHR_North_2	Human / Recreation	UWHR	1501250	5376600
UWHR_South_2	Ecological	UWHR	1501350	5376550
ESE_1	Ecological	ESC	1499550	5374500
ESE_2	Ecological	ESC	1496450	5376500
MFS_1	Ecological	MFS	1503250	5380150
MFS_2	Human / Recreation	MFS	1502650	5380900

Note: All grid-coordinate locations are given in New Zealand Transverse Mercator and are indicative only. The locations maybe subject to change due to practical constraints with installation of the monitoring location.

Figure 6.1: Existing and proposed dust deposition monitoring sites.

6.3.3 Meteorological monitoring

As described in Section 4.4, Bathurst operates a number of meteorological stations at Ngakawau and across the Buller Plateaux. It is also recommended that meteorological monitoring continue at the Ngakawau, Stockton Office and Burnett's Face Road monitoring sites to provide ongoing data that can be used to investigate dust complaints should they arise. These three monitoring sites are considered to provide good coverage of the Project sub-areas relative to identified sensitive receptor locations.

6.3.4 Routine checks

Buller Plateaux:

- Daily visual monitoring during dry weather of the haul roads, the working areas, and the CHPP to assess dust suppression requirements and to assess the haul and access road conditions, including the need for grading, compacting and re-sheeting of identified areas of the haul and access roads.
- Visual monitoring of vegetation and fauna habitat on a monthly basis during warmer months (December to April) adjacent to mining areas to identify dust deposition impacts.

Ngakawau:

- Daily visual checks of the site to confirm dust control requirements and that all necessary dust suppression measures are being implemented.

7 Assessment of air quality effects

7.1 Overview

This section provides an assessment of the ongoing operation of the mining and coal handling activities with regards to dust nuisance, human health effects and cumulative effects.

The assessment of dust nuisance and human health impacts use qualitative methods. Quantitative modelling of diffuse emissions from mining is not considered appropriate for the activity, and the Ministry for the Environment's *Good Practice Guide for Assessing and Managing Dust* in conjunction with the Institute of Air Quality Management (IAQM) guidance has been used to develop the assessment methodology to consider the impacts on off-site receptors. Furthermore, the MfE Guide recommends not using dispersion modelling for diffuse dust sources such mines.

The scale of combustion emissions from the mining equipment (e.g., haul trucks, excavators, generators etc) used on site is moderate. However, due the isolated location of the mine sites it is expected that ambient concentrations associated with combustion related emissions will be very low relative to applicable human health air quality guidelines and standards. Consequently, no further consideration is given to combustion emissions from mining equipment.

7.2 Assessment methodology

7.2.1 Screening evaluation

The principle of using separation distances is derived from the fact that dust or any contaminant will decrease in concentration with increasing distance from a source. In this regard, the MfE *'Good practice guide for assessing discharges to air from industry*' (MfE, 2016b) states that:

> *"…the EPA Victoria guidelines (and other similar guidance) are generic. Most of the separation distance guidelines are based on the protection of amenity values at sensitive locations. They do not generally consider risk, or potential health effects. It is also important to note that they do not take into account site specific factors which may influence discharge rates and how they are dispersed (e.g., the specific processes and emission controls used on site). They are also applied in all directions and so do not take into account the effects of local topography and meteorology."*

MfE, 2016b also advises that:

> *"Separation distance guidelines are not intended to be used as a pass/fail test, rather as a trigger for more detailed assessment to determine the appropriate separation distance for a particular site".*

Given the above context, we note that separation distance criteria are generic and do not account for local site conditions and as such are only suitable for an initial screening assessment to identify locations where a more detailed assessment is necessary.

The Environment Protection Authority Victoria (EPA Victoria) guidelines have been extensively used in New Zealand. EPA Victoria released its updated separation guidelines[6] on 12 August 2024. The recommendations for separation distances for activities relevant to the BPCP are presented in Table 7.1. Based on this, a distance of 2 km is applicable to the open-cut coal mining activities on the Buller Plateaux, while a distance of 1 km is applicable to the Ngakawau Rail Loadout. Figure 4.1 displays these separation distances as a yellow buffer.

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[6] EPA Victoria. Draft separation distance guideline. Publication 1949 December 2022.

Table 7.1: EPA Victoria (2024) applicable separation distance guidelines

Industry/activity type	Activity/definition	Scale and description	Recommended separation distance (m)
Coal handling and storage without mining	Crushing, milling, stockpiling and transferring extracted coal	< 1 t/day or a storage capacity up to 50 t	500
		> 1 t/day or a storage capacity > 50 t	1,000
Mine for other minerals	Crushing, screening, stockpiling and conveying of other minerals	N/A	250
Open-cut coal mine	Harvesting, crushing, screening, stockpiling and conveying of coal	N/A	2,000

7.2.2 FIDOL

Nuisance dust effects can be assessed using a structured framework that considers the frequency, duration and intensity of impacts, the offensiveness of the dust (some dusts have a greater potential for soiling, such as coal dust), and the sensitivity of the location where the impacts occur. These factors are referred to as the FIDOL[7] factors and are set out by the MfE in its '*Good practice guide for assessing and managing dust*' (MfE, 2016a) and in Policy 7.4.3 of the RAQP. The FIDOL Factors are described in Table 7.2.

Table 7.2: Definition of each FIDOL factor (MfE 2016a)

Frequency:	The frequency of exposure to dust impacts experienced at a given location. This depends on both the frequency of discharges and the frequency of weather conditions that could transport a discharge towards a sensitive location.
Intensity:	The intensity of dust impacts depends on the degree to which dust sources are controlled but also the separation distance between a source and the receptor.
Duration	The duration of dust impacts depends on both the duration of the discharge and how long a sensitive location is continuously downwind of the dust source.
Offensiveness:	The offensiveness of the dust relates to both the character of dust and the degree of how pleasant or unpleasant the dust is. For example, some dust types such as coal dust have a greater potential for soiling.
Location:	The location factor relates to the sensitivity of the location being assessed, and is typically expressed as low, medium or high. Residential dwellings are considered to have a high sensitivity, whereas rural/pastoral land is considered to have a low sensitivity.

The FIDOL assessment is a qualitative assessment which provides consideration of the potential dust impacts on sensitive locations surrounding the mining activities. The assessment is initially informed by 'screening' for sensitive locations based on their separation distance from the dust sources, using published evaluation distance criteria, as identified in Section 7.2.1. Those locations within the evaluation distance criteria are then assessed in more detail using the FIDOL factors, which consider the exposure of sensitive locations to certain wind conditions and terrain features to inform the

[7] Frequency, Intensity, Duration, Offensiveness, Location.

likely frequency and duration of potential impacts. This focuses on the occurrence of moderate to strong winds, as these conditions can rapidly dry surfaces and generate and carry windblown dust.

The assessment is also informed by consideration of the following:

- Review of process controls.
- Analysis of site-specific meteorology and topographical features.
- Review of historic complaints to identify public concern or specific sources of nuisance dust. While an absence of complaints does not necessarily show absence of adverse effects, it can be indicative that adverse effects are not significant and ongoing.

7.2.3 IAQM methodology

The FIDOL factors are well established and used for dust assessments of this nature. However, as an assessment approach, their use is reliant on expert judgement when weighing the different factors and determining the degree of effects. In practice, this means different outcomes can result from different interpretations of the combination of the factors. For this reason, the approach set out by the UK Institute of Air Quality Management (IAQM 2016) is increasingly being adopted for dust assessments in New Zealand. While the IAQM approach is consistent with FIDOL, it applies more clearly defined criteria than FIDOL. Therefore, although an overall professional judgment is still required, the transparency of the IAQM framework means it is less reliant on interpretation than FIDOL. The IAQM approach is discussed in the following section. The IAQM (2016) published guidance on the assessment of impacts of mineral dust emissions, which is applicable for the assessment of coal mining operations. The assessment methodology is based on the following:

> *"…simple distance-based screening processes to identify those minerals sites where the dust impacts are unlikely to be significant and therefore require no further assessment.*
>
> *Where more detailed assessment is required, a basic assessment framework is presented which employs the Source → Pathway → Receptor approach to evaluate the risk of dust impacts and effects."*

The results from the detailed assessment method using the IAQM approach determines the degree of potential dust effects as being 'negligible', 'slight', 'moderate' or 'substantial'. We have treated this as being commensurate with a FIDOL assessment, as the IAQM method is premised on the same considerations as the FIDOL factors, but uses an objective framework to establish the degree of potential effects.

The 'source-pathway-receptor' method described by the IAQM is schematically illustrated in Figure 7.1. The method seeks to do the following:

- Understand the scale of residual emissions from the discharge source (i.e., those remaining following the implementation of dust control measures). In the context of the FIDOL factors, this is relative to the 'intensity' and 'duration' factors influenced by source emissions.
- The pathway effectiveness of environmental factors (i.e., strong dry winds, and the distance to a receptor) that govern how residual emissions may disperse and dilute in the process of being transported towards a receptor location. In the context of the FIDOL factors, this is relative to the 'intensity', 'frequency' and 'duration' factors.
- Determine the combined dust risk, taking into account the pathway effectiveness and magnitude of residual source emissions.
- Evaluate the magnitude of impact taking account of the dust impact risk and the sensitivity of sensitive receptors. In the context of the FIDOL factors, this final step takes into account the sensitivity of the 'location' being impacted.

The categorisation and decision matrices associated with the IAQM method are set out in Table 7.3 to Table 7.8.

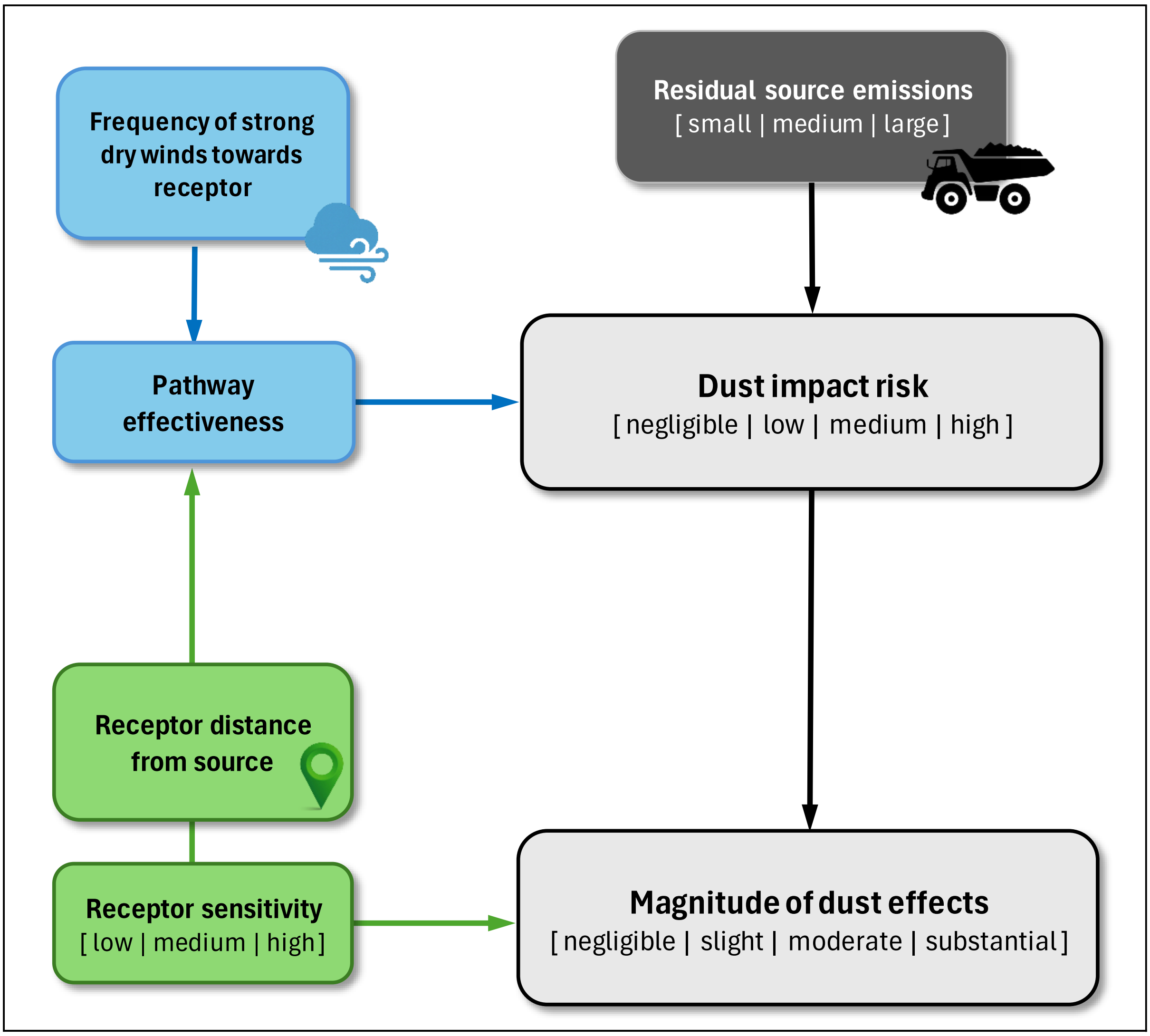

Figure 7.1: Source-pathway-receptor method for determining the magnitude of dust effect (derived by T+T from IAQM 2016).

