



# Bonney Downs Wind Farm

## Dust Assessment

Fortescue Ltd

12 June 2025

→ The Power of Commitment



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# Executive summary

The Bonney Downs Wind Farm (the Project) includes development of a large-scale wind farm and transmission infrastructure within the Bonney Downs Pastoral Lease approximately 130 km north of Newman and approximately 40 km southwest of Nullagine. The Project consists of up to 200 wind turbines, battery energy storage systems (BESS) and supporting infrastructure and two substations and associated transmission infrastructure which will enable energy transfer from the wind farm to Fortescue’s mining operations. Fortescue plan to build this network of wind turbines progressively, with construction of up to five turbines running concurrently.

This Project is being developed to aid Fortescue’s decarbonisation towards carbon neutrality within existing and future operations by 2030. Much of the Project area is located within Palyku Native Title Determination area and a part of the proposed transmission line is located within Nyiyaparli Native Title Determination area and hence includes areas of cultural and environmental significance.

As part of the Environmental Impact Assessment (EIA) for the project, a social surroundings assessment is required. The social surroundings assessment is to consider amenity values and impacts of the Project including impact on air quality. The potential sources of dust during construction phase of the Project may include ground disturbing activities, blasting, earth moving, wind erosion of exposed areas, stockpiled materials and vehicular traffic. Potential sources of dust during operation phase of the Project may include wind erosion of exposed areas, use of operational equipment and vehicular traffic on unsealed roads. Fortescue requested GHD to undertake a Dust Assessment during construction and operations of the Project.

Air dispersion modelling was conducted to assess the impacts of the construction and operational phases of the Project. Predicted incremental ground level concentrations (GLCs) were assessed against the relevant criteria, with the primary pollutants assessed being particulate matter less than 10 micrometres (PM<sub>10</sub>) and 2.5 micrometres (PM<sub>2.5</sub>) each for the human health criteria and total suspended particulates (TSP) and dust deposition each for the amenity criteria.

Air quality criteria for key pollutants were derived from multiple authoritative sources, including the *National Environment Protection (Ambient Air Quality) Measure* (Air NEPM), the Department of Water and Environmental Regulation (DWER) *Guideline on Air Emissions*, and the *Environmental Protection (Kwinana) (Atmospheric Waste) Policy 1992*. The strictest standards from these sources were ultimately adopted.

Observations from the Marble Bar Bureau of Meteorology (BoM) station were assessed for a period between 2014 to 2023, and ultimately the year 2019 was chosen for air dispersion modelling as its temperature, rainfall, and wind data most closely matched the long-term historical data. The Marble Bar observations were processed through the AERMET meteorological model to create a model-ready meteorological file for AERMOD.

AERMOD was selected as the model of choice for the air dispersion modelling, which is a steady state plume model that models air dispersion based on planetary boundary layer structure and scaling concepts. AERMOD version 10.0.1 was used for this assessment.

A total of 10 scenarios were considered for this assessment, which can be seen in Table E.1.

**Table E.1** Overview of scenarios

Scenario	Classification	Description	Region
SC1	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	South
SC2		Incremental emissions from construction of one wind turbine with management measures	
SC3		Incremental emissions from construction of five wind turbine without management measures	
SC4		Incremental emissions from construction of five wind turbine with management measures	

Scenario	Classification	Description	Region
SC5	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	North
SC6		Incremental emissions from construction of one wind turbine with management measures	
SC7		Incremental emissions from construction of five wind turbine without management measures	
SC8		Incremental emissions from construction of five wind turbine with management measures	
SC9	Turbine operations	Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) without management measures	North & south
SC10		Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) with management measures	

The Dust Assessment considered analysis of 200 turbines (cleared areas) and access tracks and other supporting infrastructure. GHD's modelling considered nearby sensitive and cultural receptors, and cultural values.

The results of the air dispersion modelling indicate that the Project will **comply** with the relevant air quality criteria for each of the pollutants across all scenarios, with the exceptions as shown in Table E.2. Non-compliant model predictions occur exclusively in the five-turbine construction scenario within the northern region, and only when no mitigation measures are applied. Standard dust control strategies are expected to effectively reduce emissions to levels that comply with the relevant air quality criteria.

