HAIL CREEK MINE

Environmental Authority Amendment
Air Quality

Prepared for:

Glencore
PO Box 107
Glenden QLD 4743

SLR Ref: 626.30128.00000-R05
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Glencore (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
626.30128.00000-R05-V0.1	13 April 2023	Judith Cox	K Lawrence	DRAFT
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1 Introduction

1.1 Overview

Hail Creek Open Cut (HCOC) is an open cut coal mine located in the Bowen Basin in Central Queensland. It is situated 85 km west of Mackay (150 km by road) and approximately 35 km northwest (50 km by road) of the township of Nebo. HCOC is a joint venture, predominantly owned by Hail Creek Coal Holdings Pty Ltd (HCC), a subsidiary of Glencore Coal Assets Australia. Glencore began operational management of the mine in August 2018, after Glencore acquired Rio Tinto's 82% interest in the mine.

HCOC is authorised through Environmental Authority (EA) EPML00661913 and Mining Leases (MLs) 4738 and 700026. Construction of HCOC commenced in December 2001, with infrastructure completed in April 2003. Mining of overburden began in April 2003, with the first coal produced in August 2003. Coal is mined using conventional open-cut strip-mining methods, with approval to produce up to 20 million tonnes of product coal per annum. The mine has an expected life of mine to 2043.

Due to changes in mine sequencing, improvements in mining efficiency and further resource definition, an extension to the approved mining footprint of the Carrinyah and Exevale Pits is required to continue mining at HCOC (the Project).

1.2 Report Purpose and Structure

This Air Quality Impact Assessment Technical Report has been prepared by SLR Consulting Australia Pty Ltd (SLR) on behalf of HCC to provide supporting information to the EA Amendment Application under *Section 226* of the *Environmental Protection Act 1994* (EP Act). The structure of the Report is outlined in **Table 1**.

Table 1 Report Structure

Section	Description
1: Introduction	Provides an overview of the purpose of the Report and outlines the structure and supporting documentation
3: Regulatory Framework	Provides an overview of the relevant regulations, including the current EA conditions relevant to air quality
4: Existing Environment	Provides an overview of the local topography, meteorology, and an assessment of the current ambient air quality in the context of the nearest sensitive receptors
5: Assessment	Presents the air quality impact assessment for the proposed amendments
7: Conclusion	Summarises the key findings of the assessment

2 Project Description

2.1 Current Operations

Hail Creek Open Cut (HCOC) is an open cut coal mine located in the Bowen Basin in Central Queensland. It is situated 85km west of Mackay (150 km by road) and approximately 35 km northwest (50 km by road) of the township of Nebo.

HCOC is a joint venture (Table 2 1), predominantly owned by Hail Creek Coal Holdings Pty Ltd, a subsidiary of Glencore Coal Assets Australia. Glencore began operational management of the mine in August 2018, after Glencore acquired Rio Tinto's 82% interest in the mine.

HCOC is authorised through Environmental Authority (EA) EPML00661913 and Mining Leases (MLs) 4738 and 700026. Construction of HCOC commenced in December 2001 with infrastructure completed in April 2003. Mining of overburden began in April 2003, with the first coal produced in August 2003. Coal is mined using conventional open-cut strip-mining methods and has approval to produce up to 20 million tonnes of product coal per annum.

The four key mining activities undertaken at HCOC are:

1. Pre-production and exploration drilling;
2. Open cut mining;
3. Coal handling and preparation; and
4. Maintenance and services.

2.2 Proposed Operations

Figure 1 shows the currently authorised extent of disturbance (green) and the proposed extension areas relevant to this report (purple). The amendment application for the Project includes the following extensions to the current operations:

1. An amendment to the approved footprint of the Kemmis Pit to include an additional 2 hectares (ha) of surface disturbance (**Figure 1 – Area 1**).
2. An amendment to include a new footprint of the Homevale Pit with 96 ha of surface disturbance (**Figure 1 – Area 2**).
3. An amendment to the approved footprint of the Exevale Pit to include an additional 125 ha of surface disturbance (**Figure 1 – Area 3**); and
4. An amendment to the approved footprint of the Carrinyah Pit to include an additional 275 ha of surface disturbance (**Figure 1 – Area 4**).

The extents of the Kemmis Pit, Carrinyah Pit and Exevale Pit are proposed to be amended to reflect the new mine plan. The mining of the currently authorised disturbance has already been assessed in prior approvals. This air quality impact assessment will assess the potential impacts of the increased disturbance area on local air quality, and identify the need for any further air quality management or mitigation practices. No changes to the mining method, approved annual extraction rate or coal processing/handling activities are proposed.

2.3 Identified Air Emission Sources for the Project

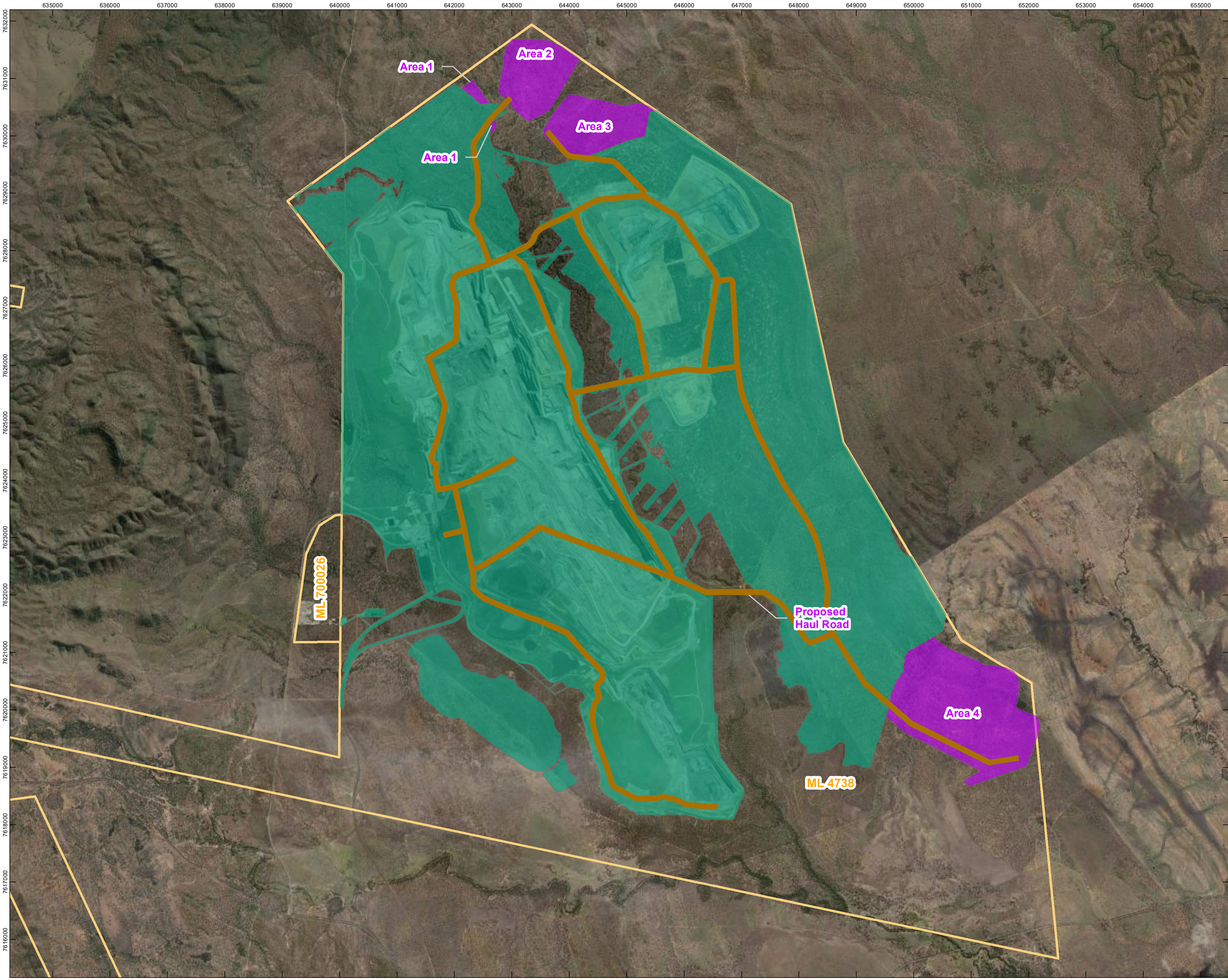
Project activities with the potential to generate emissions to air have been identified as follows:

- Progressive land clearing and topsoil removal
- Stockpiling topsoil from disturbed areas for storage and use in future rehabilitation of the site
- Drill and blasting of overburden material
- Pre-stripping/excavation of overburden material using excavators/shovels and trucks
- Removal of overburden and placement in either the in pit or out of pit dumps
- Loading and hauling of ROM coal using a combination of excavators, loaders and trucks, and
- Progressive rehabilitation by backfilling the mined-out pit, reshaping dumps, topsoiling and revegetation.

HAIL CREEK

Figure 1

MAJOR EA AMENDMENT



EA AMENDMENT PROPOSED DISTURBANCE

LEGEND

- Haul Road Realignment
- PRCP Authorised Extent of Disturbance
- EA Amendment Proposed Extent of Disturbance
- Mining Lease

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
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3 Regulatory Framework

3.1 Queensland Environmental Protection Act 1994 (EP Act)

The *Environmental Protection Act 1994* (EP Act) enables the framework for environmental assessments to be developed in Queensland. The EP Act is applicable to all members and bodies in the community, including industry and government. It provides a method for government departments to incorporate environmental factors into their decision-making process.

A summary of the objective of the EP Act is as follows:

> *The object of the Environmental Protection Act 1994 is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.* (EPP (Air) Explanatory Notes, General outline).

There is a general environmental duty to prevent and minimise environmental harm under section 319 of the EP Act. The EP Act specifically states:

> *A person must not carry out an activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (the general environment duty).*

To decide the measures required to meet the general environmental duty in accordance with the EP Act, regard must be had to:

- the nature of the harm or potential harm;
- the sensitivity of the receiving environment;
- the current state of technical knowledge for the activity;
- the current state of successful application of the different measures that might be taken; and
- the financial implications of the different measures as they would relate to the type of activity.

The EP Act allows the Environment Minister to produce Environmental Protection Policies, designed to protect environmental aspects in Queensland. The *Environmental Protection (Air) Policy* was developed under this framework in 2008, with the most recent revision being published in August 2019 and coming into force as of 1 September 2019.

3.2 Queensland Environmental Protection (Air) Policy 2019

The *Environmental Protection (Air) Policy 2019* (EPP Air, 2019) provides for the management and regulation of commercial and industrial air emissions that could adversely impact on sensitive receptors.

The purpose of the EPP (Air) is summarised below:

> *The purpose of the EPP (Air) is to achieve the object of the Act in relation to the air environment* (EPP (Air) Part 2, Section 3)*. The purpose of this policy is achieved by –*
>
> *a) Identifying environmental values to be enhanced or protected; and*

b) *Stating indicators and air quality objectives for enhancing or protecting the environmental values; and*

c) *Providing a framework for making consistent, equitable and informed decisions about the air environment.*

The environmental values listed in the EPP (Air) that are to be enhanced or protected under the policy are:

a) *The qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems; and*

b) *The qualities of the air environment that are conducive to human health and wellbeing; and*

c) *The qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and*

d) *The qualities of the air environment that are conducive to protecting agricultural use of the environment.*

Queensland air quality guidelines are published in Schedule 1 of the EPP (Air) to protect the environmental values listed above. The air quality goals prescribed for the key pollutants of concern in this study (particulate matter) are shown in **Table 2**.