Table 7.3: Receptor sensitivity (IAQM 2016)

Receptor sensitivity	Example
Low	Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Medium	Parks and places of work
High	Residential dwellings or areas, schools, community areas, places of worship

Table 7.4: Residual source emissions (adapted from IAQM 2016)

Scale of residual dust emission	Emission source activity
Small	Site Preparation and Restoration
Small	Off-site transportation
Medium	Mineral Extraction
Medium	Materials Handling
Medium	Stockpiles and Exposed Surfaces
Large	On-site transportation
Large	Mineral Processing

Table 7.5: Receptor distance source categorisation (adapted from IAQM 2016)

Distance categorisation	Distance between source and receptor
Negligible	> 2 km
Very distant	400 m -2 km
Distant	200 m – 400 m
Intermediate	100 m – 400 m
Close	50 – 100 m
Very close	< 50 m

Table 7.6: Categorisation of exposure to strong dry winds (IAQM 2016)

Insert heading	Frequency of winds > 5 m/s on dry days
Very infrequent	< 1%
Infrequent	1% - 5%
Moderately frequent	5% - 12%
Frequent	12% - 20%
Very frequent	> 20%

Table 7.7: Pathway effectiveness matrix (adapted from IAQM 2016)

Receptor distance category	Strong dry wind exposure category: Very infrequent (<1%)	Infrequent (1% - 5%)	Moderately frequent (5%-12%)	Frequent (12%-20%)	Very frequent (>20%)
Very close	Ineffective	Moderately effective	Highly effective	Highly effective	Highly effective
Close	Ineffective	Ineffective	Moderately effective	Highly effective	Highly effective
Intermediate	Ineffective	Ineffective	Moderately effective	Moderately effective	Highly effective
Distant	Ineffective	Ineffective	Ineffective	Moderately effective	Moderately effective
Very distant	Very ineffective	Ineffective	Ineffective	Ineffective	Moderately effective
Negligible	Very ineffective	Very ineffective	Ineffective	Ineffective	Moderately effective

Table 7.8: Dust impact risk matrix (adapted from IAQM 2016)

Pathway effectiveness	Residual source emission category: Small	Medium	Large
Highly effective	Low	Medium	High
Moderately effective	Negligible	Low	Medium
Ineffective	Negligible	Negligible	Low
Very ineffective	Negligible	Negligible	Negligible

Table 7.9: Magnitude of effect matrix (adapted from IAQM 2016)

		Receptor sensitivity		
		Low	**Medium**	**High**
Dust impact risk	**High risk**	Slight adverse effect	Moderate adverse effect	Substantial adverse effect
	Medium risk	Negligible effect	Slight adverse effect	Moderate adverse effect
	Low risk	Negligible effect	Negligible effect	Slight adverse effect
	Negligible risk	Negligible effect	Negligible effect	Negligible effect

7.3 Complaints

Complaints records can provide a general sense of community satisfaction or otherwise, noting that an absence of complaints does not necessarily mean there is an absence of community annoyance. However, an absence of complaints does indicate that this is not an ongoing substantial concern regarding dust emissions from the activity.

In this instance, Bathurst advises that it has not received any complaints regarding dust impacts since 2010 in relation to mining activities on the Buller Plateaux (noting that Bathurst only took over operation of the Stockton mine and Ngakawau in August 2017).

With regard to the Ngakawau Rail Loadout, there have been only two complaints received in the last ten years, which are described as follows:

- A single complaint related to contingency trucking operations in 2024. This occurred due to KiwiRail's Tawhai Tunnel near Reefton having collapsed, which meant that rail transport could not be used. The principal concern of the complainant was understood to be regarding trucking activity impacting on them, although dust was raised as one of the concerns.
- A complaint in 2025 on the day after protestors were removed from the aerial ropeway buckets. The complainant's concerns appear to have been principally related to truck movements and those movements not ceasing immediately after the protestors were removed. It was not possible to cease the truck movements immediately at that time due to the need for a specialist team to be brought to site to remove rubbish from the aerial buckets that prevented its operation before the ropeway could be safely restarted. As with the earlier complaint, the principal concern was understood to be regarding trucking activity, although dust was raised as one of the concerns.

Of note is that neither of these two recent complaints relate to normal operation of the Ngakawau Rail Loadout.

7.4 IAQM/FIDOL assessments

7.4.1 Stockton

The nearest identified sensitive receptor locations to the Stockton Project sub-area are the Millerton and Granity residential areas, along with a small number of isolated dwellings to the west, as shown in Figure 7.2 and detailed in Table 7.10. Separation distances from the proposed consented boundary range from approximately 540 m for Millerton to 900 m for Granity and the isolated dwellings. The frequency of strong, dry winds directed from Stockton towards these receptors is low, between 2.5% and 6.2%. This is with the exception of the [redacted] residence, which is located approximately [redacted], as illustrated in Figure 7.3. The [redacted] residence has a moderately high frequency of exposure to strong dry winds (5.9%) that blow from the direction of the [redacted].

The IAQM results for all receptors are summarised in Table 7.11. All residential areas are assessed as high sensitivity. Receptor distance categories are 'very distant' for all except the [redacted] residence (discussed below) and pathway effectiveness is rated as 'ineffective' due to the low frequency of strong-dry winds in these directions. Residual dust emissions, i.e., those that are anticipated to occur following the implication of dust mitigation measures, are categorised as large, reflecting the scale of on-site haulage and material movement.

The resulting dust impact risk for all receptors with the exception of the [redacted] residence is low, and the magnitude of effects is assessed as a 'slight' adverse effect when using the IAQM methodology. In this context a 'slight'[8] magnitude of effects is considered to correspond to a low potential for adverse air quality effects with regarding to dust nuisance effects and potential health effects.

The potential magnitude of effect for the [redacted] residence is assessed as a 'moderate adverse effect' when applying the IAQM assessment approach. However, the [redacted] residence is located on elevated ground relative to the Haul Road (approximately 20 m higher) with dense native vegetation between the two. These factors will help to significantly mitigate potential dust effects associated with discharges from the Haul Road and the unloading of coal at the headworks to the Aerial Ropeway. This is partly demonstrated through dust deposition monitoring undertaken at site 'N5A', which is located between the [redacted] residence and the Haul Road. Historic deposition rates measured at the N5A site, summarised in Section 4.5.2, show that all rates have been below 3 g/m²/30 days. This is below the MfE trigger value of 4 g/m²/30-days above background, indicating a relatively low level of dust deposition. Given this context, it is expected that potential dust effects on the [redacted] residence will remain low, provided that existing dust suppression measures are continued.

Table 7.10: Sensitive receptor details for the Stockton sub-area

Receptor ID/name	Distance between receptor and consented area	Direction from receptor to consented area	Frequency of strong, dry winds
Millerton residential area	540 m	100-30°N	6.2%
Granity residential area	900 m	110-180°N	3.4%
Nearest Isolated dwellings to the west	900 m	70-170°N	2.5%
[redacted] residence	150 m	135-220 °N	5.9%

[8] "Slight' is defined by the Oxford Dictionary as "Small in degree or amount; not considerable."

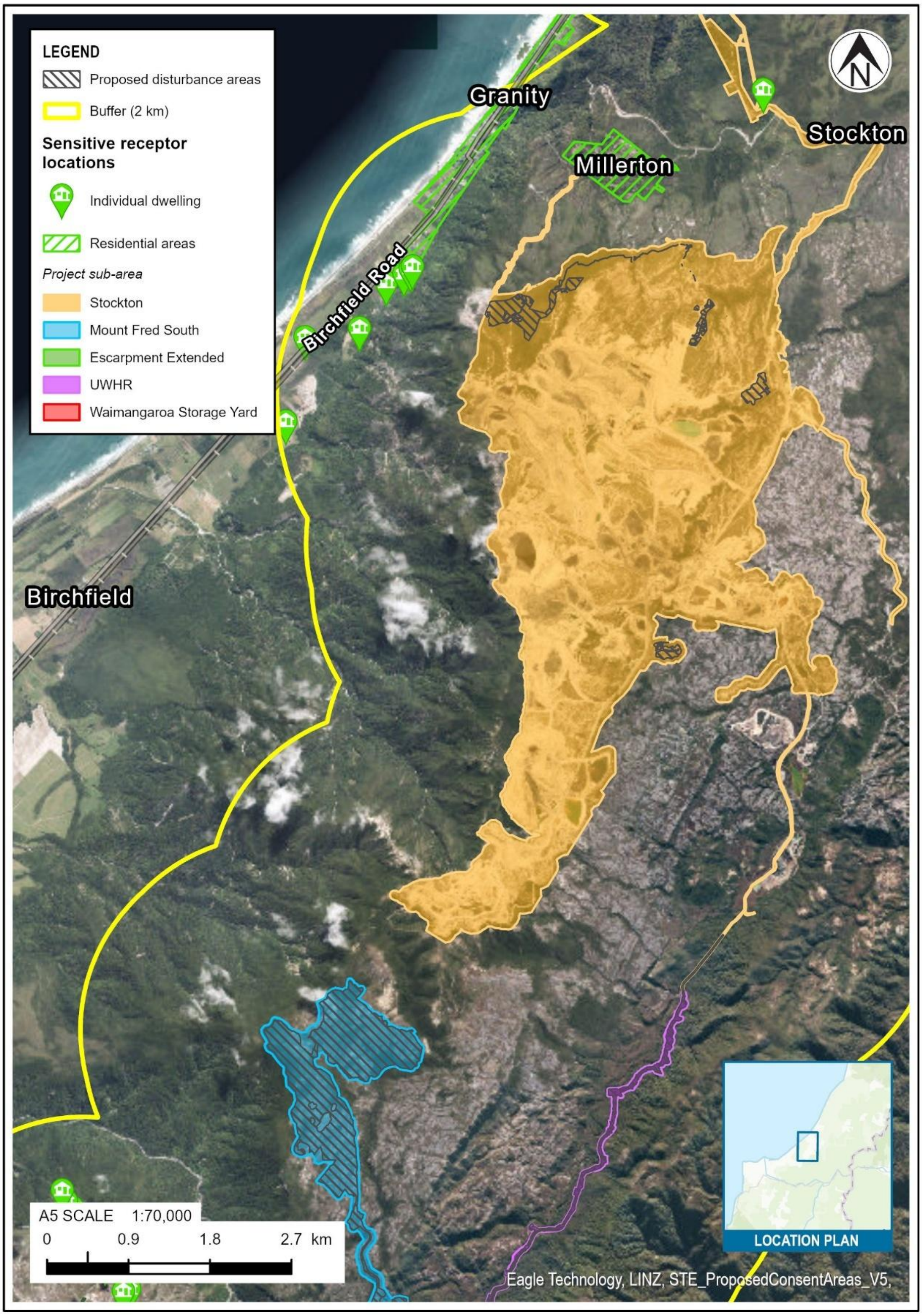

Figure 7.2: Stockton project sub-area relative to sensitive receptor locations.

[redacted]

Figure 7.3: Location of [redacted] *residence relative to the Stockton Haul Road, Aerial Ropeway, and existing dust deposition monitoring locations.*

Table 7.11: IAQM assessment for sensitive receptors near to the Stockton sub-area

Receptor ID/name	Sensitivity of receptor	Receptor distance category	Strong, dry winds category	Residual dust emissions	Pathway effectiveness	Dust impact risk	Magnitude of effects
Millerton residential area	High	Very distant	Moderately frequent (5%-12%)	Large	Ineffective	Low Risk	Slight Adverse Effect
Granity residential area	High	Very distant	Infrequent (1% - 5%)	Large	Ineffective	Low Risk	Slight Adverse Effect
Nearest Isolated dwellings to the west	High	Very distant	Infrequent (1% - 5%)	Large	Ineffective	Low Risk	Slight Adverse Effect
[redacted] residence	High	Intermediate	Moderately frequent (5%-12%)	Large	Moderately effective	Medium	Moderate adverse effects

7.4.2 Mount Frederick South

There are no sensitive receptor locations within 2 km of the Mount Frederick South Project sub-area. The nearest residential dwelling is in Denniston, approximately 2,300 m to the east, as indicated in Figure 7.2 and Table 7.12. Strong, dry winds from this sub-area towards the receptor occur extremely rarely (0.03%).

The IAQM results provided in Table 7.13 classify the receptor as high sensitivity. The large separation distance places it in the 'negligible' receptor distance category, with pathway effectiveness rated as 'very ineffective' due to the very infrequent occurrence of strong-dry winds towards the receptor. Although residual dust emissions are categorised as large, the pathway constraints result in a negligible dust impact risk. Consequently, the magnitude of effects is assessed as negligible.