**Table E.2** Summary of non-compliant model predictions

ID	Description	Pollutant	Averaging Period	Scenario 7 (5T in the north region, no controls)		
				GLC ( $\mu\text{g}/\text{m}^3$ )	% of criteria	# of exceedances
#R1	Bonnie Pool	PM <sub>10</sub>	24-hour	57.5	115%	1
		TSP		152	169%	6

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.3 and the assumptions and qualifications contained throughout the report.

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## Appendices

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# 1. Introduction

The Bonney Downs Wind Farm (the Project) includes development of a large-scale wind farm and transmission infrastructure within the Bonney Downs Pastoral Lease approximately 130 km north of Newman and approximately 40 km southwest of Nullagine. The Project consists of up to 200 wind turbines, battery energy storage systems (BESS) and supporting infrastructure, and two substations and associated transmission infrastructure which will enable energy transfer from the wind farm to Fortescue's mining operations.

This Project is being developed to aid Fortescue's decarbonisation towards carbon neutrality within existing and future operations by 2030. Much of the Project area is located within Palyku Native Title Determination area and a part of the proposed transmission line is located within Nyiyaparli Native Title Determination area and hence includes areas of cultural and environmental significance.

As part of the Environmental Impact Assessment (EIA) for the project, a social surroundings assessment is required. The social surroundings assessment is to consider amenity values and impacts of the Project including impact on air quality. The potential sources of dust during construction phase of the Project may include ground disturbing activities, blasting, earth moving, wind erosion of exposed areas, stockpiled materials and vehicular traffic. Potential sources of dust during operation phase of the Project may include wind erosion of exposed areas, use of operational equipment and vehicular traffic on unsealed roads. Fortescue requested GHD to undertake a Dust Assessment during construction and operations of the Project.

## 1.1 Purpose of this report

This dust modelling assessment (the assessment) has been prepared to assess the potential direct and indirect impacts associated with dust from the projects' operations, and the risk and management to key sensitive and cultural receptors associated with the Bonney Downs region.

## 1.2 Scope of works

The scope of work includes the following:

- Provision of up to four AQ-Mesh monitors to determine baseline conditions of Project area prior to construction.
- A description of the national, state, and council level air quality legislation and guidelines relevant to the Project.
- A description of the surrounding environment, including sensitive and cultural receptors and places, terrain and land use, local meteorology, other sources of dust in the local area.
- A description of the potential sources of air emissions that may be generated during construction and operation of the proposed Project.
- Dust modelling to determine impacts during construction and operations phase of the Project.
- Provide mitigation and management measures to reduce any impacts, if required.
- Preparation of a final report, along with provision of separate maps without cultural information if requested.
- Preparation of a standalone technical memorandum outlining mitigation and management recommendations. It is intended that this memorandum be read in conjunction with the social surroundings assessment, which describes the surrounding environment, prevailing meteorological conditions, emissions estimates from construction and operational activities, and the results of AERMOD dispersion modelling. The recommendations presented in this memorandum are made on the basis of the findings of the report.

## 1.3 Assumptions and limitations

The following assumptions were relied upon in preparation of this assessment:

- Sensitive and cultural receptors have been provided by Fortescue and are assumed to be representative of sensitive uses in the local area.

- Cumulative emissions were not considered in the assessment due to a lack of available background monitoring data.

This report has been prepared by GHD for Fortescue and may only be used and relied on by Fortescue for the purpose agreed between GHD and Fortescue as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Fortescue arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