Table 2 EPP (Air) 2019 Ambient Air Quality Objectives for Particulate Matter

Indicator	Environmental Value	Air Quality Objectives ($\mu g/m^3$ at 0°C)	Averaging Period
PM_{10}	Health and wellbeing	50	24 Hours
		25	1 Year
$PM_{2.5}$	Health and wellbeing	25	24 Hours
		8	1 Year
TSP	Health and wellbeing	90	1 Year

Although the EPP (Air) does not specify an ambient air quality objective for deposited matter, the Queensland Government has adopted a trigger level of 120 mg/m^2/day, which is recognised as an appropriate goal for deposited dust to avoid nuisance impacts.

3.3 EA EPML0661913 Air Quality Requirements

Under the EA EPML0661913 (dated 2 March 2022), with respect to air quality, HCOC is required to operate in accordance with Schedule B Air Conditions B1 to B2, reproduced below in **Table 3**. Condition C3 also requires that tailings must be managed in accordance with procedures contained within the tailings management plan, which must include provisions for the control of fugitive emissions to air.

Table 3 HCOC EA Schedule B (Air Quality Condition Limits)

Condition number	Condition
B1	Dust monitoring must be undertaken at least annually at the monitoring locations detailed as part of an annual return submission.
B2	**Dust and particulate matter monitoring** The holder of this environmental authority must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause nuisance at any sensitive or commercial place. The environmental authority holder will respond within twenty-eight (28) days to any validated air quality complaints with a dust monitoring campaign, as agreed with the administering authority, that assesses the level of nuisance with reference to the following air quality levels: (a) dust deposition of 120 milligrams per square metre per day, averaged over one month, when monitored in accordance with the most recent version of ‘*Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air — Determination of particulate matter—Deposited matter – Gravimetric method*’. (b) a concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM_{10}) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than five exceedances recorded each year, when monitored in accordance with the most recent version of either: (i) ‘*Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM_{10} high volume sampler with size-selective inlet – Gravimetric method*’; or (ii) ‘*Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — PM_{10} low volume sampler — Gravimetric method*’; or (iii) ‘*Australian Standard AS3580.9.11 Methods for sampling and analysis of ambient air – determination of suspended particulate matter – PM_{10} Beta Attenuation Monitors*’. (c) a concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, when monitored in accordance with the most recent version of ‘*AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air — Determination of suspended particulate matter — Total suspended particulate matter (TSP) — High volume sampler gravimetric method*’. In the event where it is determined that levels generated by the mining activities are being exceeded by the holder of this environmental authority, dust abatement measures must be implemented so that emissions of dust from the activity do not result in further exceedance of levels; or address the complaint using dispute resolution if required.

4 Existing Environment

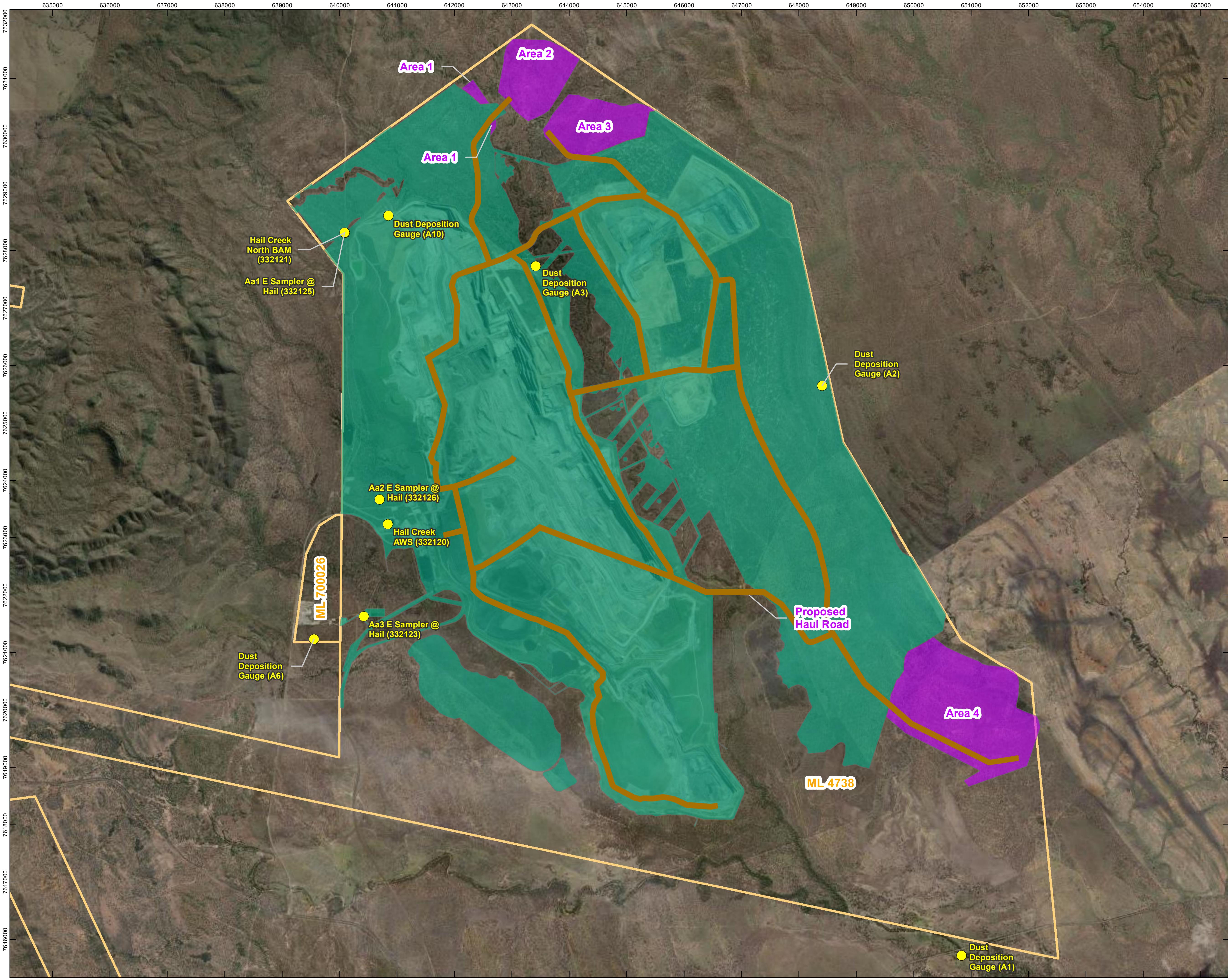
4.1 Available Data

HCOC operates a comprehensive monitoring network to assist with the environmental management of site operations. As summarised in **Table 4**, and shown on **Figure 2**, the air quality monitoring network comprises the following:

- One automatic weather stations (AWS) measuring a range of parameters, with wind speed and wind direction being the most relevant data to this assessment
- One Beta Attenuation Monitor (BAM) measuring 24-hour average PM_{10} concentrations
- One E-Sampler measuring PM_{10} concentrations
- Two E-Samplers measuring TSP and PM_{10} concentrations
- Five dust deposition gauges (DDGs).

Only data identified by HCOC as having been quality reviewed have been deemed valid and collated for analysis and discussion in this assessment.

The calculation of 24-hour averages and annual averages were completed using the valid 1-hour averages collected between January 2019 and October 2022 in accordance with the *NEPM Technical Paper on Data Collection and Handling* (NEPM, 2001), which states that an average concentration can be considered valid only if it is based on at least 75% of the expected samples in the averaging period. For example, to calculate a 24-hour average from 1-average data, at least 18 hours of data must be valid.



HAIL CREEK

Figure 2

MAJOR EA AMENDMENT

AIR QUALITY MONITORING

LEGEND

- Air Quality Monitoring Location
- Haul Road Realignment
- PRCP Authorised Extent of Disturbance
- EA Amendment Proposed Extent of Disturbance
- Mining Lease

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	13-Apr-2023
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Table 4 Summary of Hail Creek Meteorological and Ambient Air Quality Monitoring Network

Type	Monitor ID	Easting (m)	Northing (m)	Measuring	Data Reviewed	Percentage of Valid Data Available (%)			
						2019	2020	2021	2022
AWS	Hail Creek AWS (332120)	640,839.6	7,623,236.4	Meteorological data	22 November 2019 to 6 December 2022	11	100	100	88
BAM	Hail Creek North BAM (332121)	640,090.1	7,628,308.7	PM_{10}	2 December 2019 to 6 December 2022	-	94	56[(a)]	86 (to 31 Oct)
E-Sampler	Aa1 E Sampler @ Hail (332125)	640,088.9	7,628,317.6	PM_{10}	16 December 2020 to 6 December 2022	-	0[(a)]	4[(a)]	39[(a)]
	Aa2 E Sampler @ Hail (332126)	640,695.8	7,623,664.5	TSP	15 December 2020 to 6 December 2022	-	0[(a)]	10[(a)]	31[(a)]
				PM_{10}		-	0[(a)]	88	0[(a)]
	Aa3 E Sampler @ Hail (332123)	640,423.4	7,621,628.3	TSP	16 December 2020 to 6 December 2022	--	0[(a)]	12[(a)]	72[(a)]
				PM_{10}		-	41[(a)]	87	0[(a)]
Dust Deposition Gauge	A1	650,832.0	7,615,719.0	Insoluble solids Ash	6 July 2014 to 19 September 2022	Refer to **Section 4.5.1**			
	A2	648,403.2	7,625,649.0						
	A3	643,418.1	7,627,730.6						
	A6	639,556.0	7,621,234.0						
	A10	640,852.0	7,628,613.0						

(a) Less than 75% valid data, therefore no further analysis completed.

4.2 Topography

4.3 Meteorology

Whilst the Hail Creek AWS is located over 6 km from any of the proposed amendment areas, there is no significant change in the topography between them, and the AWS data are therefore considered representative of the wider area (refer to **Figure 3**).

The available windspeed and wind direction from the Hail Creek AWS between November 2019 and November 2022 are presented as wind roses in **Figure 4**.

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from north). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

Whilst there are winds recorded from all directions, on an annual basis the dominant wind direction is from the east-southeast. This is also the dominant wind direction in spring and summer. During autumn and winter, there is also a high frequency of winds from the south and south-southeast.