Table 7.12: Sensitive receptor details for the Mount Frederick South sub-area

Receptor ID/name	Distance between receptor and consented area	Direction from receptor to consented area	Frequency of strong, dry winds
Nearest dwelling in Denniston	2,300 m	40 - 110°N	0.03%

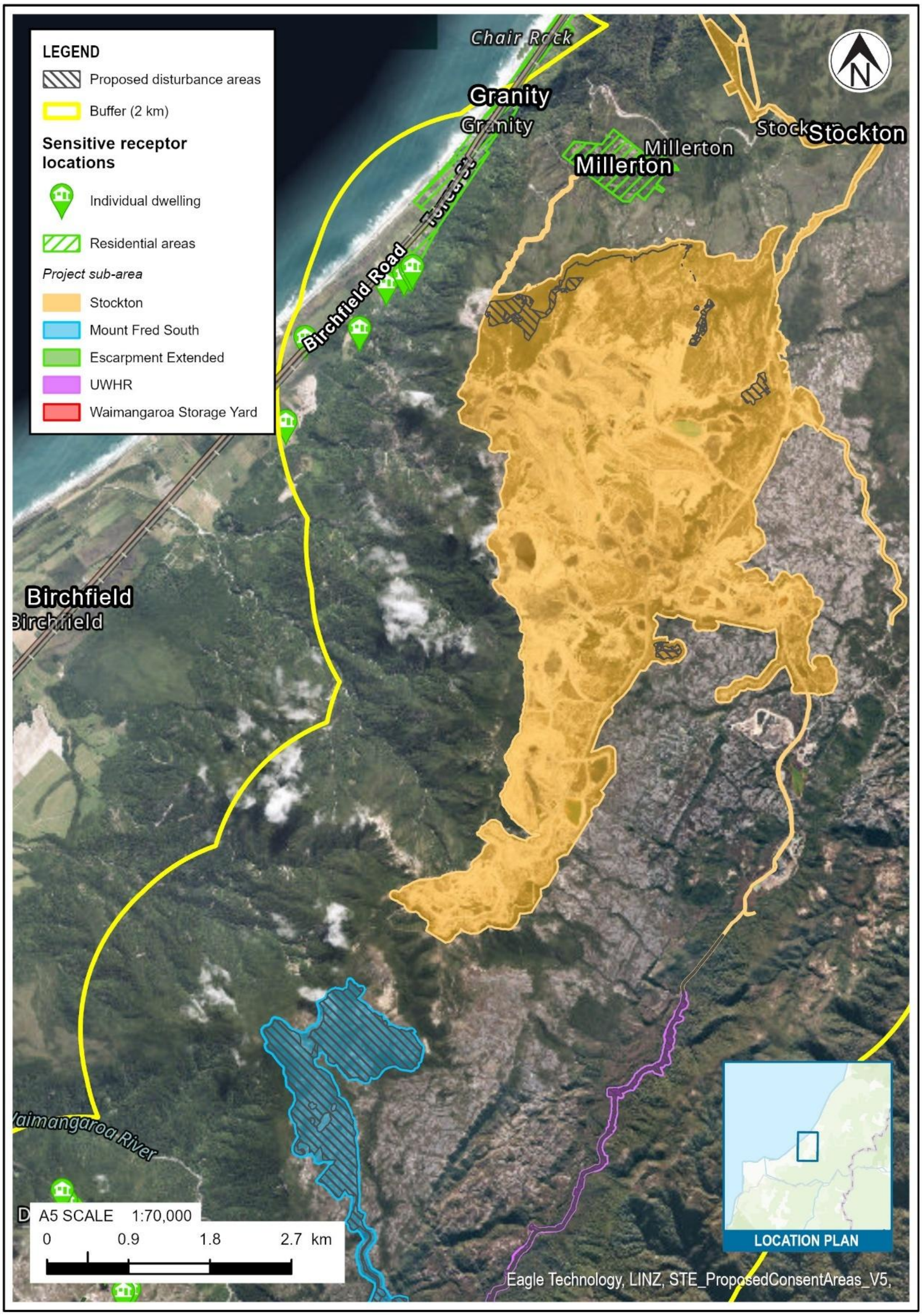

Figure 7.4: Mt Fred project sub-area relative to sensitive receptor locations.

Table 7.13: IAQM assessment for sensitive receptors near to the Mount Frederick South project sub-area

Receptor ID/name	Sensitivity of receptor	Receptor distance category	Strong, dry winds category	Residual dust emissions	Pathway effectiveness	Dust impact risk	Magnitude of effects
Nearest dwelling in Denniston	High	Negligible	Very infrequent (<1%)	Large	Very ineffective	Negligible	Negligible effect

7.4.3 Escarpment Extended

The nearest sensitive receptors to the Escarpment Extended Project sub-area are residential dwellings in Denniston, as illustrated in Figure 7.5. Two scenarios were assessed separately:

- The nearest dwellings to the access road (Whareatea Road), are approximately 420 m away (this road is used for legal-road vehicles access to the project sub-area – but not large mine haul trucks or other mining activities); and
- The nearest dwellings to the main mining area, approximately 2,020 m away (Table 7.14).

Strong, dry winds towards these receptors for both scenarios are infrequent (around less than 0.3%).

The IAQM results in Table 7.15 indicate that both receptor locations are of high sensitivity. For the access way, the receptor distance category is 'very distant', and pathway effectiveness is 'ineffective'; for the main mining area, the receptor distance category is 'negligible' (i.e., a distance of more than 2 km is achieved) with pathway effectiveness rated 'very ineffective'. Residual dust emissions are considered large for both due to material handling and vehicle movements. The resulting dust impact risk is low for the access road (Whareatea Road), leading to a slight adverse effect, and negligible for the main mining area, resulting in a negligible effect.

Table 7.14: Sensitive receptor details for the Escarpment Extended project sub-area

Receptor ID/name	Distance between receptor and consented area	Direction from receptor to consented area	Frequency of strong, dry winds
Nearest dwelling in Denniston (access way)	420 m	215 - 265°N	0.3%
Nearest dwelling in Denniston (main mining areas)	2,020 m	200 - 245°N	0.2%

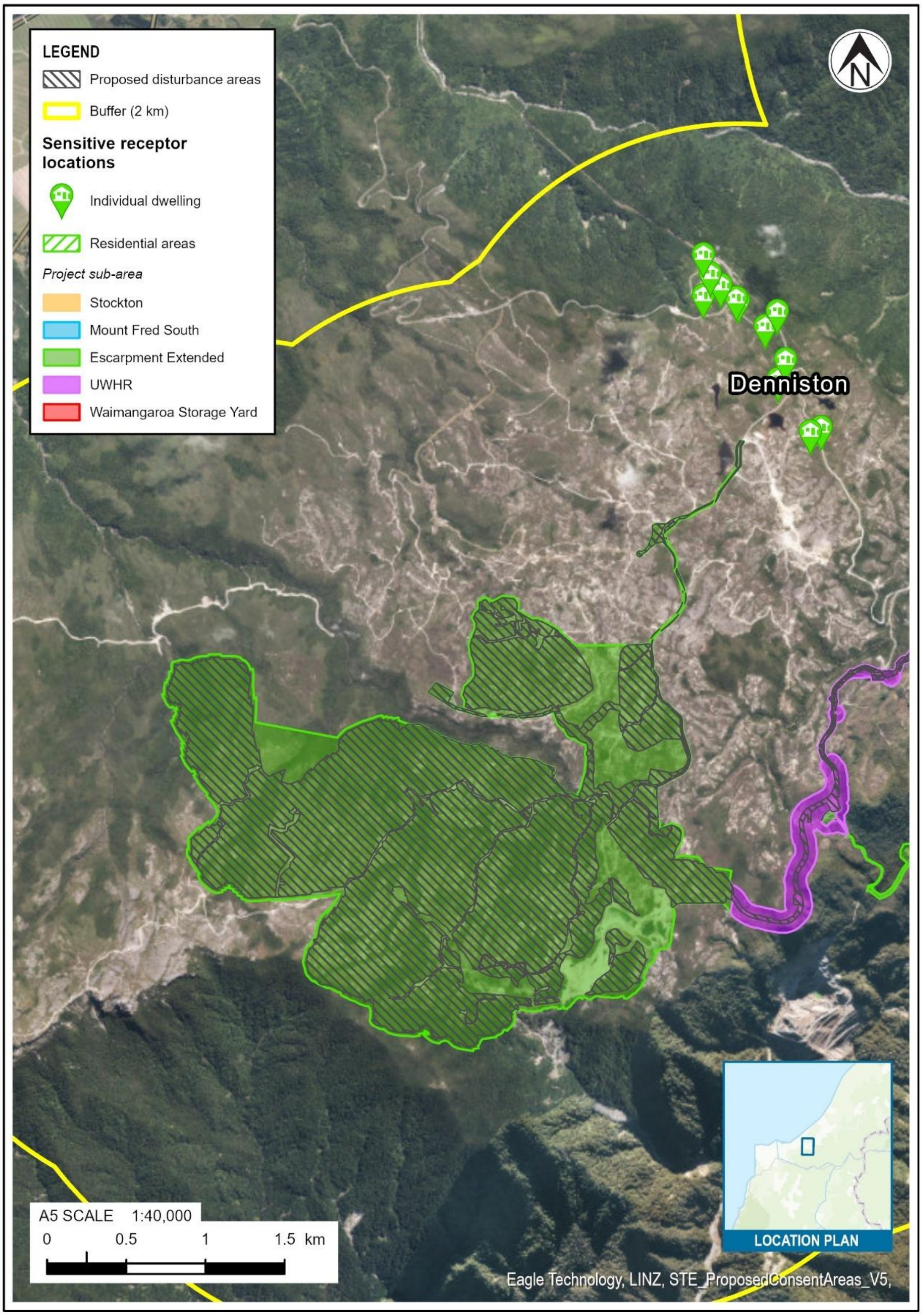

Figure 7.5: Escarpment Extended project sub-area relative to sensitive receptor locations.

Table 7.15: IAQM assessment for sensitive receptors near to the Escarpment Extended project sub-area

Receptor ID/name	Sensitivity of receptor	Receptor distance category	Strong, dry winds category	Residual dust emissions	Pathway effectiveness	Dust impact risk	Magnitude of effects
Nearest dwelling in Denniston (access way)	High	Very distant	Very infrequent (<1%)	Medium	Very ineffective	Negligible	Negligible effect
Nearest dwelling in Denniston (main area)	High	Negligible	Very infrequent (<1%)	Large	Very ineffective	Negligible	Negligible effect

7.4.4 Upper Waimangaroa Haul Road

The nearest identified sensitive receptor location to the UWHR is a residential dwelling in Denniston located approximately 1,350 m from the proposed haul road alignment, as shown in Figure 7.6 and detailed in Table 7.16. The frequency of strong, dry winds from the haul road towards this receptor is infrequent.

The IAQM results for this receptor are presented in Table 7.16. The receptor is classified as having high sensitivity due to its residential land use. The separation distance places it in the 'very distant' category, and given the low frequency of strong, dry winds from the haul road towards the receptor, pathway effectiveness is assessed as 'ineffective'. Although the residual source emissions from the haul road are categorised as large—reflecting the high potential for dust generation from heavy vehicle traffic—the ineffective pathway results in a low dust impact risk. Consequently, the magnitude of effects for this receptor is assessed as a slight adverse effect, consistent with the findings for comparable receptor situations reported for other sub-areas when using the IAQM methodology. In this context a 'slight'[9] magnitude of effects is considered to correspond to a low potential for adverse air quality effects with regarding to dust nuisance effects and potential health effects.

Table 7.16: Sensitive receptor details for the UWHR project sub-area

Receptor ID/name	Distance between receptor and consented area	Direction from receptor to consented area	Frequency of strong, dry winds
Nearest dwelling in Denniston	1,350	105 - 180°N	3.9%

[9] "Slight' is defined by the Oxford Dictionary as "Small in degree or amount; not considerable."

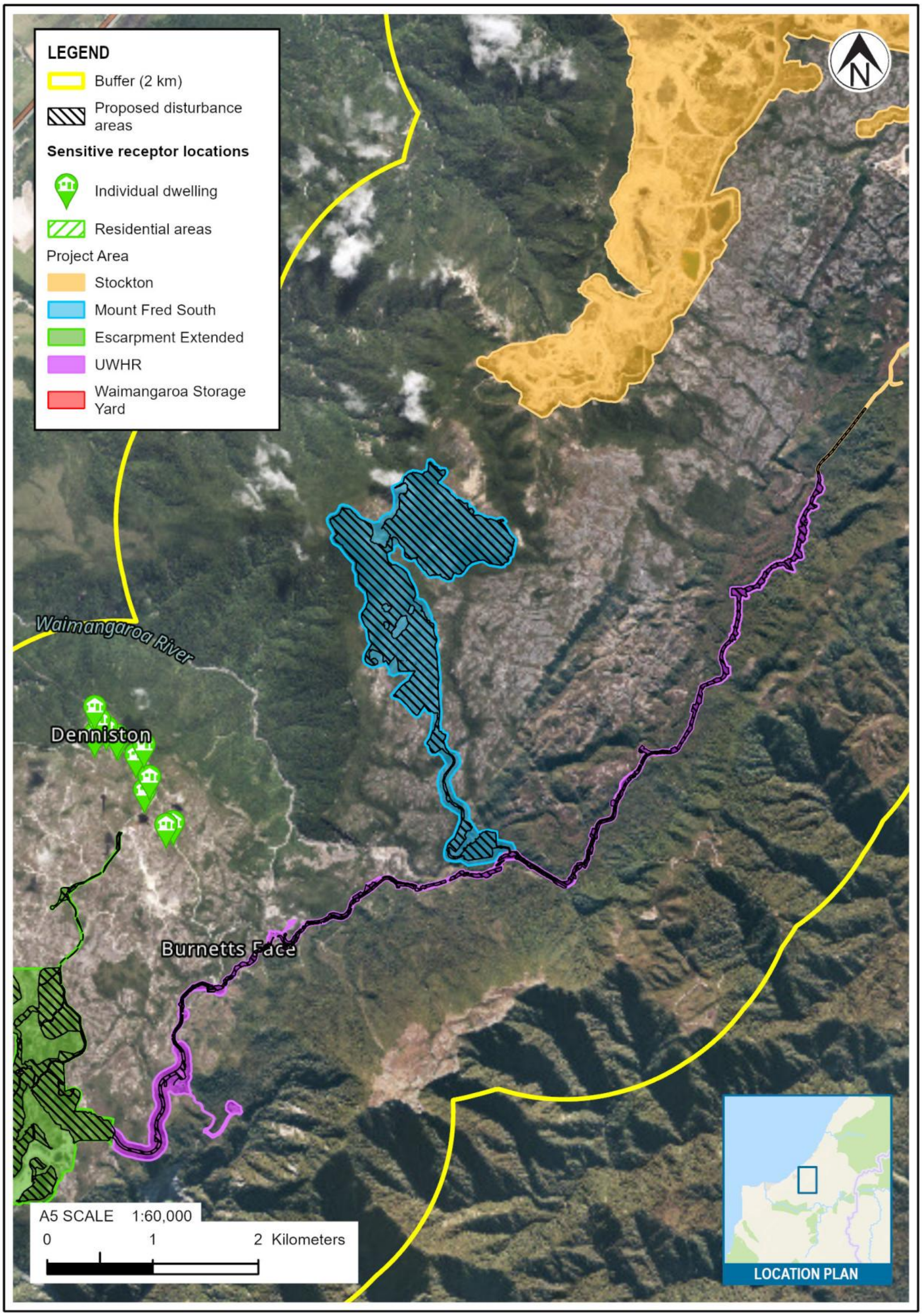

Figure 7.6: UWHR project sub-area relative to sensitive receptor locations.