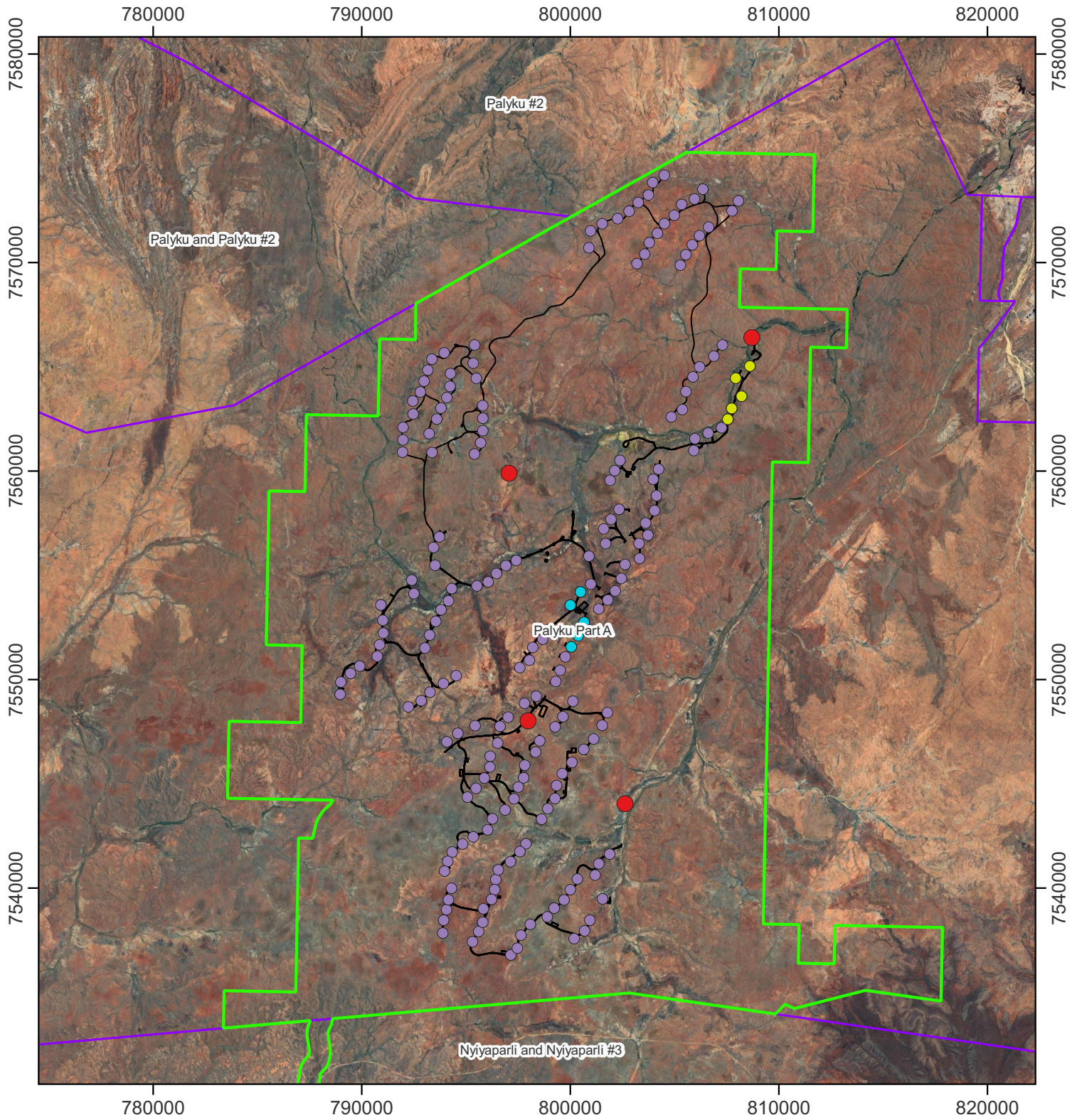
## 2. Project background

Fortescue propose to construct and operate a wind farm within the Bonney Downs Pastoral Lease approximately 130 km north of Newman and approximately 40 km southwest of Nullagine. The Project footprint includes activities for a total of 200 wind turbines. Fortescue plan to build this network of wind turbines progressively, with construction of up to five turbines running concurrently.

This project has evaluated a total of 12 scenarios which are discussed in Section 6.1 of this report.

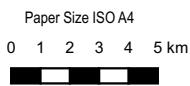
The assessment modelled the ground level concentrations (GLCs) of parameters related to both amenity (total suspended particulates (TSP) and dust deposition) and human health (particulate matter smaller than 10 micrometres ( $PM_{10}$ ) and 2.5 micrometres ( $PM_{2.5}$ ), i.e. respirable) during construction and operations phase of the Project.

The location of the project is shown in Figure 2.1.

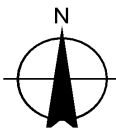


**Legend**

- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- North region selected turbines



Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm

**Overview of Bonney Downs Wind Farm**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 2.1**

## 3. Air quality criteria

### 3.1 Definitions of particulates and dust

Particulates, alternatively referred to as particulate matter, are tiny particles of solid matter suspended in air. They range in size from less than 10 nanometres to more than 100 micrometres ( $\mu\text{m}$ ) in diameter. Dust, a more common name for particulate matter, is defined as particles that can remain suspended in the air by turbulence for a considerable length of time. Typically, particulate matter is characterised by its size as measured by collection devices specified by regulatory agencies. The particulate size ranges and their respective ambient air criteria are categorised in Table 3.1.