Figure 3 Pseudo 3-dimensional Plot of Topography

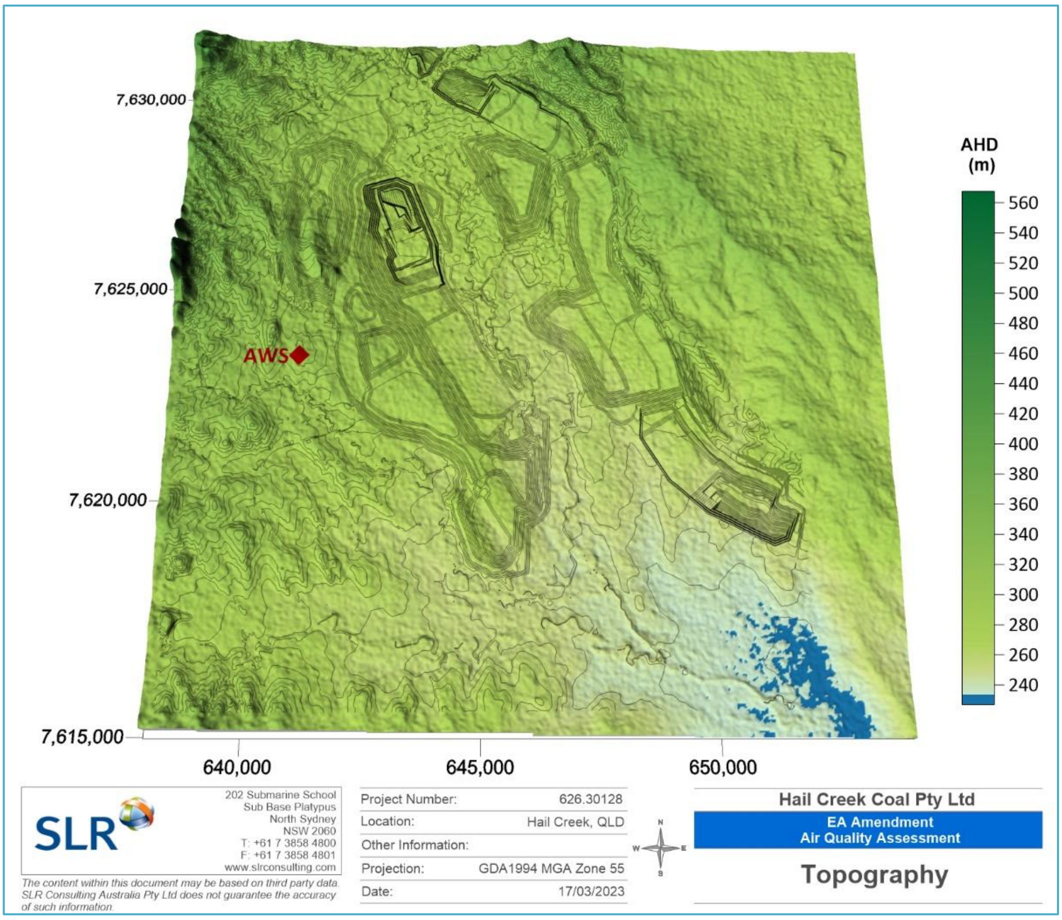
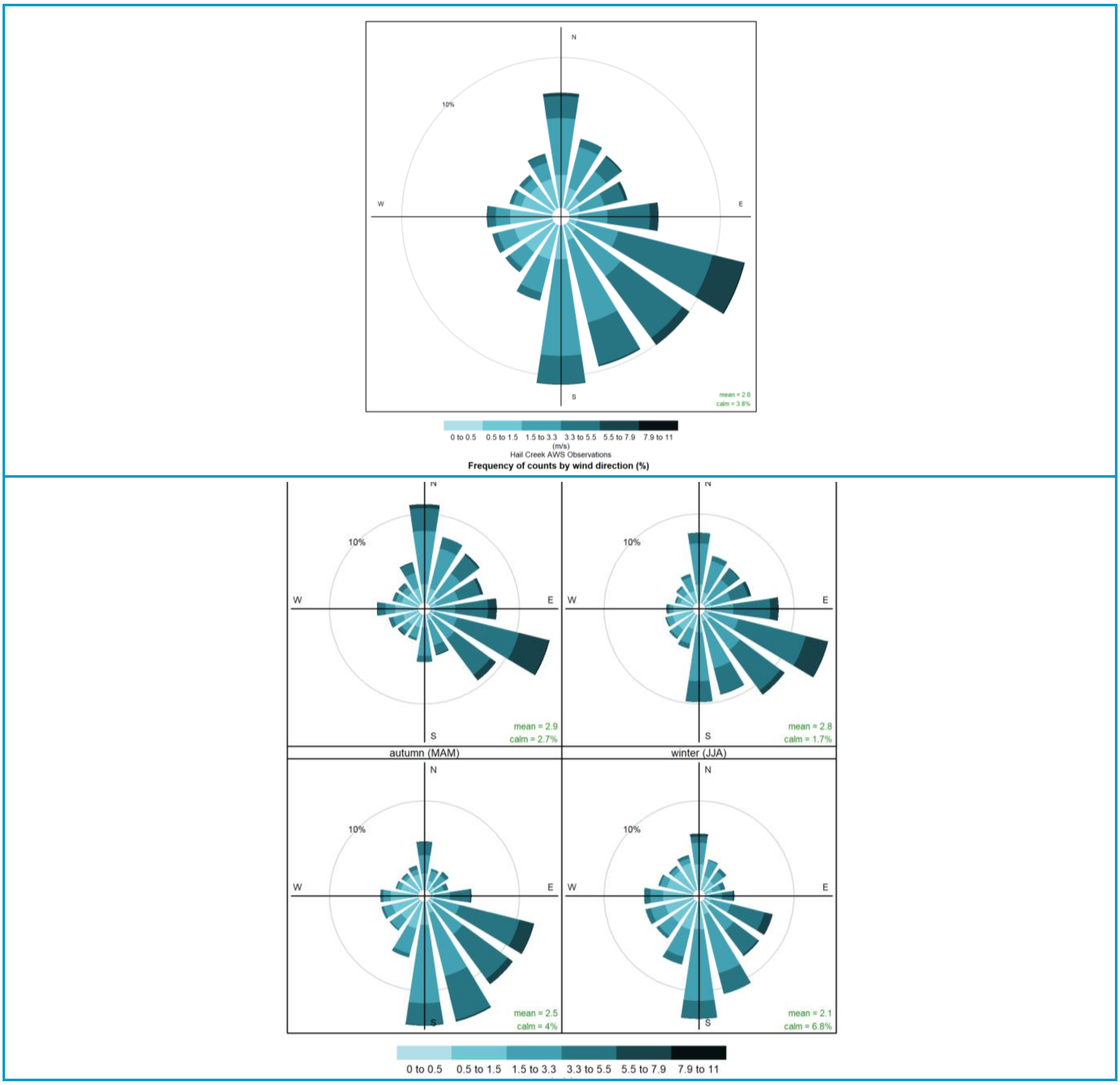


Figure 4 Hail Creek Annual and Season Windroses – November 2019 to November 2022



4.4 Sensitive Receptors

As shown in **Figure 5**, the nearest identified sensitive receptors are located 4 km or more from Amendment Area 4:

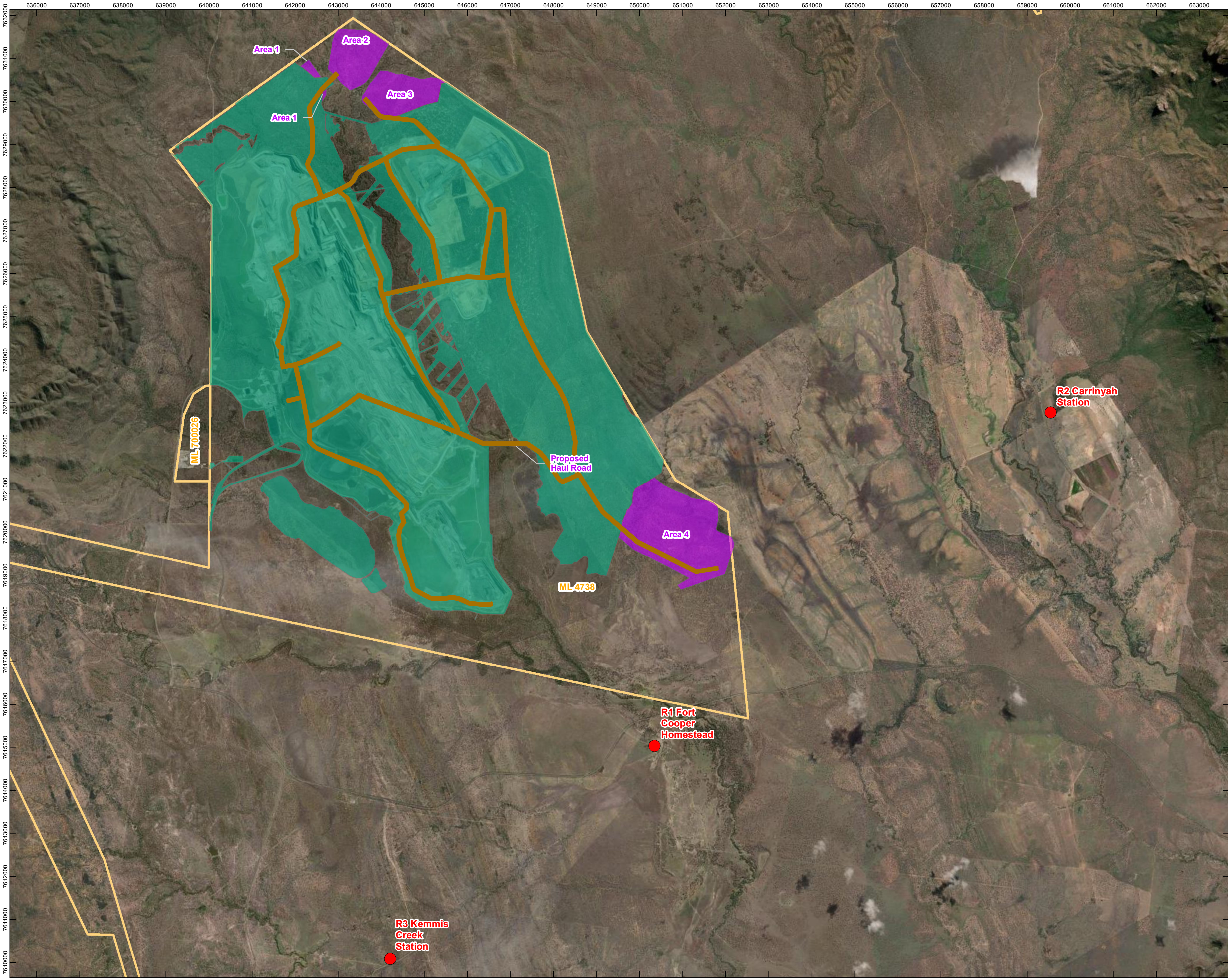
- R1 (Fort Cooper Homestead) is located approximately 4 km south of Area 4,
- R2 (Carrinyah Station) is located approximately 8 km east of Area 4
- R3 (Kemmis Creek Station) is located approximately 11 km south-southwest of Area 4

HAIL CREEK

MAJOR EA AMENDMENT

Figure 5

SENSITIVE RECEPTORS



LEGEND

- Sensitive Receptor
- Haul Road Realignment
- PRCP Authorised Extent of Disturbance
- EA Amendment Proposed Extent of Disturbance
- Mining Lease

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
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4.5 Existing Ambient Air Quality

4.5.1 Deposited dust

HCOC operates five DDGs, the locations of which are shown on **Figure 2**. A summary of the location of each DDG in relation to the proposed amendment areas is presented in **Table 5**.

As the sensitive receptors identified in the vicinity of the HCOC are all located at the southern end of the mine (refer to **Figure 5**) the data collected at DDGs A1, A2 and A6 are considered to be the most relevant for charactering the existing environment. However it is noted that all five dust gauges are located much closer to the existing HCOC mining activities than the nearest sensitive receptors and can therefore be expected to overestimate deposition rates that may be expected at those residential locations.