Table 7.17: IAQM assessment for sensitive receptors near to the UWHR project sub-area

Receptor ID/name	Sensitivity of receptor	Receptor distance category	Strong, dry winds category	Residual dust emissions	Pathway effectiveness	Dust impact risk	Magnitude of effects
Nearest dwelling in Denniston	High	Very distant	Infrequent (1% - 5%)	Large	Ineffective	Low	Slight adverse effect

7.4.5 Ngakawau Rail Loadout

The nearest identified sensitive receptors to the Ngakawau Rail Loadout are residential dwellings along Dole Street, Tyler Road, and Radcliff Road, at distances ranging from 90 m to 260 m from the primary dust sources at the facility (coal stockpiles, loadout areas, and ropeway unloading point), as illustrated in Figure 7.7 and detailed in Table 7.18. The frequency of strong, dry winds from the facility towards these dwellings is very low (<1% for most dwellings and up to 1.4% for those closest to the ropeway unloading area).

The IAQM results for these receptors are summarised in Table 7.19. All dwellings are assessed as high sensitivity due to their residential use. Distance categories range from 'close' for properties within 100 m to 'distant' for those further than 200 m from the source. Residual source emissions are assessed as large, given the high throughput of coal handling (>1,000,000 tonnes per year) and frequency of material movement. However, pathway effectiveness is rated as 'ineffective' due to the very low prevalence of strong, dry wind conditions from the facility towards these receptors. As a result, despite the proximity of some dwellings, the dust impact risk is categorised as low and the magnitude of effects for all receptors is assessed as a slight adverse effect when using the IAQM methodology. In this context a 'slight'[10] magnitude of effects is considered to correspond to a low potential for adverse air quality effects with regarding to dust nuisance effects and potential health effects.

Table 7.18: Sensitive receptor details for the Ngakawau Rail Loadout project sub-area

Receptor ID/name	Distance between receptor and consented area	Direction from receptor to consented area	Frequency of strong, dry winds
[redacted]	110 m (coal stockpiles)	65 - 85°N	<0.1%
[redacted]	170 m (coal stockpiles)	55 - 70°N	<0.1%
[redacted]	90 m (coal loadout)	130 - 230°N	<0.1%
[redacted]	95 m (coal loadout)	160 - 205°N	<0.1%
[redacted]	105 m (coal loadout)	165 - 205°N	<0.1%
[redacted]	125 m (coal loadout)	175 - 210°N	<0.1%
[redacted]	175 m (cableway coal unloading)	260-285°N	1.4%
[redacted]	240 m (cableway coal unloading)	260-280°N	1.4%
[redacted]	260 m (cableway coal unloading)	260-280°N	1.4%

10 "Slight' is defined by the Oxford Dictionary as "Small in degree or amount; not considerable."

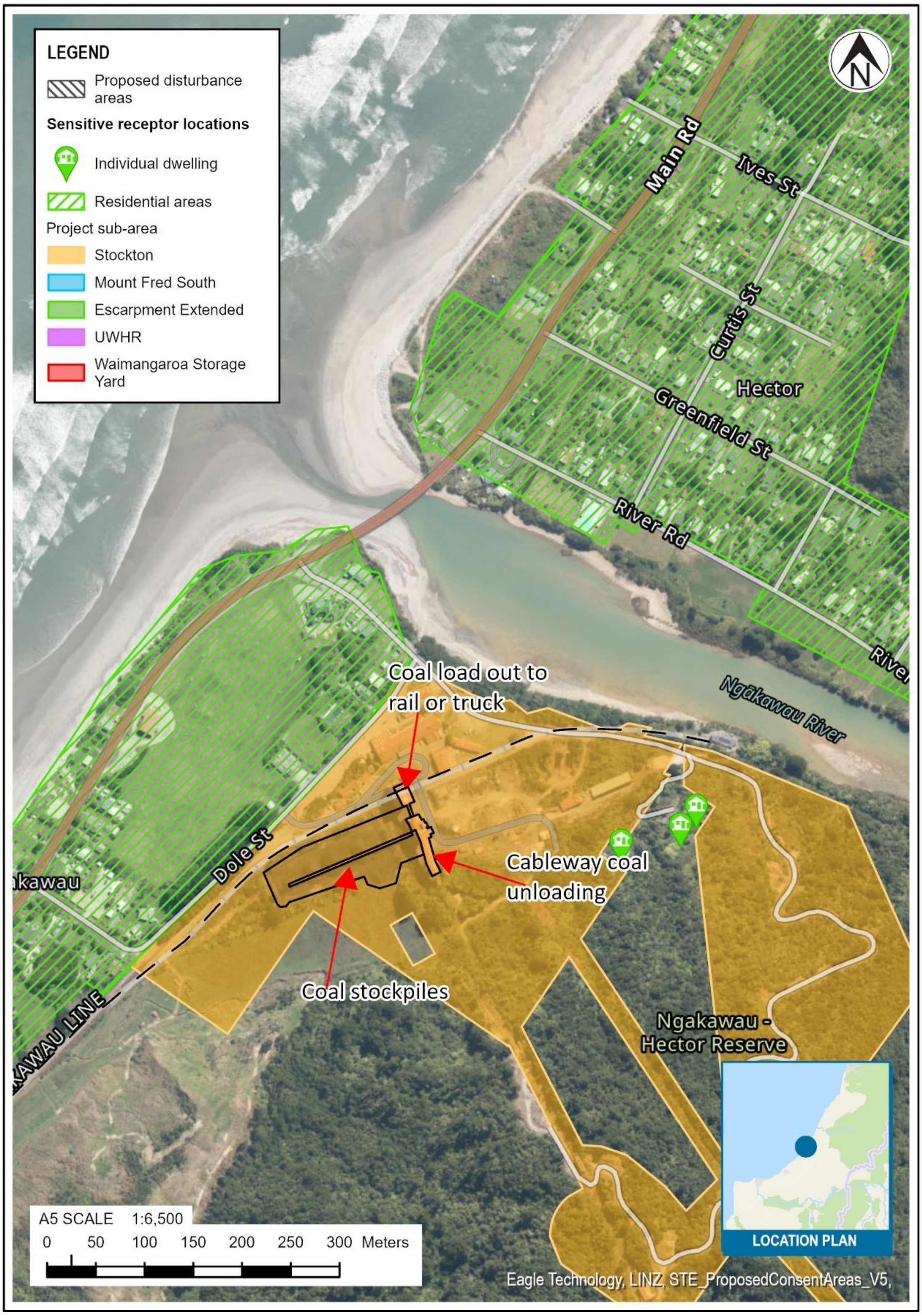

Figure 7.7: Ngakawau Rail Loadout relative to sensitive receptor locations.

Table 7.19: IAQM assessment for sensitive receptors near to the Ngakawau Rail Loadout

Receptor ID/name	Sensitivity of receptor	Receptor distance category	Strong, dry winds category	Residual dust emissions	Pathway effectiveness	Dust impact risk	Magnitude of effects
[redacted]	High	Intermediate	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Intermediate	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Close	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Close	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Intermediate	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Intermediate	Very infrequent (<1%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Intermediate	Infrequent (1% - 5%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Distant	Infrequent (1% - 5%)	Large	Ineffective	Low	Slight adverse effect
[redacted]	High	Distant	Infrequent (1% - 5%)	Large	Ineffective	Low	Slight adverse effect

7.4.6 Summary

The IAQM/FIDOL assessments undertaken for the Stockton and Ngakawau Rail Loadout, Mount Frederick South, Escarpment Extended, Upper Waimangaroa Haul Road Project sub-areas indicate that the potential for off-site dust effects at sensitive human receptors is generally low. Across all Project sub-areas, the combination of substantial separation distances to the nearest dwellings, low to very low frequencies of strong-dry winds towards those receptors, and the existing and proposed dust mitigation measures significantly limits the potential for nuisance or amenity effects. This is with the exception of the [redacted] residence located close to the headworks of the aerial ropeway and approximately 150 m from the Main Haul Road, where a 'moderate adverse effect' is determined using the IAQM assessment approach. However, because of the [redacted] residences elevated position and dense vegetation separating it from dust sources, it is expected that potential dust effects on the [redacted] residence will remain low, provided that existing dust suppression measures are continued. This finding is supported by the historic results of a nearby dust monitor indicating low levels of dust deposition.

For most receptors, the assessment identifies pathway effectiveness as 'ineffective' or 'very ineffective', despite residual dust emissions in some locations being categorised as large due to the nature of haul road traffic, coal handling, and material movement. This results in dust impact risks that are predominantly low or negligible. Magnitude of effects is assessed as slight adverse effect for locations where receptors are relatively closer or where haul roads pass within a few hundred metres, and negligible where distances are greater and wind exposure is minimal.

Overall, the results confirm that, with the continuation of the dust suppression, operational controls, and progressive rehabilitation measures outlined in Section 6.1, the BPCP is expected to avoid offensive or objectionable dust effects beyond the site boundaries.

7.5 Recreational users

Recreational users in the vicinity of the Project sub areas include trampers, hikers, trail-runners, motor bikers, mountain bikers and four-wheel drivers using established walking and cycling tracks, as illustrated in Figure 4.2. These users are generally considered to have a moderate to high sensitivity to dust effects due to their expectations of a high-amenity natural environment. However, their presence near dust-generating sources such as haul roads, active mining areas, or coal handling facilities is typically infrequent, transitory, and of short duration.

Potential dust exposure for these users would arise when tracks pass in close proximity to operational areas, haul routes, or stockpiles, particularly during periods of strong, dry winds. Given local meteorology—characterised by very high annual rainfall and relatively low frequency of strong-dry wind conditions coinciding with recreational use—such exposure events are predicted to be limited. This is further minimised by internal setbacks to the haul roads, stockpiles and operational areas. In instances where exposure to dust were to occur, it would likely involve coarse, visible dust particles that settle quickly and dissipate over short distances, rather than resulting in prolonged inhalable particulate concentrations.

When applying the IAQM/FIDOL principles to recreational users, the location sensitivity is moderated by the low frequency and short duration of potential encounters with dust. Pathway effectiveness is further reduced by the prevailing wind patterns, which in most cases do not align with the orientation of tracks relative to dust sources. Residual dust emissions are managed through the operational controls described in Section 6, which include water suppression on haul roads, enclosure or wind-fencing of coal stockpiles, and progressive rehabilitation of exposed surfaces.

Taking these factors into account, the magnitude of potential effects for recreational users is assessed as being low. For the majority of recreational activity in the area, effects are expected to be negligible.

The recreational and tourism assessment prepared by Rob Greenaway & Associates (2025) considers the impacts on recreational users of the areas surrounding the Project. The key conclusions from that assessment are as follows:

> *"The Buller Plateaux includes a wide range of recreation and tourism settings, ranging from the broadly popular Denniston Brakehead, Burnetts Face and Coalbrookdale areas to the more specialised mountain biking, trail running, motorbiking and four wheel drive opportunities in the Mount Rochfort Conservation Area and the block of LINZ administered land. The Project largely avoids impacts on the most popular tourism settings, but has several unavoidable effects on those other recreation opportunities, largely via the development of the UWHR and ESE.*
>
> *While there will remain many recreation tracks in the Mount Rochfort Conservation Area for the mine life, access to Mount Rochfort will be interrupted. This is a popular setting for four-wheel drive, motorbikes, cycling and trail running. Similarly, the UWHR will disrupt four-wheel drive access within the LINZ land and to the Mackley Track. Access for cyclists and walkers to the Mackley Track is relatively easily maintained by the addition of a shared (cyclist/walkers) path adjacent to the UWHR."*

A suite of mitigation measures is proposed in the recreational and tourism assessment that are in addition those described in Section 6.

7.6 Vegetation and sensitive ecological receptors

Large amounts of dust can adversely impact the physiological processes of plants, including gas exchange, photosynthesis, and water usage (Lovich & Ennen 2011, IAQM 2016). However, there are many variables that are required for consideration. The specific foliar morphology and anatomy of the plant species can affect the capacity of leaves as dust receptors; species-specific characteristics such as leaf orientation (if the leaf is horizontal or vertical) and sessility can also have variable effects on dust deposition. The mineralogy and particle size of the deposited dust can also have variable effects on the physiology of plants.

Dust accumulation can damage plant tissue through biochemical reactions caused by direct contact of dust to leaf surface and inhibit growth by plugging stomata openings and decreasing photosynthesis processes causing a decrease in carbon dioxide exchange, carbon assimilation, transpiration, and net photosynthesis (Sett 2017). However, the meteorology of the Buller Plateaux (notably the high rainfall) and baseline soil pH conditions, mean that these potential effects are likely to be negligible.