Table 5 Location of Dust Deposition Gauges in Relation to Proposed Amendment Areas

Dust Deposition Gauge ID	Distance to Proposed Amendment
A1	Located outside the southern mine lease. Approximately 3.4 km south of Proposed Amendment Area 4.
A2	Located on the eastern boundary of the mine lease. Approximately 5.5 km south of Area 3 and 5 km north of Proposed Amendment Area 4.
A3	Located to the north of the middle of the mine lease. Approximately 2 km southeast of Area 3, 2.5 km south of Proposed Amendment Area 1 and Proposed Amendment Area 2.
A6	Located on the western boundary of the mine lease. Approximately 10 km west of Proposed Amendment Area 4.
A10	Located in the northwest of the mine lease. Approximately 3 km southwest of Proposed Amendment Area 3.

The dust gauge samples are collected by ALS every 30 ± 2 days and analysed in accordance with the requirements of AS/NZS 3580.10.1:2003 *Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method*. The samples are analysed for the following parameters:

- Insoluble solids (required for regulatory compliance);
- Soluble matter;
- Ash; and
- Combustible matter.

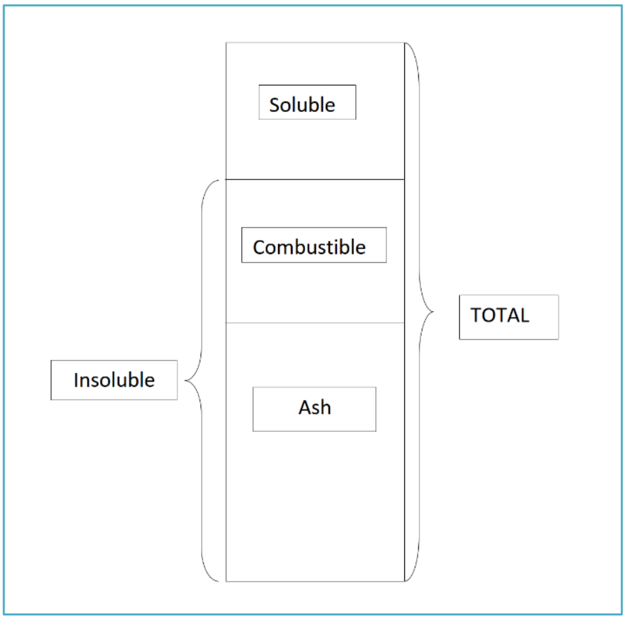
A visual analysis of each sample is also recorded.

Insoluble solids are the total filterable material within each sample. Once filtered, the filtered portion of the sample is dried and weighed and then burnt in a furnace at approximately 850°C. Combustible materials such as vegetative matter, coal dust and insects are lost in the process, and the remaining non-combustible material is weighed and recorded. Although combustible matter is typically used as an indicator of contamination due to insects and vegetation, coal fines are also combusted in this process. Should a sample contain a high percentage of coal, the percentage of combustible material would also be expected to be high. The resultant ash residue provides an indication of the 'inorganic' or non-combustible sample contents.

The proportions of ash to combustible matter in the dust deposition samples can provide an indication as to whether the dust levels have been significantly affected by mine activities. This is because samples from DDGs directly affected by the mine operations such as overburden handling and haul roads etc can be expected to have a high proportion of minerals/ash and to have low organic content (i.e. matter resulting from flora or fauna). Conversely, as noted above, samples containing a significant amount of coal dust would have a high proportion of combustible matter and lower proportion of ash.

A pictorial of the analysis is shown in **Figure 6**.

Figure 6 Pictorial of Dust Deposition Data Analysis



The valid deposited dust levels recorded between 2014 and 2022 are presented in **Appendix A**. The insoluble solid values in **bold** exceed the Queensland nuisance guideline of 120 g/m^2/day.

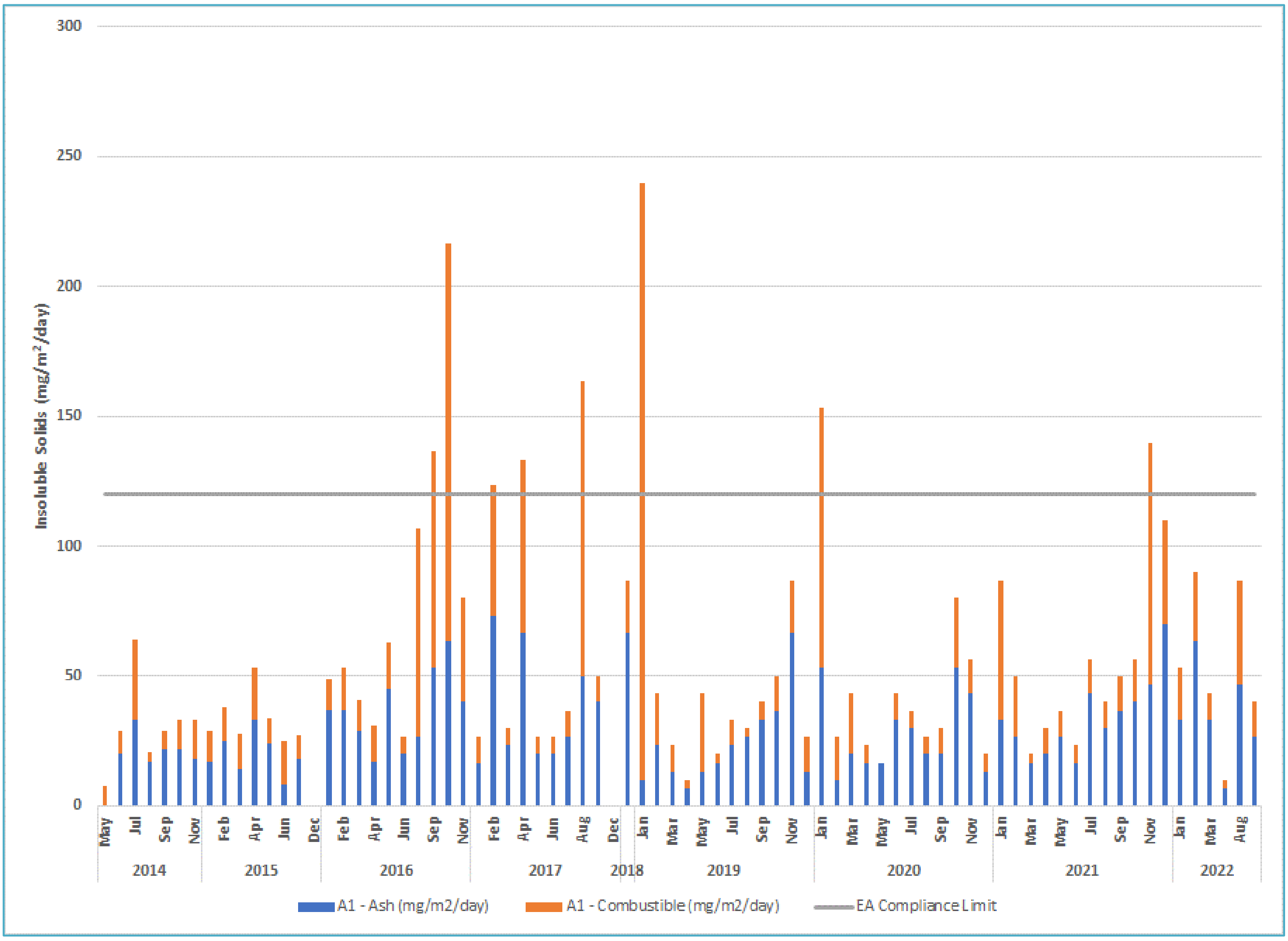
A graphical representation of the valid data for each dust deposition gauge is shown in **Figure 7** to **Figure 11**. The combustible portion has been calculated by subtracting the ash content from the insoluble solids. Due to the wide range of data being presented, the scale on the y-axis varies between figures and as such they are not directly comparable with each other.

A1

DDG A1 is located outside the mine lease, predominately upwind of past and proposed mining activities (refer to **Figure 2**) and can be considered to be representative of background levels.

As shown on **Figure 7**, there has been only one measured exceedance of the EA Compliance Limit of 120 mg/m^2/day at A1 in the last two years. This exceedance was recorded for the period November – December 2021, when approximately 70% of the deposited matter collected was determined to be combustible matter. The majority of the insoluble solid levels measured at A1 between 2014 and 2022 are less than 60 mg/m^2/day (approximately half the EA Compliance Limit).

Figure 7 A1 Deposited Dust – Ash and Combustible (mg/m^2/day)

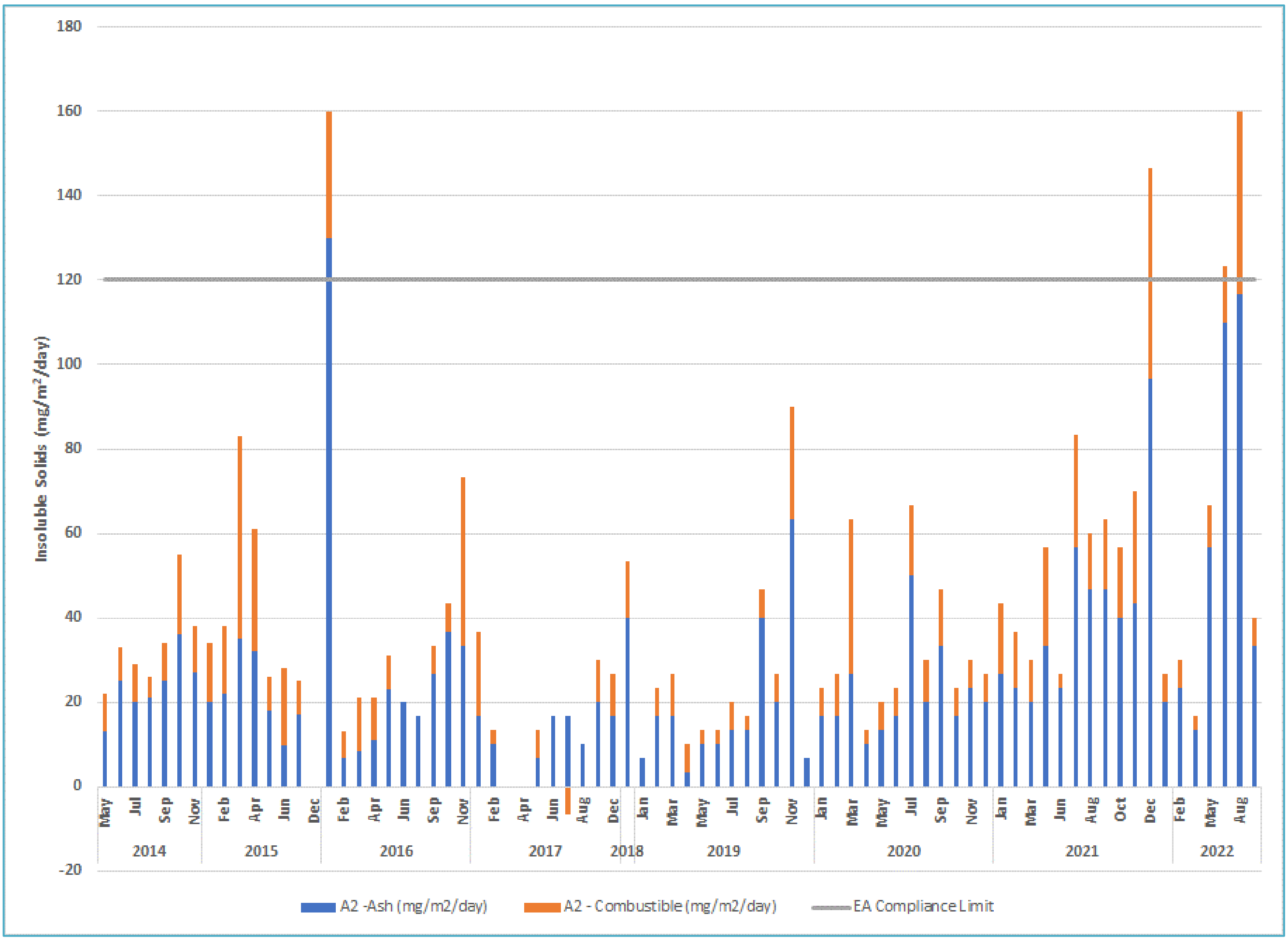


A2

DDG A2 is located on the western side of the mining lease, approximately half way between Proposed Amendment Area 3 and Proposed Amendment Area 4 (refer to **Figure 2**).

As shown on **Figure 8**, there have only been four recorded exceedances of the EA Compliance Limit of 120 mg/m^2/day at A2 between 2014 and 2022. The two most recent exceedances were recorded in July/August 2022 and July/September 2022. Both these samples recorded a high percentage of ash.

Figure 8 A2 Deposited Dust – Insoluble Solids (mg/m^2/day)

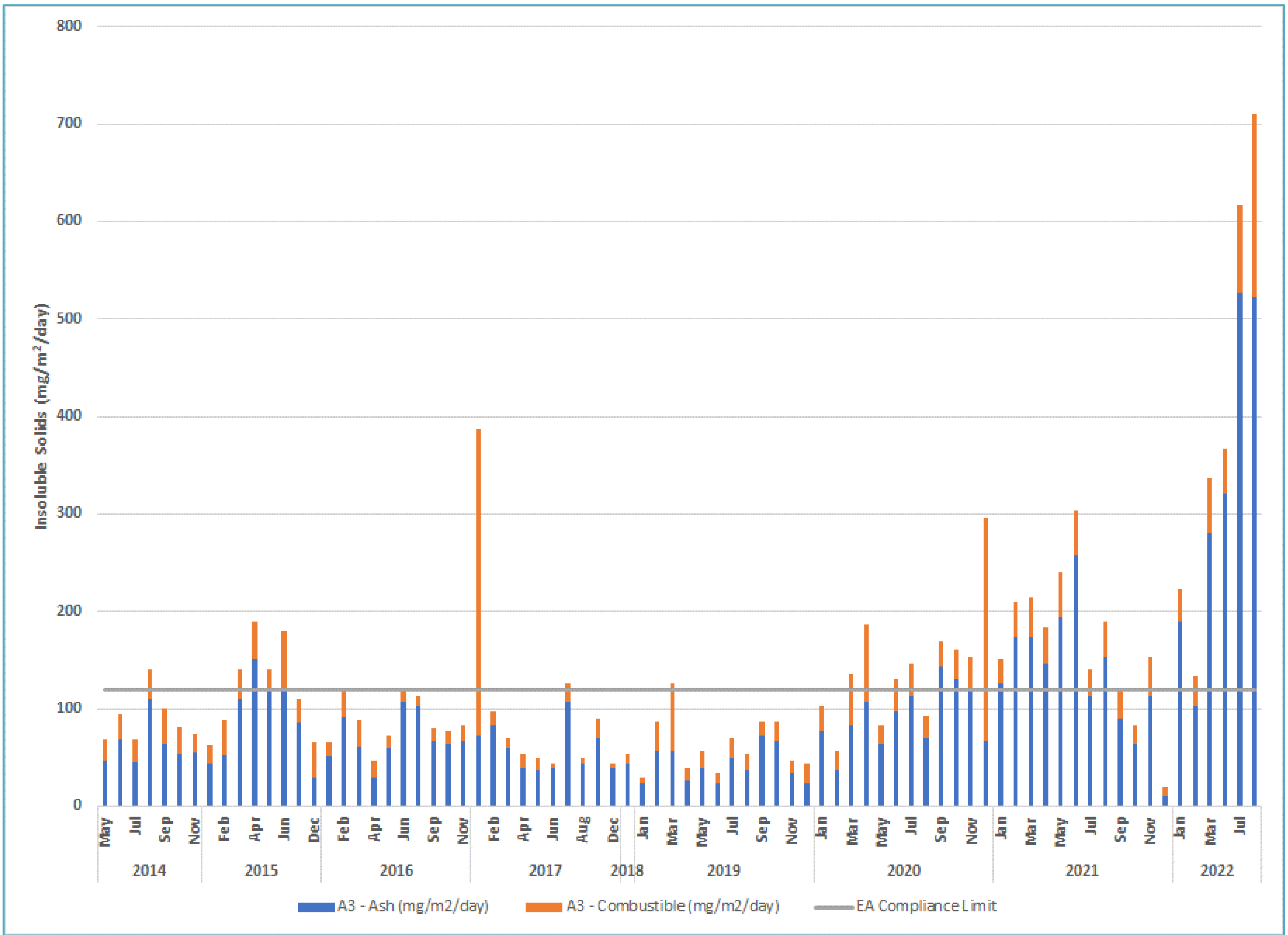


A3

DDG A3 has recorded exceedances of the EA Compliance Limit of 120 mg/m^2/day in most years between 2014 2022 (refer to **Figure 9**).

The most recent exceedances during 2022 recorded a high percentage of ash and as such is it probable that mining activities were the main contributor. This is not unexpected because, as shown on **Figure 2**, A3 is located adjacent to a haul road, in the middle of the mine lease and is therefore not considered to be representative of dust deposition levels experienced outside the mine lease, or at the sensitive receptors.

Figure 9 A3 Deposited Dust – Insoluble Solids (mg/m^2/day)

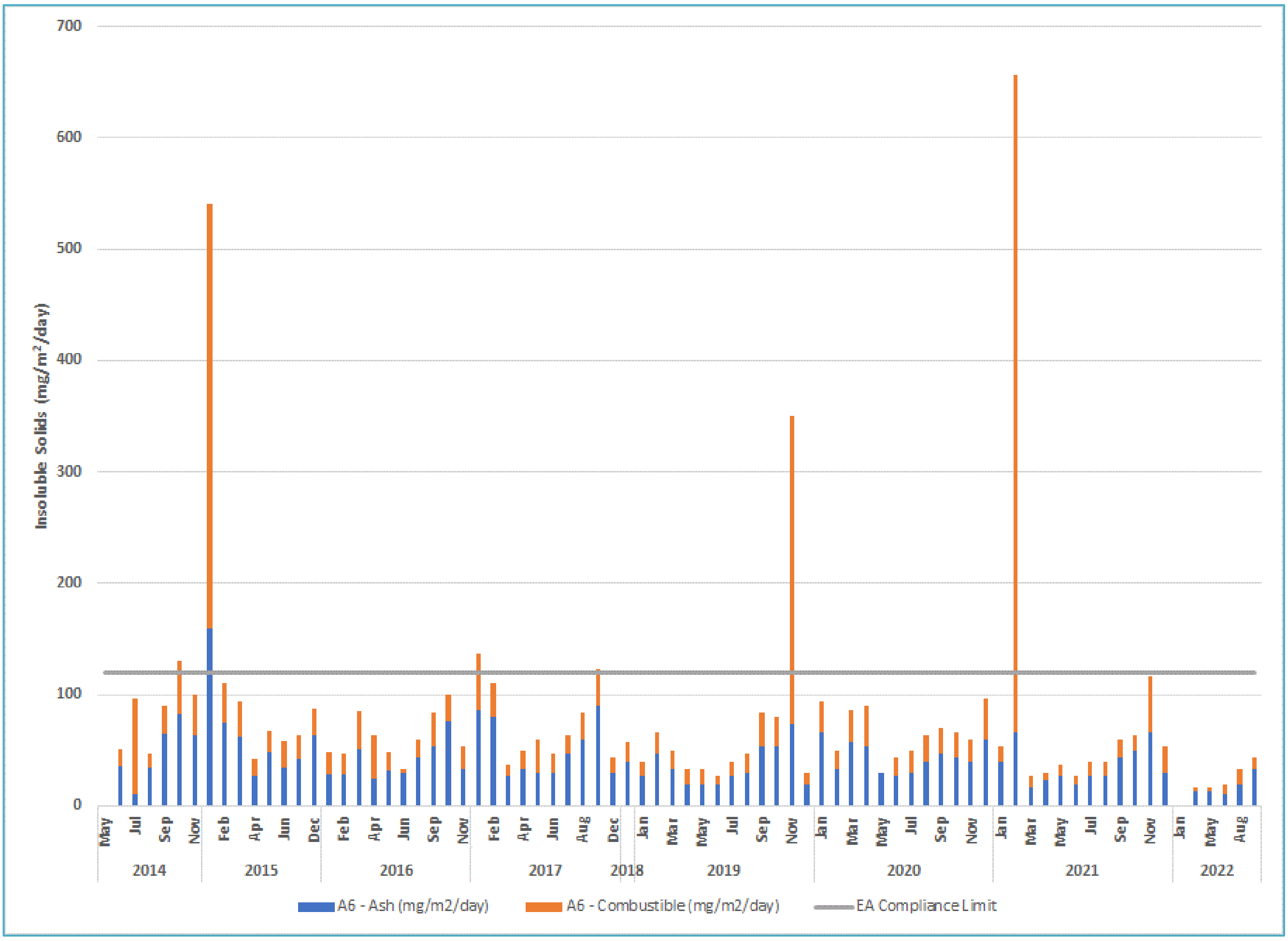


A6

DDG A6 is located to the west of the mine lease, close to the CHPP (refer to **Figure 2**).

As shown in **Figure 10**, there have only been three exceedances of the EA Compliance Limit of 120 mg/m^2/day recorded at A6 between 2014 and 2022, and none since early 2021. All the measured exceedances recorded a high percentage of combustible matter.

Figure 10 A6 Deposited Dust – Insoluble Solids (mg/m^2/day)