A literature review indicated that an estimate of dust deposition amounts greater than 1.0 $g/m^2/day$ would cause the effects described above (Treshow 2010). Similarly, IAQM 2016 states "the level of dust deposition likely to lead to a change in vegetation is very high (over 1 $g/m^2/day$) and the likelihood of significant effects is therefore very low except on sites with the highest dust release close to sensitive habitats."

Dust deposition rates are typically monitored over a 30-day period (± 2 days, in accordance with *AS/NZS 3580.10.1:2016 Methods for sampling and analysis of ambient air - Method 10.1: Determination of particulate matter - Deposited matter - Gravimetric method*). A 1 $g/m^2/day$ deposition rate over the standard 30-day monitoring period would equate to a deposition rate of 30 $g/m^2/30$-days. This is far in excess of the deposition rates that have been measured as part of the existing dust deposition monitoring programmes that have been undertaken (refer to Section 4.5.2), where measured rates are typically well below 4 g/m²/30-days. Notwithstanding this, the deposition monitoring results indicate that dust levels on the leeward side of haul roads, at a distance of approximately 70 m to 100 m, typically had a greater degree of impact.

Dust deposition is typically isolated within 100 m of a source, with deposition rates reducing rapidly with distance from the source. This is because coarse dust particles settle over relatively short distances following their discharge.

Based on the dust deposition monitoring data in Section 4.5.2, local meteorology (high rainfall environment), and short distance over which dust material will deposit, the native vegetation that is immediately adjacent to the haul routes (i.e., within approximately 50 m) and downwind under prevailing winds is predicted to have the greatest potential impact from dust derived from coal or overburden. Notwithstanding this, provided the continuation of existing dust mitigation measures employed by Bathurst continues for the proposed operation, it is expected that dust deposition rates can be maintained within the existing deposition rate limit of 4 g/m²/30-days and the potential effects on vegetation will be low.

The ecological assessment report (Ecological Solutions, 2026) describes the potential for 'edge effects' that may occur in conjunction with actual disturbance footprints. It describes edge effects as being *"something that can arise from changes in microhabitat conditions at the borders of mining activities, including alterations in hydrology, moisture levels, light exposure, and dust, all of which can affect species survival in these areas".* With regard to dust impacts, T+T considers this will be most pronounced when close to unpaved haul roads and downwind of prevailing winds.

Ecological Solutions (2026) recommends setback distances that are to be applied to each of the disturbance areas, based on the type of vegetation or landcover present so as to account for these edge effects. The width of the recommended ecological setback recommended by Ecological Solutions varies between 10 m and 20 m depending on the type of vegetation and habitat and existing buffers that may already be in place. T+T consider these distances to be reasonable for managing dust impacts, given:

- The above discussion regarding dust deposition rates associated with vegetation impacts;
- The results of deposition monitoring (refer to Section 4.5.2); and
- The proposed dust mitigation measures (refer to Section 6).

Provided that the mitigation measures described in Section 6 are implemented, it is considered the potential ecological effects beyond the ecological setbacks are likely to be low.

The Ecological Solutions (2026) report includes an appendix that considers the potential impacts of dust on *Powelliphanta* snail populations and provides the following conclusion:

> *"Although it is not possible to make a definitive statement about how dust from mine related activities affects Powelliphanta snails, results from long-term capture-recapture monitoring of Powelliphanta snail populations in 10 capture-recapture plots close to disturbed areas likely to be sources for dust show snail populations persist in all 10 plots despite exposure to dust from mine related activities. Thus, despite the ten plots' proximity to disturbance areas, there is no evidence that snail populations in any of the plots have suffered adverse effects from dust originating in the disturbance areas."*

Two predator exclusion areas (the 'Coalbrook' exclusion area adjacent to ESE Project sub-area and then 'Whirlwind Rise' exclusion area adjacent to the Stockton Project sub-area) run immediately to the west of the UWHR. However, because both exclusion areas are located upwind of the UWHR with regard to prevailing winds, it is expected that impacts on vegetation and sensitive ecosystems within the exclusion areas will be minimised.

7.7 Human health impacts

7.7.1 Fine particulate PM_{10} and $PM_{2.5}$

An air quality study focusing on the Yaldhurst quarries located to the west of Christchurch was carried out as a joint project for Environment Canterbury (ECan), Christchurch City Council (CCC) and the Canterbury District Health Board (CDHB) in 2018 (herein referred to as the Yaldhurst study). Mote Limited (Mote) and Emissions Impossible Limited were engaged to undertake a monitoring programme to determine exposure to fine particulate matter (PM_{10} and $PM_{2.5}$) and respirable crystalline silica (RCS) for the surrounding Yaldhurst community.

The study has provided a detailed characterisation of fine particulate matter and respirable crystalline silica concentrations in the receiving environment surrounding the Yaldhurst quarries. The Yaldhurst quarries comprised several gravel quarries with large process plants (crushing and screening) and at the time of the study covered an exposed area of approximately 220 hectares (ha). The general activities undertaken with quarrying and mechanisms for dust generation are very similar to those associated with the Project. Consequently, the Yaldhurst study provides a useful source of information that can be used to infer potential health effects associated with PM_{10} and $PM_{2.5}$ emissions associate with the Project. While the extent of the Yaldhurst quarries is smaller than the activities associated with the Project, the annual rainfall for Christchurch is about 600-650 mm per year; approximately 1/10th that of the Buller Plateaux. The results of the Yaldhurst Study when considered in the context of the Project are expected to be conservative.

The Yaldhurst Study measured PM_{10}, $PM_{2.5}$ and RCS surrounding the quarries at varying distances from the quarries as illustrated in Figure 7.8, with details of the monitoring sites provided in Table 7.20.

Figure 7.8: Indicative location of monitoring sites (reproduced from Mote 2018). Imaged is aligned to true north.

Table 7.20: Main monitoring sites description (summarised from Mote 2018)

Site ID	Distance from quarries	Contaminant monitored
1	50 m (east)	PM_{10}, RCS
2	190 m (northeast)	PM_{10}, $PM_{2.5}$, RCS
3	50 m (south)	PM_{10}, $PM_{2.5}$, RCS
4 (background site)	4.8 km	PM_{10}, $PM_{2.5}$, RCS
5	80 m (southwest)	PM_{10}, RCS
6	160 m (northwest)	PM_{10}, RCS
7	250 m (southeast)	PM_{10}
8	500 m (southeast)	PM_{10}
9	650 m (southeast)	PM_{10}

Note: Sites 7, 8 and 9 were installed later in the monitoring programme.

A literature review undertaken for Environment Canterbury by Pattle Delamore Partners (PDP 2024) provided a review of the Yaldhurst Study data and provided the following conclusion regarding PM10 impacts with distance from the quarry:

> *"The comparison of the maximum 24-hour average PM_{10} concentration measured at background and the three 160 to 250 m downwind sites suggest that beyond 250 m the change in PM_{10} concentrations due to the influence of the quarry's emissions is not distinguishable from background PM_{10} concentrations".*

IAQM provides data, summarised in Figure 7.9, for a range of mineral mining/quarrying operations (including opencast coal mining), from which a similar conclusion to that of PDP is reached. The data in that instance shows that the additional mean PM_{10} concentration beyond 300 m is negligible. Given this context and the significantly larger separation distances to sensitive receptors where persons are likely to be present for 24-hour or longer, it is concluded that potential effects of PM_{10} discharges associated with the proposed Buller Plateaux operations are likely to be negligible.

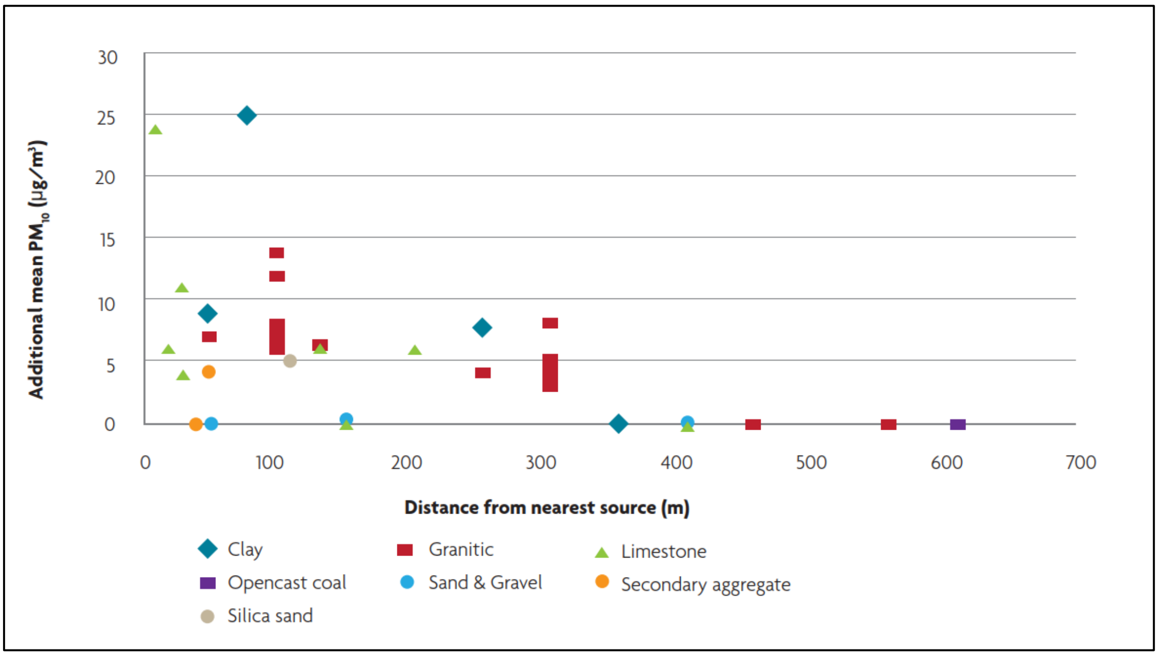

Figure 7.9: Mineral site PM_{10} increment as a function of distance from operation as by mineral type (source: IAQM 2016).

With regard to the finer $PM_{2.5}$ fraction, the Yaldhurst study found concentrations were generally low with no recorded exceedances of the MfE reporting 24-hour guideline of 25 µg/m³. The study also states that "*A comparison of $PM_{2.5}$ and PM_{10} (nephelometer) data shows $PM_{2.5}$ to be a minor component of the PM_{10} concentrations measured in Yaldhurst (at sites 2 and 3) compared with background (site 4). The fine fraction $PM_{2.5}$ was 17% and 14% of PM_{10} measured at sites 2 and 3 respectively, but 24% at site 4.*" This finding is consistent with the understanding that quarry and mining operations are not expected to be a significant source of $PM_{2.5}$ emissions, noting that such emissions are predominantly associated with combustion related emission sources.

A monitoring study to inform the air quality assessment for the Lyttleton Coal Stockyard was undertaken for the Lyttelton Port Company (LPC) by T+T in 2021. The Lyttleton Coal Stockyard is where the coal from Bathurst is transport to by rail after it leaves the Ngakawau Rail Loadout. The monitoring study for LPC considered the impacts of coal dust on the residential community (located approximately 450 m from the coal stockpiles) and measured concentrations of PM_{10} and $PM_{2.5}$. The monitoring study also sought to determine the contribution of coal to measured source of PM_{10} and $PM_{2.5}$. The results of that study are summarised as a graph in Figure 7.10, and showed generally low concentrations relative to the human health guideline values. The source apportionment study showed that coal dust from the stockyard contributed approximately only 7% to measured $PM_{2.5}$ concentrations, with shipping emissions and marine aerosols dominating the measured concentrations (refer to Figure 7.11).

Given the findings of the Yaldhurst study and those of the Lyttleton Coal Stockyard, and the significant separation distances to sensitive locations where persons are likely to be present for 24-hour or longer, it is concluded that potential $PM_{2.5}$ impacts will be negligible.

Given the above findings regarding $PM_{2.5}$ and the significantly larger separation distances to sensitive receptors where persons are likely to be present for 24-hour or longer, it is concluded that potential effects of $PM_{2.5}$ discharges associated with the proposed BPCP operations are likely to be negligible.

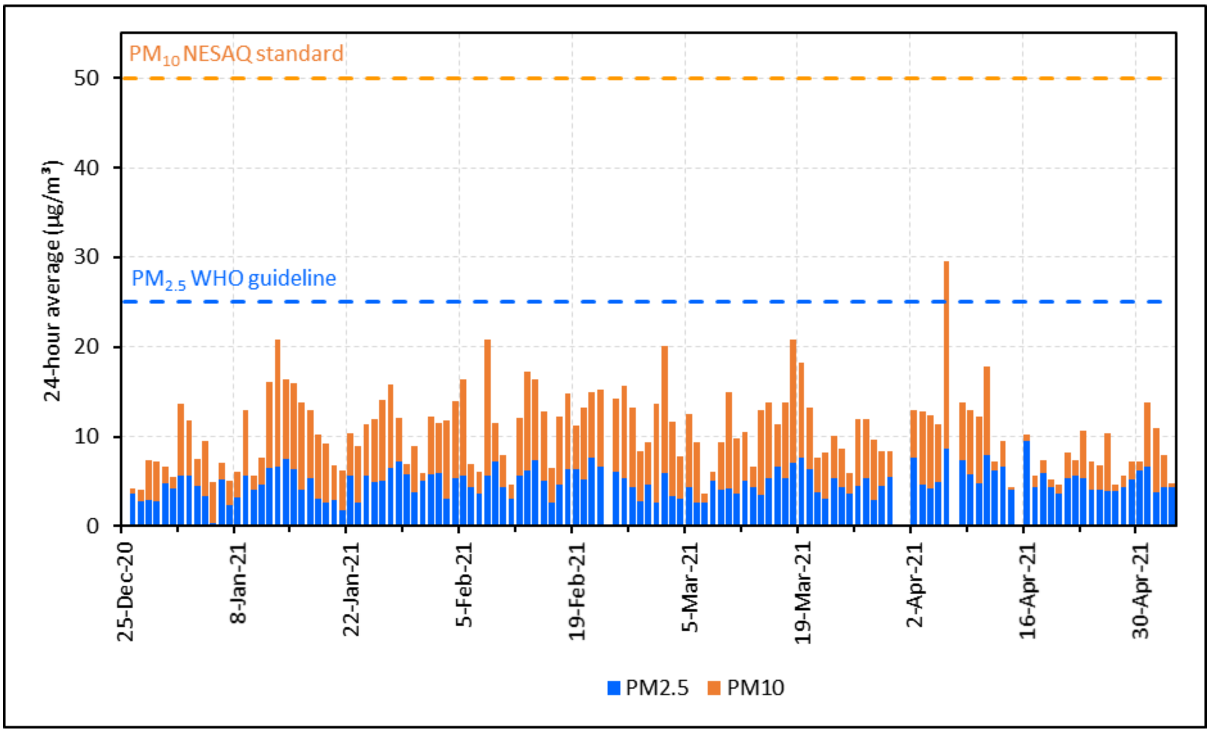

Figure 7.10: Gilmore Terrace site measured 24-hour average $PM_{2.5}$ and PM_{10} for the monitoring period.