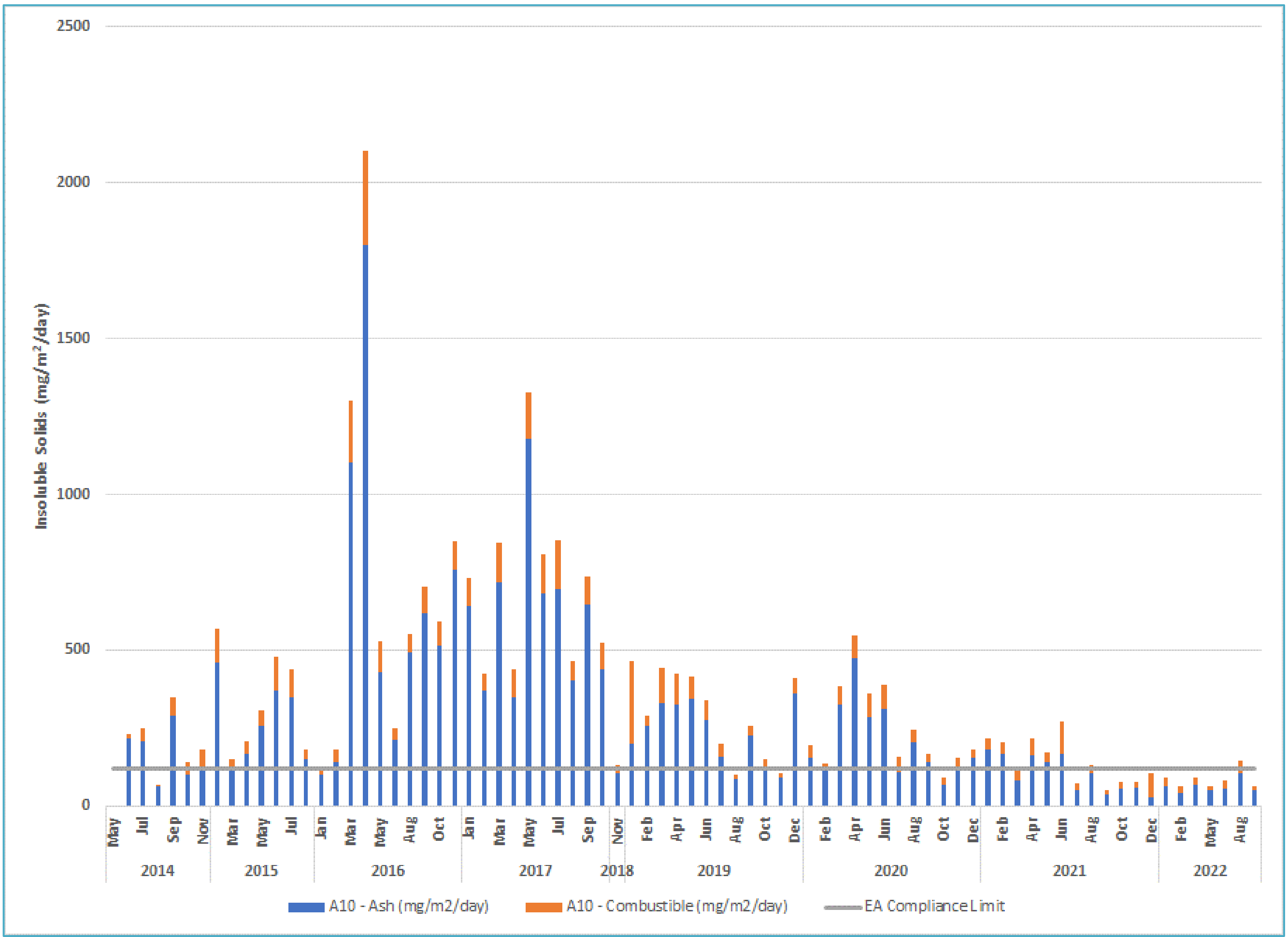
A10

As shown in **Figure 11**, multiple exceedances of the EA Compliance Limit of 120 mg/m^2/day were recorded at A10 between 2014 and mid-2021, with ash contributing the majority of the sample, indicating that mining activities were the main source.

Other than one minor exceedance in August 2022, **Figure 11** shows that there has been a significant decrease in the insoluble solids measured at A10 since 2017. It is understood that this reduction is due to a number of factors, including:

- Rehabilitation of the batters on Dump 11 resulting in elimination of wind-blown dust from the exposed spoil.
- Increased rainfall during 2022.
- Negligible mining activity in the Western pit.

Figure 11 A10 Deposited Dust – Insoluble Solids (mg/m^2/day)



4.5.2 PM_{10} Data

HCOC operates one BAM and three E-Samplers measuring real-time PM_{10} concentrations (refer to **Figure 2** for locations). A summary of the location of each monitor in relation to the proposed amendment areas is presented in **Table 6**.

Table 6 Location of PM_{10} Monitors in Relation to Proposed Amendment Areas

ID	Distance to Proposed Amendment
Hail Creek North BAM (332121)	Located to the northwest of the mine lease, adjacent to E-sampler Aa1 (332125)
Aa1 E Sampler @ Hail (332125)	Located to the northwest of the mine lease, adjacent to the BAM
Aa2 E Sampler @ Hail (332126)	Located to the western side of the mine lease. Approximately 9.6 km northwest of Proposed Amendment Area 4
Aa3 E Sampler @ Hail (332123)	Located close to the CHPP on the west of the mine lease. Approximately 9.4 km northwest of Proposed Amendment Area 4.

As shown in **Table 4** and **Table 7**, there are limited periods of time for which adequate valid TSP or PM_{10} data are available. A review of the available data does, however, provide an indication of the current air quality in the area with respect to PM_{10}.

Whilst there are occasional exceedances of the 24-hour average PM_{10} air quality objective of 50 µg/m^3 measured by the BAM, they have reduced from 13 days in 2020 to two days in 2022. The annual average PM_{10} concentration also reduced from 25.3 µg/m^3 (slightly above the air quality objective of 25 µg/m^3) to 18.3 µg/m^3. Similar to the reduction in the dust deposition rates measured at A10 (refer to **Section 4.5.1**), it is understood that this reduction is due to:

- Rehabilitation of the batters on Dump 11 resulting in elimination of wind-blown dust from the exposed spoil;
- Increased rainfall during 2022; and
- Negligible mining activity in the pit.

No exceedances of the 24-hour average or annual average air quality objectives were recorded by the E-samplers Aa2 or Aa3 during 2021.

Table 7 Maximum Measured 24-hour Average and Annual Average PM_{10} concentrations (µg/m^3)

ID	Maximum Measured 24-hour Average and Annual Average PM_{10} concentrations (µg/m^3)					
	2020		2021		2022	
	Maximum 24-hour average	Annual average	Maximum 24-hour average	Annual average	Maximum 24-hour average	Annual average
Hail Creek North BAM (332121)	94.5 (13 days > 50 µg/m^3)	25.3	Insufficient data		51.6 (2 days > 50 µg/m^3)	18.3
Aa2 E Sampler @ Hail (332126)	Insufficient data		50.0 (0 days > 50 µg/m^3)	19.7	Insufficient data	
Aa3 E Sampler @ Hail (332123)	Insufficient data		27.4 (0 days > 50 µg/m^3)	5.7	Insufficient data	

4.5.3 Summary

In summary, the monitoring data available has shown that while exceedances of the PM_{10} and dust deposition criteria do occur on occasion, the dust levels are typically well within guideline levels

Consideration of these findings in relation to the closest sensitive receptors and the proposed Amendments is discussed in **Section 5.3**.

5 Air Quality Impact Assessment

5.1 Assessment Methodology

An air quality and greenhouse gas assessment (AQGHGA) was completed in 2015 by Todoroski Air Sciences (TAS) (TAS, 2015) to support the Hail Mine Transition Project, which was approved in 2017. Only one worst-case operating scenario was assessed and it is not stated in the TAS AQGHGA which year of operations this was representing. The modelling predicted compliance with relevant suspended and deposited particulate guidelines for the modelled scenario at the nearest sensitive receptor locations.

However, it is also understood that the actual progression of the mining has differed from that assumed in the TAS AQGHGA, and the emission inventory and predicted impacts for the modelled scenario are unlikely to be representative of current impacts. As such, the predicted air quality impacts presented in the TAS AQGHGA are not considered further.

Detailed activity data for the proposed amendments are also not available at the time of preparing this report to enable detailed estimation of emissions from the proposed operations for comparison with those presented in the 2015 air quality assessment, or for use in an updated dispersion modelling study. However, the Project involves a relatively minor change in the disturbance area footprint and pit locations, compared to the approved operations and considering the significant distance to the identified nearest sensitive receptors. Given this, an updated air dispersion modelling study has not been performed for the Project. Instead, the assessment of potential air quality impacts has been undertaken qualitatively, based on the potential impacts of the Project on the magnitude of dust emissions from the mine, the data recorded by the dust monitoring network in the vicinity of the current operations, predominant wind directions recorded by the AWS, and the separation distance between the proposed pits and the nearest sensitive receptors.

5.2 Particulate Emission Sources from Proposed Amendment

Activities associated with the proposed amendments that are likely to generate dust emissions remain the same as the current operations, and include:

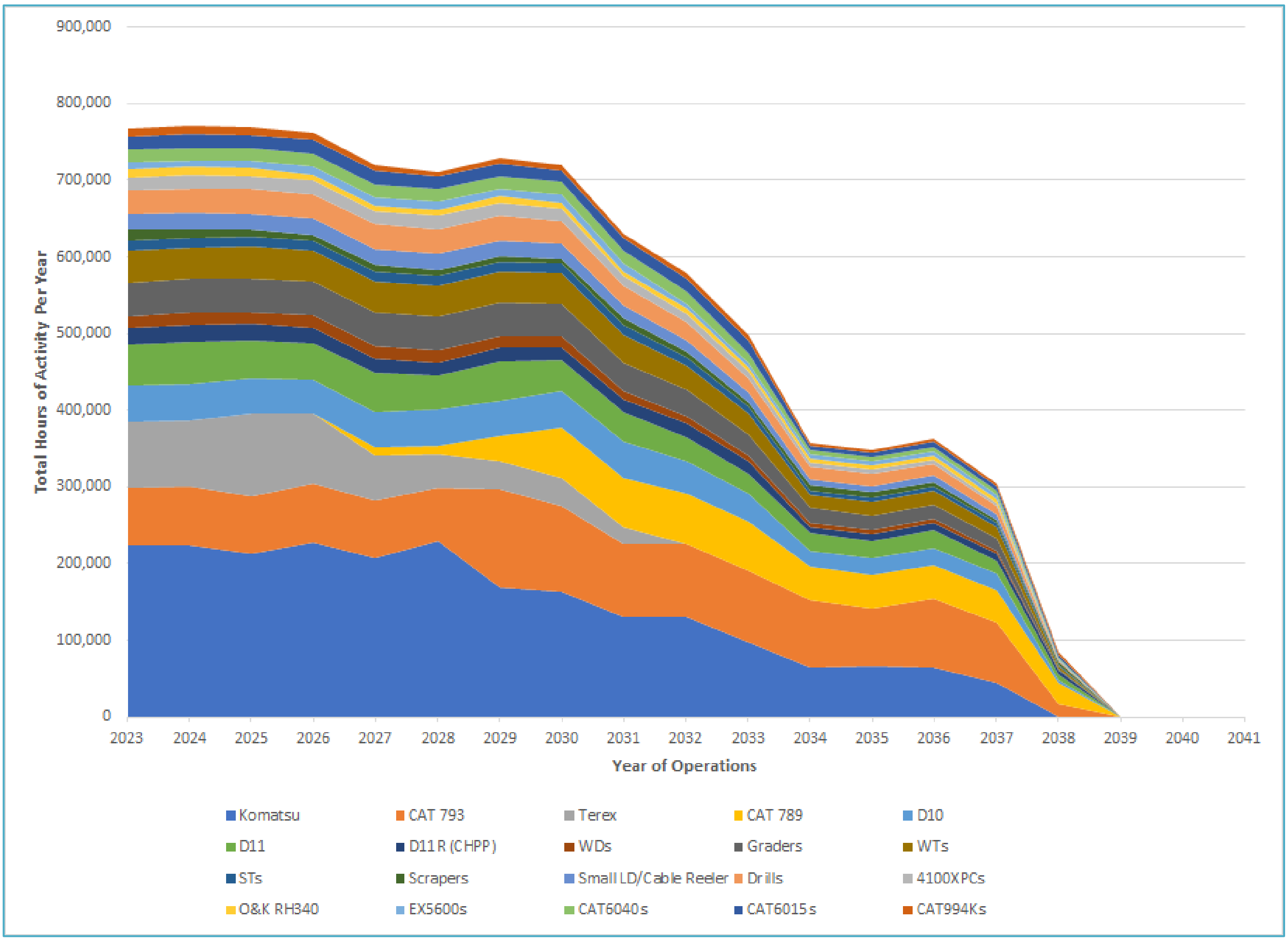
- Progressive land clearing and topsoil removal
- Stockpiling topsoil from disturbed areas for storage and use in future rehabilitation of the site
- Drill and blasting of overburden material
- Pre-stripping/excavation of overburden material using excavators/shovels and trucks
- Removal of overburden and placement in either the in pit or out of pit dumps
- Loading and hauling of ROM coal using a combination of excavators, loaders and trucks, and
- Progressive rehabilitation by backfilling the mined-out pit, reshaping dumps, topsoiling and revegetation.

5.3 Impact Assessment

As noted above, detailed activity data for the proposed amendments were not available at the time of preparing this report to enable detailed estimation of emissions from the proposed operations. However, as shown in **Figure 12**, the proposed hours of equipment usage is projected to decrease each year from 2024 onwards. By 2038, the total projected equipment hours per year are approximately 10% of those proposed for 2023. Up until

2030, the total proposed equipment hours per year are similar to current levels, with a slight decrease starting from 2026. In the short term, therefore, activity levels at HCOC are expected to be similar to, or slightly lower than current levels. It can be inferred from this that the quantity of materials handled, transferred and processed will also be similar to, or slightly lower than current levels, and ultimately so will emissions to air and potential for adverse impacts. The location of the mining activities, however, would change from that currently approved, with mining moving further north into Areas 1, 2 and 3, and further south into Area 4. Haulage distances from the pit area to the CHPP will also be slightly longer, which would result in a slight increase in wheel-generated dust emissions compared to the approved mining areas. With no significant change to ROM throughputs over this time, no significant changes in emissions from stockpiles, the CHPP and rail load-out facility etc would be anticipated.

Figure 12 Projected Equipment Usage (hours per year by type)



As discussed in **Section 4.4**, the closest sensitive receptors to the Project are at least 4 km away from the proposed amendment areas, and are located upwind of the mine under the dominant south to southwesterly wind directions. Monitoring data available from the on-site monitoring network has shown that while exceedances of the PM_{10} and dust deposition criteria do occur on occasion, the dust levels are typically well within guideline levels, even much closer to the mine than the nearest sensitive receptors.

When considering the distance and prevailing wind direction in tandem with the review of ambient air quality presented in **Section 4.5**, it is considered unlikely that there will be any adverse air quality impacts at the sensitive receptors due to the Project.

6 Mitigation and Monitoring

Based on the review of ambient air quality monitoring data, it is concluded that current dust mitigation measures are adequate and should be adopted for the Project.

Whilst no major changes are required to the air quality monitoring network, it is suggested that e-sampler Aa3 would provide more useful data for the management of the Project if it was relocated close to dust deposition gauge A1.

7 Conclusion

This desktop assessment has considered the current air quality in the vicinity of the Project together with the prevailing wind directions, proposed activities and location of sensitive receptors.

Whilst there are have been some measured exceedances of dust deposition levels and PM_{10} ambient air quality objectives, these were all measured at locations close to of the current mining activities.

It is considered unlikely that there will be any adverse air quality impacts due to the Project, due to both the distance from the proposed pits to the nearest sensitive receptors, and the prevailing wind directions.

Appendix A:

HCOC Dust Deposition Data Summary

Table A-1 Insoluble Solids and Ash – Valid Data 2016 to 2022

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
May 14 to Jun 14	A1	8	No data
May 14 to Jun 14	A2	22	13
May 14 to Jun 14	A3	68	46
May 14 to Jun 14	A6	49	No data
May 14 to Jun 14	A10	**280**	No data
Jun 14 to Jul 14	A1	29	20
Jun 14 to Jul 14	A2	33	25
Jun 14 to Jul 14	A3	94	68
Jun 14 to Jul 14	A6	51	36
Jun 14 to Jul 14	A10	**230**	220
Jul 14 to Aug 14	A1	64	33
Jul 14 to Aug 14	A6	97	10
Jul 14 to Aug 14	A2	29	20
Jul 14 to Aug 14	A10	**250**	210
Jul 14 to Aug 14	A3	68	45
Aug 14 to Sep 14	A1	21	17
Aug 14 to Sep 14	A2	26	21
Aug 14 to Sep 14	A3	**140**	110
Aug 14 to Sep 14	A6	47	35
Aug 14 to Sep 14	A10	69	64
Sep 14 to Oct 14	A1	29	22
Sep 14 to Oct 14	A2	34	25
Sep 14 to Oct 14	A3	100	64
Sep 14 to Oct 14	A6	90	65
Sep 14 to Oct 14	A10	**350**	290
Oct 14 to Nov 14	A1	33	22
Oct 14 to Nov 14	A2	55	36
Oct 14 to Nov 14	A3	81	54
Oct 14 to Nov 14	A6	**130**	83
Oct 14 to Nov 14	A10	**140**	100
Nov 14 to Dec 14	A1	33	18
Nov 14 to Dec 14	A2	38	27
Nov 14 to Dec 14	A3	74	56
Nov 14 to Dec 14	A6	100	63
Nov 14 to Dec 14	A10	**180**	120
Dec 14 to Jan 15	A1	39	No data
Dec 14 to Jan 15	A2	23	No data
Dec 14 to Jan 15	A3	66	30
Dec 14 to Jan 15	A6	87	64

Sampling Period	Site ID	Insoluble Solids ($mg/m^2/day$)	Ash ($mg/m^2/day$)
Dec 14 to Jan 15	A10	**180**	150
Jan 15 to Feb 15	A1	29	17
Jan 15 to Feb 15	A2	34	20
Jan 15 to Feb 15	A3	62	44
Jan 15 to Feb 15	A6	**540**	160
Jan 15 to Feb 15	A10	**570**	460
Feb 15 to Mar 15	A1	38	25
Feb 15 to Mar 15	A2	38	22
Feb 15 to Mar 15	A3	89	53
Feb 15 to Mar 15	A6	110	75
Mar 15 to Apr 15	A1	28	14
Mar 15 to Apr 15	A2	83	35
Mar 15 to Apr 15	A6	94	62
Mar 15 to Apr 15	A10	**150**	120
Mar 15 to Apr 15	A3	**140**	110
Apr 15 to May 15	A1	53	33
Apr 15 to May 15	A2	61	32
Apr 15 to May 15	A3	**190**	150
Apr 15 to May 15	A6	42	27
Apr 15 to May 15	A10	**210**	170
May 15 to Jun 15	A1	34	24
May 15 to Jun 15	A2	26	18
May 15 to Jun 15	A3	**140**	120
May 15 to Jun 15	A6	67	48
May 15 to Jun 15	A10	**310**	260
Jun 15 to Jul 15	A1	25	8
Jun 15 to Jul 15	A2	28	10
Jun 15 to Jul 15	A3	**180**	120
Jun 15 to Jul 15	A6	59	35
Jun 15 to Jul 15	A10	**480**	370
Jul 15 to Aug 15	A1	27	18
Jul 15 to Aug 15	A2	25	17
Jul 15 to Aug 15	A3	110	86
Jul 15 to Aug 15	A6	64	42
Jul 15 to Aug 15	A10	**440**	350
Jan 16 to Feb 16	A1	49	37
Jan 16 to Feb 16	A2	**160**	130
Jan 16 to Feb 16	A3	66	51
Jan 16 to Feb 16	A6	49	28
Jan 16 to Feb 16	A10	**130**	100
Feb 16 to Mar 16	A2	13	7

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Feb 16 to Mar 16	A3	120	91
Feb 16 to Mar 16	A10	**180**	140
Feb 16 to Mar 16	A1	53	37
Feb 16 to Mar 16	A6	47	28
Mar 16 to Apr 16	A1	41	29
Mar 16 to Apr 16	A2	21	8
Mar 16 to Apr 16	A3	89	61
Mar 16 to Apr 16	A6	85	51
Mar 16 to Apr 16	A10	**1300**	1100
Apr 16 to May 16	A1	31	17
Apr 16 to May 16	A2	21	11
Apr 16 to May 16	A3	46	29
Apr 16 to May 16	A6	64	24
Apr 16 to May 16	A10	**2100**	1800
May 16 to Jun 16	A1	63	45
May 16 to Jun 16	A2	31	23
May 16 to Jun 16	A3	73	59
May 16 to Jun 16	A6	48	32
May 16 to Jun 16	A10	**530**	430
Jun 16 to Jul 16	A1	27	20
Jun 16 to Jul 16	A2	20	20
Jun 16 to Jul 16	A3	117	107
Jun 16 to Jul 16	A6	33	30
Jun 16 to Jul 16	A10	**250**	213
Aug 16 to Sep 16	A1	107	27
Aug 16 to Sep 16	A2	17	17
Aug 16 to Sep 16	A3	113	103
Aug 16 to Sep 16	A6	60	43
Aug 16 to Sep 16	A10	**550**	493
Sep 16 to Oct 16	A1	**137**	53
Sep 16 to Oct 16	A2	33	27
Sep 16 to Oct 16	A3	80	67
Sep 16 to Oct 16	A6	83	53
Sep 16 to Oct 16	A10	**707**	620
Oct 16 to Nov 16	A1	**217**	63
Oct 16 to Nov 16	A2	43	37
Oct 16 to Nov 16	A3	77	63
Oct 16 to Nov 16	A6	100	77
Oct 16 to Nov 16	A10	**590**	517
Nov 16 to Dec 16	A1	80	40
Nov 16 to Dec 16	A2	73	33

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Nov 16 to Dec 16	A3	83	67
Nov 16 to Dec 16	A6	53	33
Nov 16 to Dec 16	A10	**850**	760
Dec 16 to Jan 17	A2	27	17
Dec 16 to Jan 17	A3	43	40
Dec 16 to Jan 17	A6	43	30
Dec 16 to Jan 17	A10	**527**	440
Dec 16 to Jan 17	A1	No data	No data
Jan 17 to Feb 17	A1	27	17
Jan 17 to Feb 17	A2	37	17
Jan 17 to Feb 17	A3	**387**	73
Jan 17 to Feb 17	A6	**137**	87
Jan 17 to Feb 17	A10	**730**	643
Feb 17 to Mar 17	A1	**123**	73
Feb 17 to Mar 17	A2	13	10
Feb 17 to Mar 17	A3	97	83
Feb 17 to Mar 17	A6	110	80
Feb 17 to Mar 17	A10	**423**	370
Mar 17 to Apr 17	A1	30	23
Mar 17 to Apr 17	A3	70	60
Mar 17 to Apr 17	A6	37	27
Mar 17 to Apr 17	A10	**843**	717
Mar 17 to Apr 17	A2	No data	No data
Apr 17 to May 17	A1	**133**	67
Apr 17 to May 17	A2	No data	No data
Apr 17 to May 17	A3	53	40
Apr 17 to May 17	A6	50	33
Apr 17 to May 17	A10	**440**	347
May 17 to Jun 17	A1	27	20
May 17 to Jun 17	A2	13	7
May 17 to Jun 17	A3	50	37
May 17 to Jun 17	A6	60	30
May 17 to Jun 17	A10	**1327**	1177
Jun 17 to Jul 17	A1	27	20
Jun 17 to Jul 17	A2	17	17
Jun 17 to Jul 17	A3	43	40
Jun 17 to Jul 17	A6	47	30
Jun 17 to Jul 17	A10	**807**	680
Jul 17 to Aug 17	A1	37	27
Jul 17 to Aug 17	A2	10	17
Jul 17 to Aug 17	A3	**127**	107