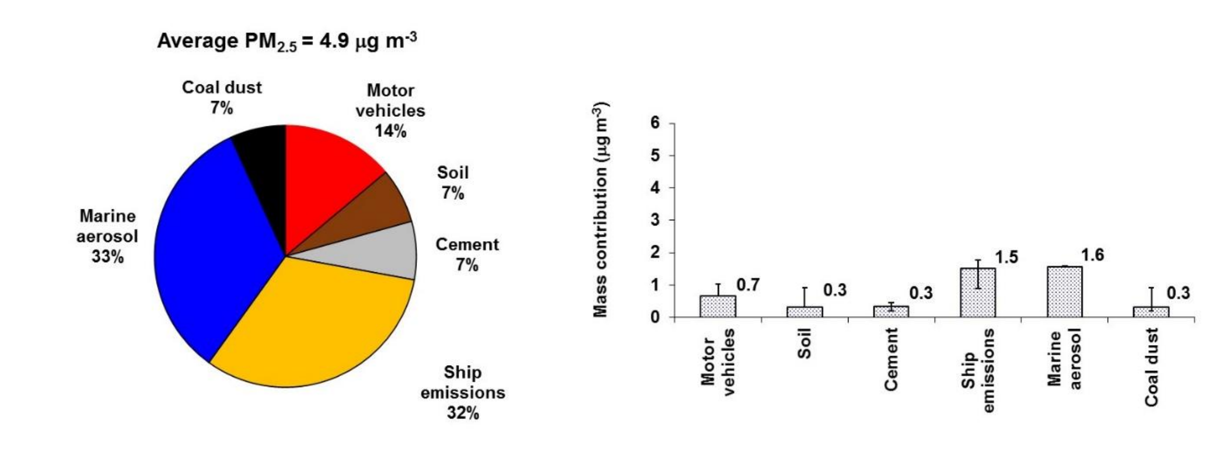

Figure 7.11: Average source contribution of PM_{10} (top) and $PM_{2.5}$ (bottom) at the Lyttelton monitoring site (Source GNS 2021).

7.7.2 Respirable crystalline silica

The Yaldhurst Study was the first time in New Zealand that long-term average ambient RCS concentrations had been measured at a resolution that would enable a comparison against the California Office of Environmental Health Hazard Assessment(OEHHA) guideline (3 µg/m³ expressed as an annual average) (OEHHA, 2020). T+T is not aware of any similar subsequent study that has been undertaken in New Zealand.

Concentrations of RCS averaged over the 4-month monitoring period were very low, with all but one of the sites recording individual monthly concentrations below the limit of detection (LOD) of the monitoring method (between 0.2 and 0.8 µg/m³) (Mote, 2018). Site 3, to the south of the quarries, had two monthly samples where the concentration was recorded as above the limit of detection (LOD) (0.33 and 1.68 µg/m³). This site was located 50 m from a quarry boundary (the closest of all monitoring sites), downwind under prevailing northeast winds and away from any sensitive locations.

The monitoring was carried out for four months, but this was timed for the summer and autumn months when the potential for dust generation is greatest. RCS levels will be lower in winter and spring when ground conditions are frequently damp. From the 4-monthly average results, it was concluded that the annual average RCS concentration would almost certainly be well below the OEHHA guideline of 3 µg/m³ as an annual average, even for the location of the closest monitoring site.

The findings of this monitoring resulted in Environment Canterbury issuing a media release (22 June 2018) quoting the Canterbury Medical Officer of Health, Dr Ramon Pink, who at that time reviewed the results and provided the following statement:

> *"Overall, the results show there is no serious public health risk to Yaldhurst residents from airborne dust… Nuisance dust levels will not cause long-term health effects, but we know it can cause irritation and symptoms of concern in some people …".*

We consider that the proposed mining operations at the BPCP are very unlikely to give rise to annual average RCS concentrations at sensitive receptor locations that would approach the OEHHA guideline of 3 µg/m³ based on the following:

- The distance between the Yaldhurst quarries and the monitors (50 m – 190 m) is considerably closer than the nearest sensitive receptors to the proposed BPCP operations (> 420 m).

- None of the nearest sensitive receptors are downwind during prevailing wind conditions to the proposed BPCP operations, thereby significantly minimising annual exposure.
- When considering the scale of the operation and local meteorology (notably rainfall), dust generation is likely to be comparatively lower for the proposed BPCP operations compared with the Yaldhurst quarries. Notably, the significantly higher rainfall and lower summer temperatures on the Buller Plateaux provides a significant degree of natural dust mitigation.
- The study period comprised a wide range of wind conditions and used monitoring sites that surrounded the quarry zone. Consequently, the results are considered to be representative of concentrations for a wide range of wind conditions and are independent of wind direction.

7.8 Cumulative effects

There are no other significant discharges to air in the vicinity of the Project sub-areas that are expected to give rise to appreciable cumulative air quality effects, other than the Cypress mine.

With regard to the Cypress mine, it is located to the east of the Stockton Project sub-area. Cumulative effects from the Cypress mining operations are expected to be negligible given the following:

- The significant separation distance between the Cypress mine and the nearest sensitive receptor (approximately 5.5 km to Millerton).
- The very low frequency of winds that blow from the Cypress mine site towards the Stockton Project sub-area and in the direction of Millerton.

The greatest risk of cumulative air quality effects arises from interaction discharges from the different Project sub-areas. However, cumulative effects from discharges of different Project sub-areas occurring concurrently are expected to be negligible in this instance because of:

- The large separation distances between the different Project sub-areas (approximately 1 km for MFS and Stockton, 3.5 km between MFS and ESE); and
- The large separation distances to the nearest sensitive receptors (discussed in Section 7.4).

7.9 Conclusion

Across the Stockton and Ngakawau Rail Loadout, Mount Frederick South, Escarpment Extended, Upper Waimangaroa Haul Road, sub-areas, the IAQM and FIDOL assessments consistently show low to negligible dust impact risks at sensitive locations. Where slight adverse effects are predicted, these are confined to receptors located relatively close to active sources and occur under infrequent meteorological conditions that favour dust transport. This is generally consistent with the historic deposition monitoring that is presented in Section 4.5.2.

The combination of favourable local meteorology (high annual rainfall, low summer temperatures, and prevailing winds away from sensitive receivers), substantial separation distances, and proven operational dust controls provides a high level of inherent mitigation. Potential ecological effects are expected to be confined to areas immediately adjacent to active mining and haul roads (i.e., within approximately 50 m), with these effects further reduced through progressive rehabilitation and surface stabilisation. This conclusion is again supported by the historic deposition monitoring (Section 4.5.2), showing rates well below that typically associated with impacts on sensitive vegetation.

The assessment also concludes that potential health effects associated with particulate matter (PM_{10} and $PM_{2.5}$) and respirable crystalline silica emissions are very unlikely to approach relevant health-based guideline values. No significant cumulative air quality effects are anticipated, given the separation between sub-areas and the limited overlap of operations.

Overall, subject to the continued implementation of the dust management, monitoring, and adaptive mitigation measures outlined in Section 6, the BPCP is expected to give rise to actual and potential adverse effects on the surrounding environment which are negligible or low.

8 Alternatives

Consideration of alternative methods of discharge, including discharging into any other receiving environment, is required under section 105 of the RMA for applications seeking to discharge contaminants.

In terms of alternative methods of discharge, this mainly relates to methods to control dust emissions and respond to potential dust impacts as they arise. The mitigation and monitoring methods described in Section 6 are considered appropriate to ensure that potential off-site dust effects will not be offensive or objectionable, recognising the high rainfall environment (natural dust suppression), prevailing winds (mostly away from sensitive receivers) and significant separation distances to sensitive receivers.

Alternative methods of dust control that are sometimes employed on open cast coal mining operations in other jurisdictions (such as in Australia) typically reflect the significantly more arid environments where rainfall rates are an order of magnitude lower than experienced on the Buller Plateaux and ambient temperatures are much higher. Examples of such measures include:

- The use of chemical dust suppressants (used on haul roads where water availability is constrained). Chemical dust suppressants are relatively expensive and are typically only used where there is a shortage of water for dust suppression or sensitive receptor locations that are particularly close (i.e. within 100 m). Neither situation is applicable in this instance.
- Paving haul roads can be used to control dust from vehicles travelling along them. As an option, this measure would only be used where other mitigation measures, such as the application of water to haul roads, is not viable. Notwithstanding the significant cost of this measure, it is often not practicable in circumstances where large haul trucks are used due to the paving surface not being able to withstand the significant weight of the haul trucks.
- With regard to the Ngakawau Rail Loadout, the enclosure of coal stockpiles. This is not practicable due to the relatively large area, which would otherwise require a particularly large building to enclose the coal.
- Conveyor systems can be used for transporting materials around the site between certain locations. However, periodic moving of this infrastructure to follow the mine working face movement, significant travel distances and costs associated with such infrastructure mean it is not practicable.
- Surface crusting agents on active stockpiles can be used to minimise wind-blown dust. However, this is not practicable for stockpiles that have material continuously added and removed. Its viability is also significantly affected by the high rainfall of the Buller Plateaux.

9 Conclusions

Bathurst Resources Limited (including its subsidiary companies Bathurst Coal Ltd and Buller Coal Ltd) and joint venture partner BT Mining Ltd are seeking approvals through the Fast-track Approvals Act 2024 (FTAA) for the BPCP.

The BPCP covers areas on both the Stockton Plateau and the Denniston Plateau (collectively referred to as the Buller Plateaux). The purpose of the BPCP is to extend approvals for the existing infrastructure and mining operations associated with the Stockton Mine and provide access to additional coal mining areas across the Buller Plateaux, as the coal resource in the current Stockton operations are close to depletion, and further coal resources for blending are required.

A qualitative air quality assessment has been undertaken using MfE and IAQM guidance. The assessment has considered site-specific meteorology, topography, existing dust deposition monitoring data, and sensitive receptor locations. It has also reviewed existing and proposed dust mitigation measures and monitoring.

A notable feature that is important to the assessment of potential dust impacts is that the Buller Plateaux (and to a lesser extent Ngakawau) experiences an exceptionally high annual rainfall, which helps to suppress dust emissions and maintain damp ground conditions. This is also combined with large separation distances to sensitive human receptors from dust generating activities on the Buller Plateaux. There is also a low frequency of winds that blow from the existing and proposed mining activities towards those receptors. This is with the exception of the [redacted] residence located close to the Stockton Mine. However, its elevated position and dense vegetation separating it from dust sources help to minimise effects. This is confirmed through historic dust deposition monitoring. Given this context, it is expected that potential dust effects on the [redacted] residence will remain low, provided that existing dust suppression measures are continued.

A review of historic complaints data also confirms no recent complaints relating to existing Stockton mining operations and a very small number of isolated complaints (two) relating to the Ngakawau Rail Loadout.

Consistent with comparable monitoring undertaken at similar operations, potential health effects associated with PM_{10}, $PM_{2.5}$ and respirable crystalline silica emissions are very unlikely to approach relevant human health-based guideline values due to the large separation distances to sensitive human receptors, the very high rainfall suppressing dust for much of the year, and the low wind exposure for most receptors.

The potential air quality effects on recreational users of the area have been assessed as being negligible to low, with additional mitigation set out in the recreational and tourism assessment prepared by Rob Greenaway & Associated (2025).

Potential effects on vegetation and ecological receptors are expected to be limited to areas immediately adjacent to key dust sources such as haul roads, and these will be further reduced through progressive rehabilitation and ongoing surface stabilisation measures. Additional mitigation is described in the ecological assessment report (Ecological Solutions, 2025), which includes the use of setback distances to disturbance areas.

Given the above findings, the assessment has determined that the proposed BPCP can be undertaken in a manner that appropriately manages and minimises discharges to air to ensure that adverse effects on the surrounding environment, including sensitive human, recreational and ecological receptors, will be negligible or low.

Continued dust deposition and meteorological monitoring is recommended, with new dust deposition monitoring sites to include representative locations at Denniston and other areas of importance from an ecological perspective. The use of continuous dust monitoring instruments is not recommended because of known issues such instruments have with operating in high humidity/rainfall environment, but also because of the large separation distances to sensitive receptors. Routine visual inspections to confirm the effectiveness of dust mitigation measures will continue. A dust management plan has been prepared detailing the mitigation measures and monitoring to be undertaken.

Given the above, and subject to the continuation of the mitigation and monitoring measures outlined in this report, the BPCP is consistent with the relevant objectives and policies of the West Coast Regional Air Quality Plan and the requirements of the Resource Management Act 1991. The proposed operations are expected to maintain existing good practice standards and achieve air quality outcomes that protect human health, amenity, and the wider receiving environment over the life of the BPCP.

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11 Applicability

This report has been prepared for the exclusive use of our client Bathurst Resources Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application under the Fast-track Approvals Act 2024 and that an Expert Panel as the consenting authority will use this report for the purpose of assessing that application. We understand and agree that this report will be used by the Expert Panel in undertaking its regulatory functions in connection with development of BPCP.

12 Compliance with the Environment Court Practice Note 2023

I confirm that, in my capacity as author of this air quality assessment, I have read and abided by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses contained in the Practice Note 2023.

I am employed by Tonkin & Taylor Limited. I hold a Master of Science (Hons) in Environmental Science (2000) and a Bachelor of Science (1998), both from the University of Canterbury. I am member of the Clean Air Society of Australia and New Zealand (CASANZ). I have 26 years' experience assessing air quality impacts.

Recent relevant projects and services that I have been involved with include:

- I am the technical air quality lead in the ongoing preparation of an air quality technical assessment to support an Environmental Effects Statement in relation to the proposed Wimmera Mineral Sands mining operation in Victoria Australia (Illuka Resources Limited, 2024 - present).
- I have prepared air discharge assessments and resource consent application for a various Fonterra sites, including the Te Awamutu (biomass conversion of a coal fired boiler), Darfield, Pahiatua (Dryer 3 expansion), Clandeboye, Studholme (biomass conversion and site expansion), Stirling, Kaikoura, Edendale (dryer 4 expansion), Hautapu, Waitoa, Takaka, Te Awamutu, Kauri, Longburn, Kapuni, Whareroa, and Brightwater sites. (Fonterra Limited, 2006 - present).
- I prepared the air quality technical assessments, dust management plans and presented evidence in relation to Road Metals five separate resource consent applications for the expansion of its Yaldhurst quarry operation (Road Metals Limited 2006 – 2024)
- I prepared the air quality assessment, dust management plan and presented expert evidence for the application by Lyttelton Port Company in relation to the reconsenting of its Coal Stock Yard (LPC 2019-2023).
- I prepared the air quality technical assessment in relation to air discharges from Marsden Point Oil Refinery air quality assessment as part of its reconsenting project (New Zealand Refining Company, 2019-2020).

- I was the air quality technical lead for the preparation of an air quality assessment for the reconsenting of air discharges for Ravensdown's largest superphosphate manufacturing plant near Napier. The results of the project fed into a human health risk assessment and an assessment of vegetation effects. The project included the preparation and presentation of expert evidence. (Ravensdown Napier Works (2020-2022).

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
[redacted]	[redacted]
Richard Chilton Technical Director – Air Quality	Lean Phuah Project Director

Appendix A Wind data analysis

A1 Stockton wind data

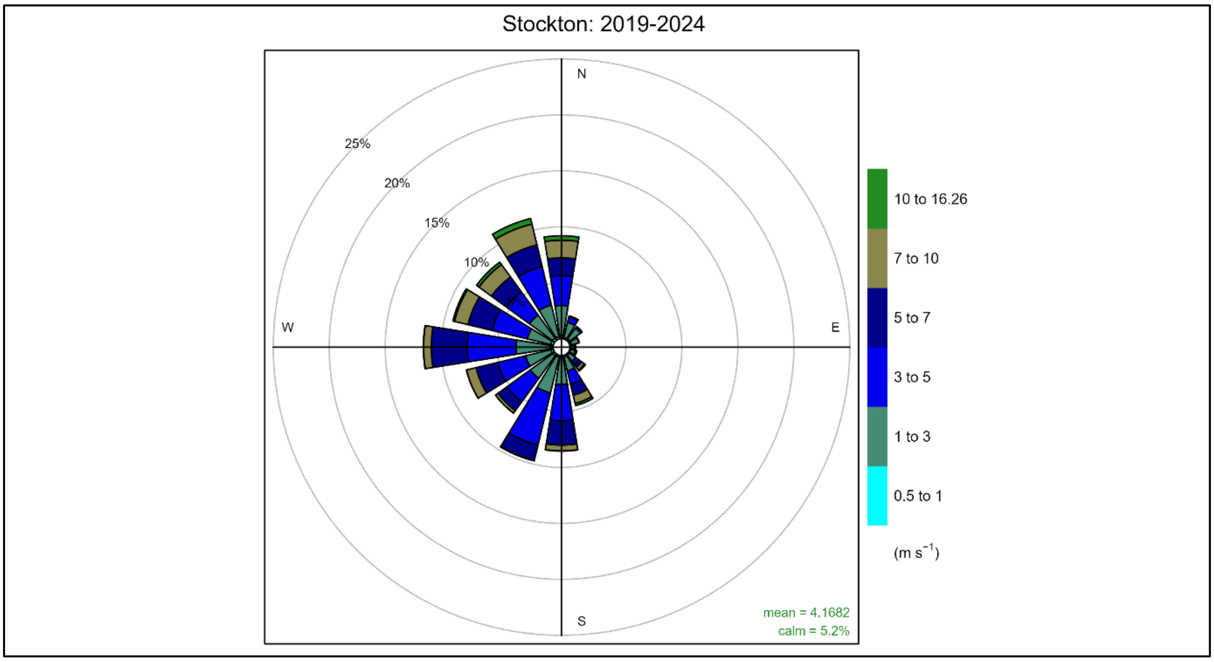

Figure Appendix A.1: Windrose for Stockton met station: 2019-2024.

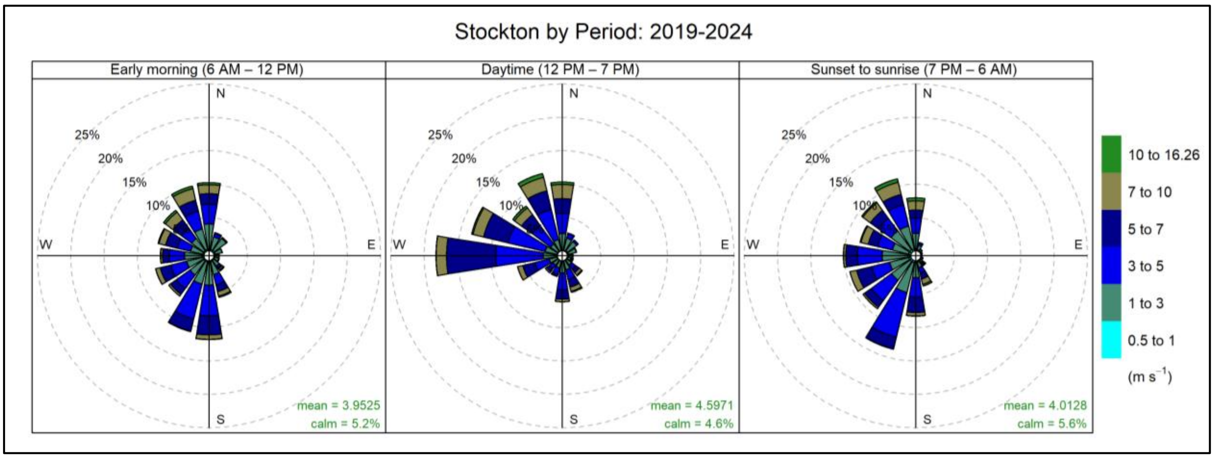

Figure Appendix A.2: Windroses for Stockton met station by time of day: 2019-2024.

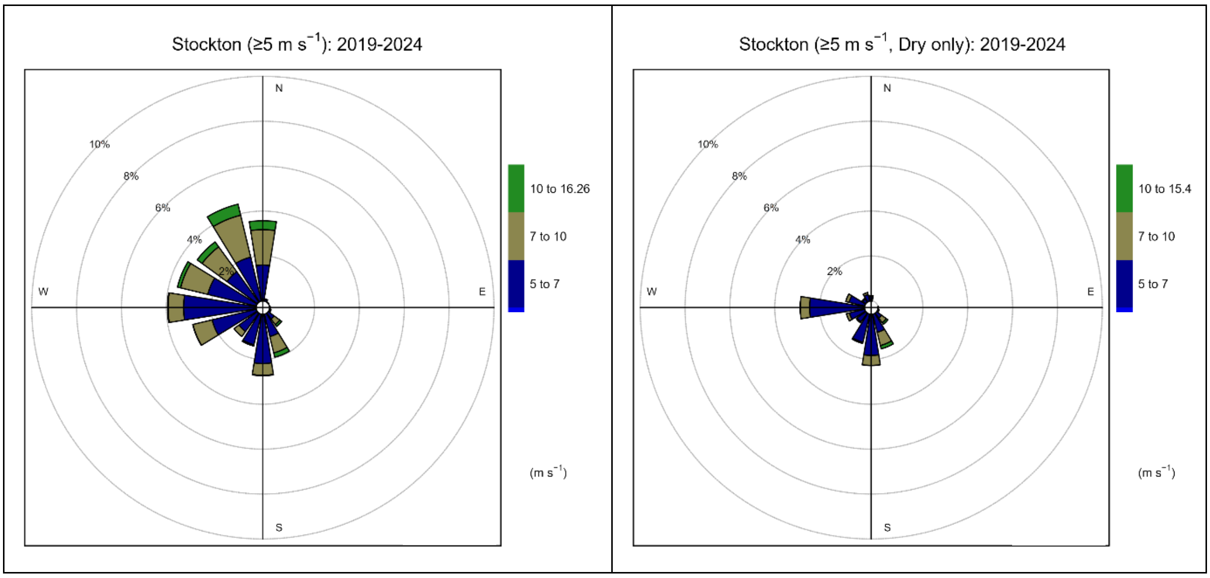

Figure Appendix A.3: Windroses for Stockton met station for strong wind conditiosn (left) and strong wind conditions during dry weather (right): 2019-2024.

A windrose has also been generated for the Cypress mine meteorological station and is provided in Figure Appendix A.4. This windrose is very similar to that of the Stockton site, notably showing a very low frequency of winds from the eastern quadrant. It is presented here to give confidence to the wind pattern observed for Stockton, which may be seen as unusual given the absence of winds form the eastern quadrant.

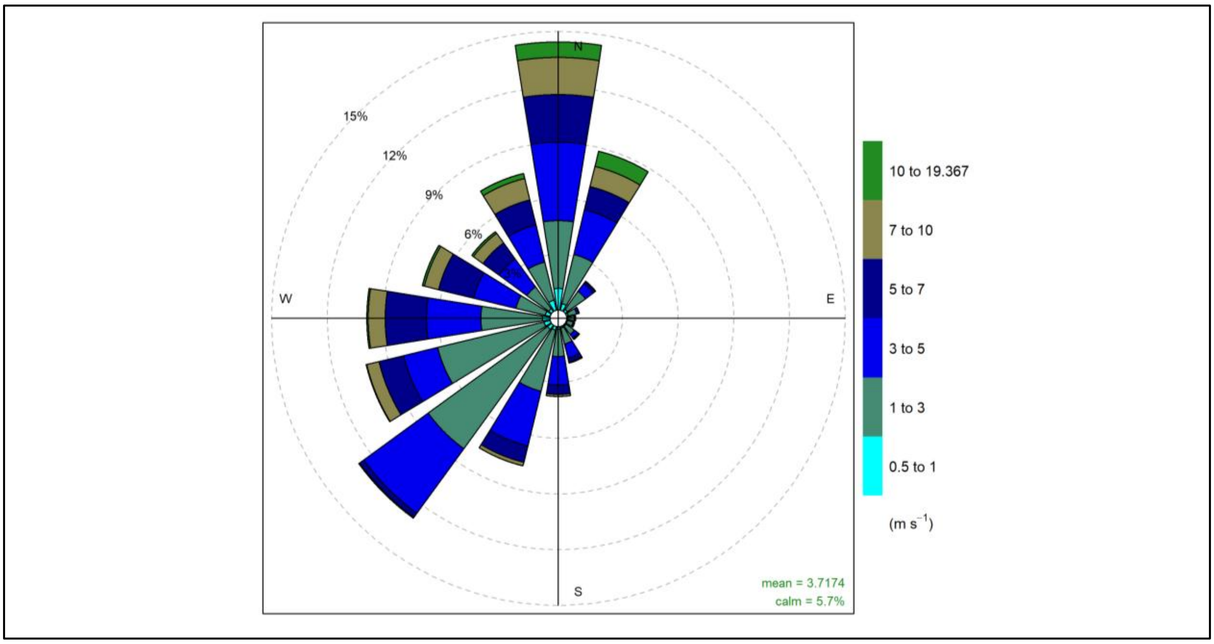

Figure Appendix A.4: Windrose for the Cypress meteorological station for five years 2019 – 2023 (inclusive), showing the direction that winds come from.