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Jul 17 to Aug 17	A6	63	47
Jul 17 to Aug 17	A10	**853**	697
Aug 17 to Sep 17	A1	**163**	50
Aug 17 to Sep 17	A2	10	10
Aug 17 to Sep 17	A3	50	43
Aug 17 to Sep 17	A6	83	60
Aug 17 to Sep 17	A10	**467**	403
Sep 17 to Oct 17	A1	50	40
Sep 17 to Oct 17	A2	30	20
Sep 17 to Oct 17	A3	90	70
Sep 17 to Oct 17	A6	**123**	90
Sep 17 to Oct 17	A10	**737**	647
Nov 18 to Dec 18	A10	**133**	107
Nov 18 to Dec 18	A3	53	43
Nov 18 to Dec 18	A2	53	40
Nov 18 to Dec 18	A6	57	40
Nov 18 to Dec 18	A1	87	67
Dec 18 to Jan 19	A10	**410**	360
Dec 18 to Jan 19	A3	43	23
Dec 18 to Jan 19	A2	7	7
Dec 18 to Jan 19	A1	27	13
Dec 18 to Jan 19	A6	30	20
Jan 19 to Feb 19	A10	**467**	200
Jan 19 to Feb 19	A3	30	23
Jan 19 to Feb 19	A2	7	7
Jan 19 to Feb 19	A6	40	27
Jan 19 to Feb 19	A1	**240**	10
Feb 19 to Mar 19	A10	**290**	257
Feb 19 to Mar 19	A3	87	57
Feb 19 to Mar 19	A2	23	17
Feb 19 to Mar 19	A6	67	47
Feb 19 to Mar 19	A1	43	23
Mar 19 to Apr 19	A2	27	17
Mar 19 to Apr 19	A3	**127**	57
Mar 19 to Apr 19	A10	**443**	330
Mar 19 to Apr 19	A6	50	33
Mar 19 to Apr 19	A1	23	13
Apr 19 to May 19	A10	**427**	327
Apr 19 to May 19	A3	40	27
Apr 19 to May 19	A2	10	3
Apr 19 to May 19	A6	33	20

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Apr 19 to May 19	A1	10	7
May 19 to Jun 19	A6	33	20
May 19 to Jun 19	A10	**417**	343
May 19 to Jun 19	A3	57	40
May 19 to Jun 19	A2	13	10
May 19 to Jun 19	A1	43	13
Jun 19 to Jul 19	A10	**340**	277
Jun 19 to Jul 19	A3	33	23
Jun 19 to Jul 19	A2	13	10
Jun 19 to Jul 19	A1	20	17
Jun 19 to Jul 19	A6	27	20
Jul 19 to Aug 19	A10	**200**	160
Jul 19 to Aug 19	A3	70	50
Jul 19 to Aug 19	A2	20	13
Jul 19 to Aug 19	A6	40	27
Jul 19 to Aug 19	A1	33	23
Aug 19 to Sep 19	A1	30	27
Aug 19 to Sep 19	A10	100	87
Aug 19 to Sep 19	A3	53	37
Aug 19 to Sep 19	A2	17	13
Aug 19 to Sep 19	A6	47	30
Sep 19 to Oct 19	A1	40	33
Sep 19 to Oct 19	A6	83	53
Sep 19 to Oct 19	A10	**260**	227
Sep 19 to Oct 19	A3	87	73
Sep 19 to Oct 19	A2	47	40
Oct 19 to Nov 19	A2	27	20
Oct 19 to Nov 19	A10	**150**	127
Oct 19 to Nov 19	A3	87	67
Oct 19 to Nov 19	A1	50	37
Oct 19 to Nov 19	A6	80	53
Nov 19 to Dec 19	A1	87	67
Nov 19 to Dec 19	A2	90	63
Nov 19 to Dec 19	A3	47	33
Nov 19 to Dec 19	A10	107	90
Nov 19 to Dec 19	A6	**350**	73
Dec 19 to Jan 20	A2	27	20
Dec 19 to Jan 20	A3	**297**	67
Dec 19 to Jan 20	A10	**183**	153
Dec 19 to Jan 20	A6	97	60
Dec 19 to Jan 20	A1	20	13

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Jan 20 to Feb 20	A1	**153**	53
Jan 20 to Feb 20	A10	**193**	157
Jan 20 to Feb 20	A2	23	17
Jan 20 to Feb 20	A3	103	77
Jan 20 to Feb 20	A6	93	67
Feb 20 to Mar 20	A10	**137**	113
Feb 20 to Mar 20	A3	57	37
Feb 20 to Mar 20	A2	27	17
Feb 20 to Mar 20	A6	50	33
Feb 20 to Mar 20	A1	27	10
Mar 20 to Apr 20	A2	63	27
Mar 20 to Apr 20	A3	**137**	83
Mar 20 to Apr 20	A10	**387**	327
Mar 20 to Apr 20	A6	87	57
Mar 20 to Apr 20	A1	43	20
Apr 20 to May 20	A2	13	10
Apr 20 to May 20	A3	**187**	107
Apr 20 to May 20	A10	**547**	473
Apr 20 to May 20	A6	90	53
Apr 20 to May 20	A1	23	17
May 20 to Jun 20	A2	20	13
May 20 to Jun 20	A3	83	63
May 20 to Jun 20	A10	**360**	287
May 20 to Jun 20	A6	30	30
May 20 to Jun 20	A1	17	17
Jun 20 to Jul 20	A1	43	33
Jun 20 to Jul 20	A6	43	27
Jun 20 to Jul 20	A10	**390**	313
Jun 20 to Jul 20	A3	**130**	97
Jun 20 to Jul 20	A2	23	17
Jul 20 to Aug 20	A1	37	30
Jul 20 to Aug 20	A6	50	30
Jul 20 to Aug 20	A2	67	50
Jul 20 to Aug 20	A3	**147**	113
Jul 20 to Aug 20	A10	**160**	110
Aug 20 to Sep 20	A2	30	20
Aug 20 to Sep 20	A3	93	70
Aug 20 to Sep 20	A10	**247**	207
Aug 20 to Sep 20	A6	63	40
Aug 20 to Sep 20	A1	27	20
Sep 20 to Oct 20	A1	30	20

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Sep 20 to Oct 20	A6	70	47
Sep 20 to Oct 20	A2	47	33
Sep 20 to Oct 20	A3	**170**	143
Sep 20 to Oct 20	A10	**170**	143
Oct 20 to Nov 20	A2	23	17
Oct 20 to Nov 20	A3	**160**	130
Oct 20 to Nov 20	A10	90	70
Oct 20 to Nov 20	A6	67	43
Oct 20 to Nov 20	A1	80	53
Nov 20 to Dec 20	A2	30	23
Nov 20 to Dec 20	A3	**153**	120
Nov 20 to Dec 20	A10	**157**	130
Nov 20 to Dec 20	A6	60	40
Nov 20 to Dec 20	A1	57	43
Dec 20 to Jan 21	A1	110	70
Dec 20 to Jan 21	A6	53	30
Dec 20 to Jan 21	A10	103	27
Dec 20 to Jan 21	A2	**147**	97
Dec 20 to Jan 21	A3	20	10
Jan 21 to Feb 21	A2	43	27
Jan 21 to Feb 21	A3	**150**	127
Jan 21 to Feb 21	A10	**217**	180
Jan 21 to Feb 21	A6	53	40
Jan 21 to Feb 21	A1	87	33
Feb 21 to Mar 21	A6	**657**	67
Feb 21 to Mar 21	A3	**210**	173
Feb 21 to Mar 21	A2	37	23
Feb 21 to Mar 21	A10	**207**	170
Feb 21 to Mar 21	A1	50	27
Mar 21 to Apr 21	A6	27	17
Mar 21 to Apr 21	A2	30	20
Mar 21 to Apr 21	A3	**213**	173
Mar 21 to Apr 21	A10	113	83
Mar 21 to Apr 21	A1	20	17
Apr 21 to May 21	A1	30	20
Apr 21 to May 21	A10	**217**	163
Apr 21 to May 21	A2	57	33
Apr 21 to May 21	A3	**183**	147
Apr 21 to May 21	A6	30	23
May 21 to Jun 21	A1	37	27
May 21 to Jun 21	A6	37	27

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
May 21 to Jun 21	A3	**240**	193
May 21 to Jun 21	A10	**173**	140
May 21 to Jun 21	A1	23	17
Jun 21 to Jul 21	A10	**270**	167
Jun 21 to Jul 21	A3	**303**	257
Jun 21 to Jul 21	A2	27	23
Jun 21 to Jul 21	A6	27	20
Jun 21 to Jul 21	A10	73	50
Jul 21 to Aug 21	A3	**140**	113
Jul 21 to Aug 21	A2	83	57
Jul 21 to Aug 21	A6	40	27
Jul 21 to Aug 21	A1	57	43
Jul 21 to Aug 21	A1	40	30
Aug 21 to Sep 21	A10	**133**	107
Aug 21 to Sep 21	A3	**190**	153
Aug 21 to Sep 21	A2	60	47
Aug 21 to Sep 21	A6	40	27
Aug 21 to Sep 21	A3	120	90
Sep 21 to Oct 21	A2	63	47
Sep 21 to Oct 21	A6	60	43
Sep 21 to Oct 21	A10	50	37
Sep 21 to Oct 21	A1	50	37
Sep 21 to Oct 21	A1	57	40
Oct 21 to Nov 21	A6	63	50
Oct 21 to Nov 21	A2	57	40
Oct 21 to Nov 21	A3	83	63
Oct 21 to Nov 21	A10	77	57
Oct 21 to Nov 21	A6	117	67
Nov 21 to Dec 21	A2	70	43
Nov 21 to Dec 21	A3	**153**	113
Nov 21 to Dec 21	A10	80	60
Nov 21 to Dec 21	A1	**140**	47
Nov 21 to Dec 21	A1	40	27
Dec 21 to Jan 22	A10	67	53
Dec 21 to Jan 22	A2	40	33
Dec 21 to Jan 22	A3	**200**	153
Dec 21 to Jan 22	A6	43	33
Dec 21 to Jan 22	A6	No data	No data
Jan 22 to Feb 22	A2	27	20
Jan 22 to Feb 22	A3	**223**	190
Jan 22 to Feb 22	A10	90	67

Sampling Period	Site ID	Insoluble Solids (mg/m²/day)	Ash (mg/m²/day)
Jan 22 to Feb 22	A1	53	33
Jan 22 to Feb 22	A2	30	23
Feb 22 to Mar 22	A3	**133**	103
Feb 22 to Mar 22	A10	67	43
Feb 22 to Mar 22	A1	90	63
Feb 22 to Mar 22	A1	43	33
Feb 22 to Mar 22	A6	17	13
Mar 22 to Apr 22	A2	17	13
Mar 22 to Apr 22	A3	**337**	280
Mar 22 to Apr 22	A10	93	70
Mar 22 to Apr 22	A6	17	13
Mar 22 to Apr 22	A2	67	57
Apr 22 to Jun 22	A3	**367**	320
Apr 22 to Jun 22	A10	67	50
Apr 22 to Jun 22	A1	10	7
Jul 22 to Aug 22	A3	**617**	527
Jul 22 to Aug 22	A2	**123**	110
Jul 22 to Aug 22	A6	20	10
Jul 22 to Aug 22	A10	83	57
Jul 22 to Sep 22	A1	87	47
Jul 22 to Sep 22	A6	33	20
Jul 22 to Sep 22	A2	**160**	117
Jul 22 to Sep 22	A3	**710**	523
Jul 22 to Sep 22	A10	**147**	107

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