A2 Ngakawau

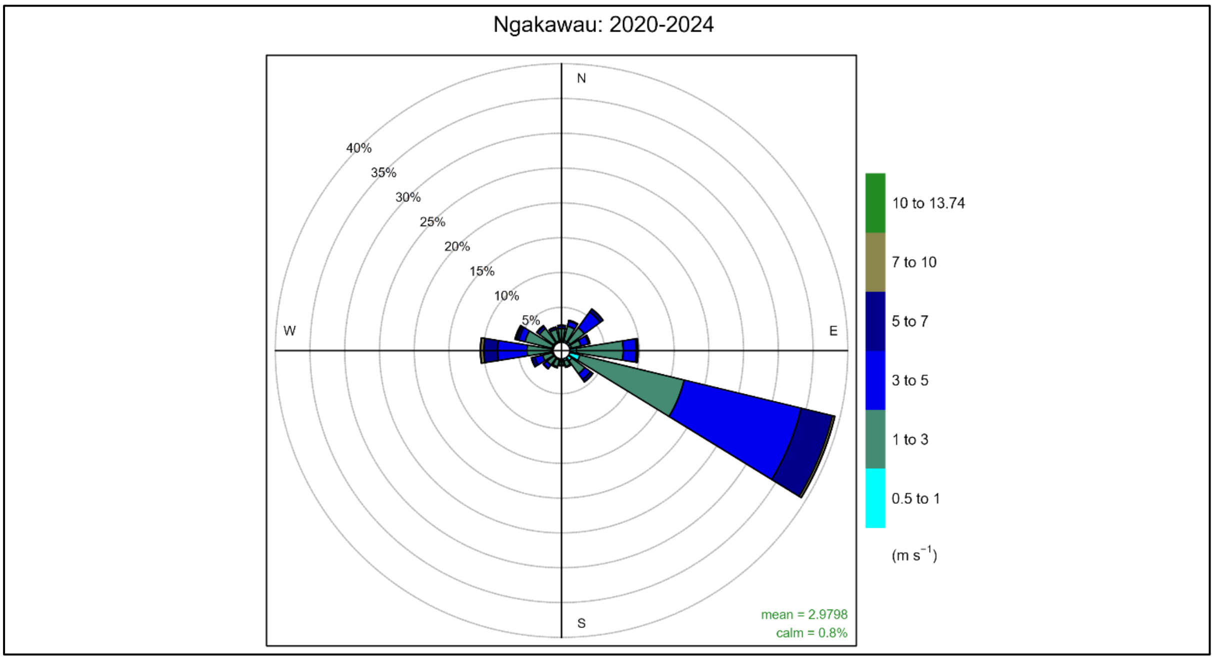

Figure Appendix A.5: Windrose for Ngakawau met station: 2020-2024.

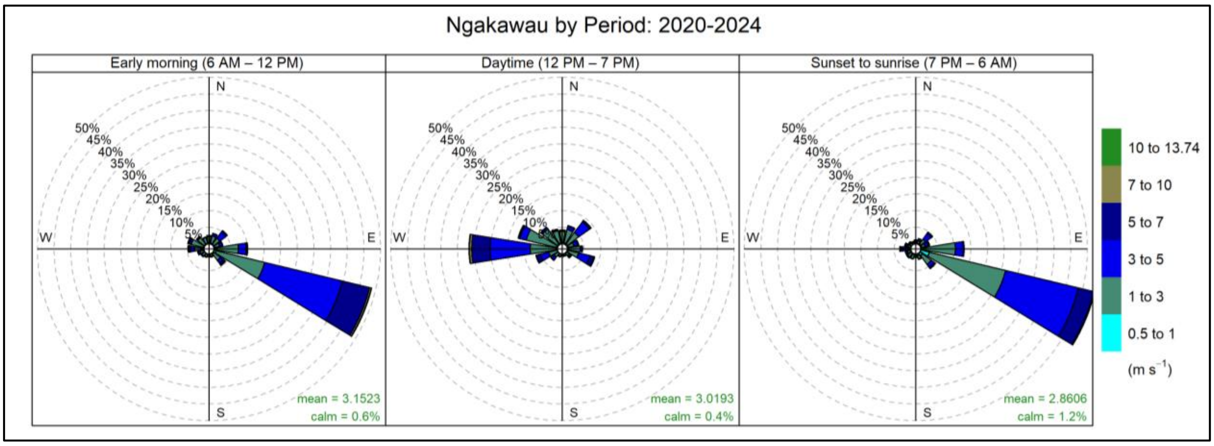

Figure Appendix A.6: Windroses for Ngakawau met station by time of day: 2020-2024.

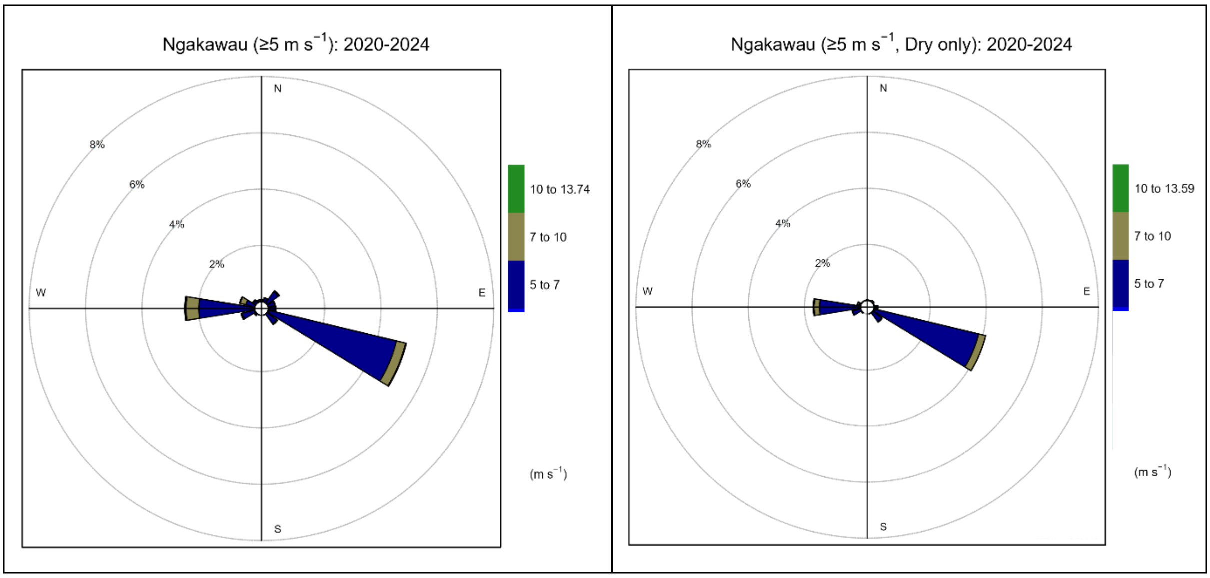

Figure Appendix A.7: Windroses for Ngakawau met station for strong wind conditiosn (left) and strong wind conditions during dry weather (right) : 2020-2024.

A3 Burnett's Face Road

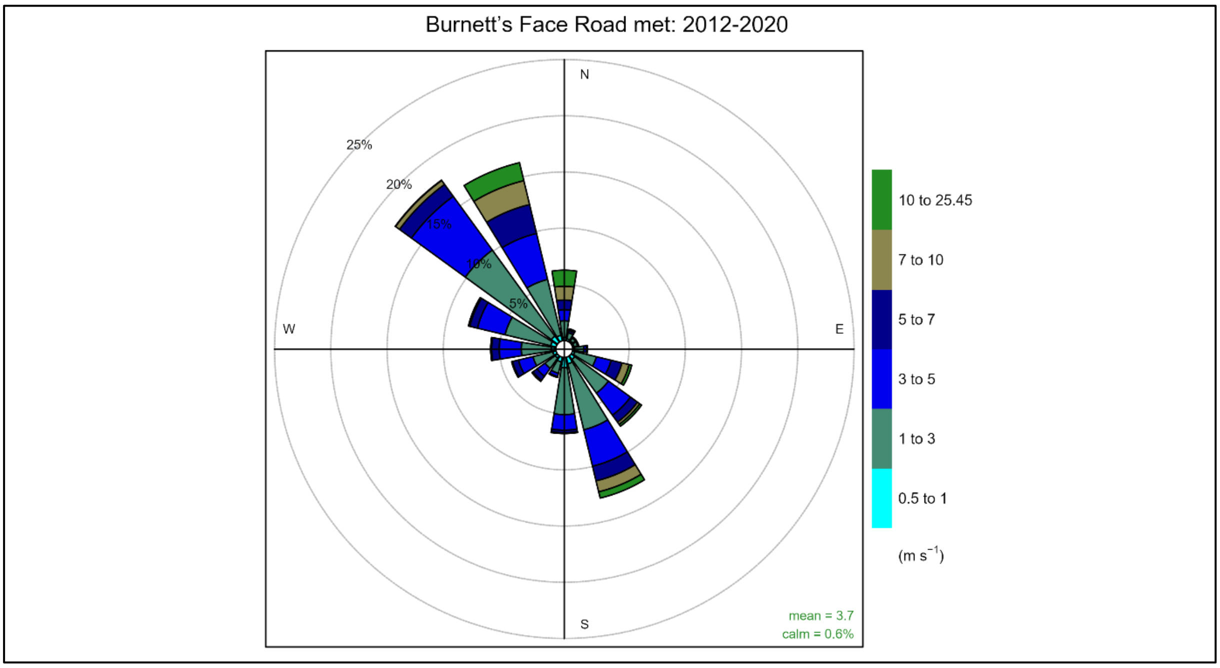

Figure Appendix A.8: Windrose for Burnett's Face Road met station: 2012-2020.

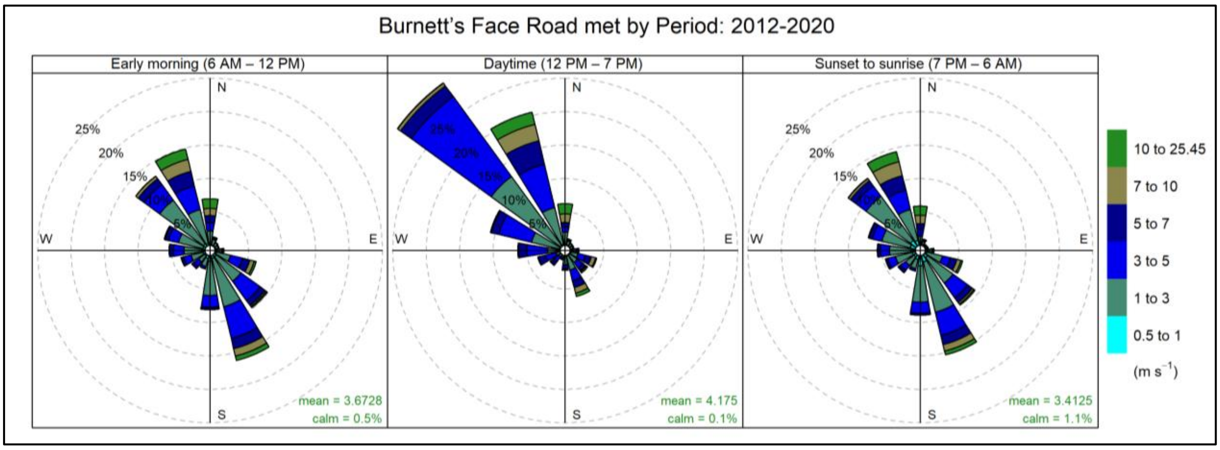

Figure Appendix A.9: Windroses for Burnett's Face Road met station by time of day: 2012-2020.

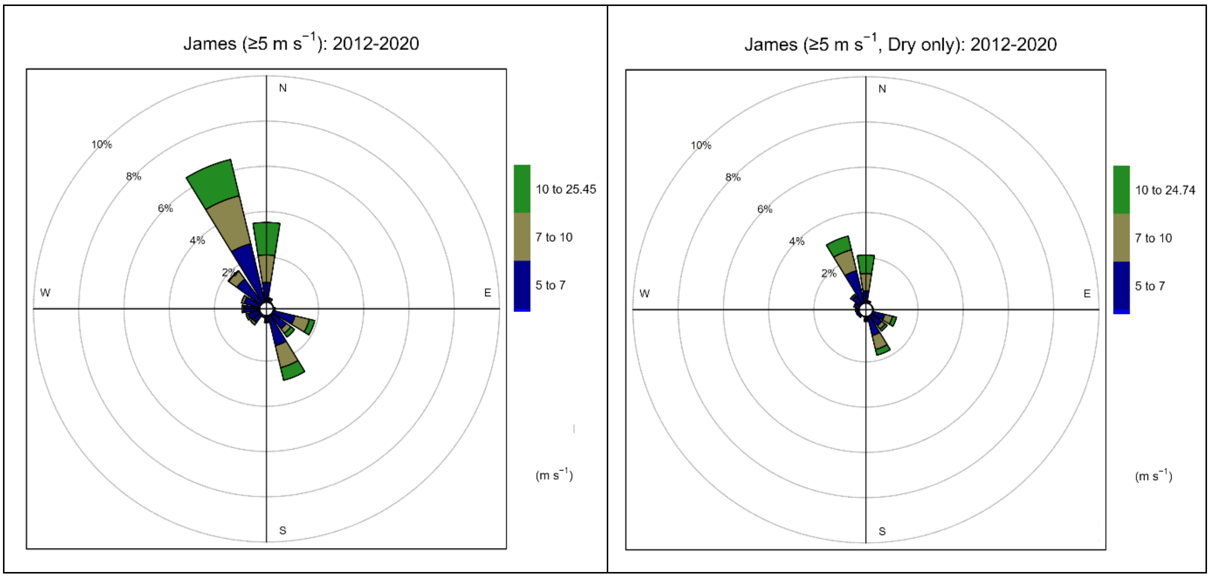

Figure Appendix A.10: Windroses for Ngakawau met station for strong wind conditiosn (left) and strong wind conditions during dry weather (right): 2012-2020.

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