Table 3.1 Overview of criteria

Pollutant	Averaging period	Criteria categorization
Particles less than 10 $\mu\text{m}$ in diameter (PM <sub>10</sub> )	24-hour	Human health
	Annual	
Particles less than 2.5 $\mu\text{m}$ in diameter (PM <sub>2.5</sub> )	24-hour	
	Annual	
Total suspended particulates (TSP) - Particulates up to 100 $\mu\text{m}$ in diameter	24-hour	Amenity
Dust deposition - Dust measured per gram per square metre per month	Monthly	

Note: All criteria are referenced to 0 °C and 1 atm.

Airborne particulates up to approximately 100  $\mu\text{m}$  in diameter are referred to as TSP, which is a larger particulate and contribute predominantly to particulate fallout and deposition. TSP is primarily related to the measurement of dust nuisance and amenity impacts. Deposited dust refers to air particles that settle out over a given area and time under the influence of gravity. Deposited dust can include particles of any size, but it comprises particles larger than 20  $\mu\text{m}$  in diameter that rapidly settle out of the air near the emission point. Like TSP, dust deposition is considered nuisance dust and impacts amenities. PM<sub>10</sub> and especially PM<sub>2.5</sub> particles are smaller and can penetrate further into the respiratory tract and cause health impacts. Therefore, from a health risk assessment perspective, PM<sub>10</sub> and PM<sub>2.5</sub> are considered more injurious to health than TSP or dust deposition.

### 3.2 Relevant criteria

The report will assess dust impacts against criteria derived for amenity and nuisance dust impacts, including TSP and dust deposition.

The criteria referred to in this assessment include:

- National Environment Protection (Ambient Air Quality) Measure 2021
- Draft Guideline - Dust Emissions
- Environmental Protection Act 1986
- Environmental Protection (Kwinana) (Atmospheric Waste) Policy 1992

#### 3.2.1 National Environment Protection (Ambient Air Quality) Measure

The National Environment Protection (Ambient Air Quality) Measure (Air NEPM) has been implemented in Western Australia under Section 20 of the National Environment Protection Council (Western Australia) Act 1996 (DWER, 2010) to provide benchmark standards for ambient air quality to allow for 'the adequate protection of human health and well-being' (National Environment Protection Council, 2021). Air NEPM standards for PM<sub>10</sub> and PM<sub>2.5</sub> are provided in Table 3.2.

Table 3.2 Air NEPM standards

Pollutant	Averaging period	Criteria ( $\mu\text{g}/\text{m}^3$ )
Particles as $\text{PM}_{10}$	24-hour	50
	Annual	25
Particles as $\text{PM}_{2.5}$	24-hour	20
	Annual	7

Note: All criteria are referenced to 0 °C and 1 atm.

### 3.2.2 Draft Guideline - Dust Emissions

The purpose of the *Draft Guideline - Dust Emissions* is to 'ensure adequate information is provided for assessing applications with fugitive dust emissions' (DWER, 2019). In addition, the guideline provides technical advice for assessing dust impacts on air quality concerning Part IV of the EP Act (WA Government Gazette, 2010). If an assessment is conducted within an area where ambient standards and limits have been defined under an Environmental Protection Policy (EPP), the EPP will take precedence over this guideline for those pollutants covered by the EPP.

The assessment criteria for dust from the *Draft Guideline - Dust Emissions* are shown in Table 3.3.

Table 3.3 Draft Guideline – Dust Emissions

Pollutant	Averaging period	Criteria ( $\mu\text{g}/\text{m}^3$ )
Particles as $\text{PM}_{10}$	24-hour	50
	Annual	25
Particles as $\text{PM}_{2.5}$	24-hour	25
	Annual	8
Dust deposition	Annual	2 g/m <sup>2</sup> /month (Above background)
		4 g/m <sup>2</sup> /month (Maximum)

Note: All criteria are referenced to 0 °C and 1 atm.

### 3.2.3 Environmental Protection (Kwinana) (Atmospheric Waste) Policy 1992

The *Environmental Protection (Kwinana) (Atmospheric Waste) Policy 1992* (Kwinana EPP) sets out to provide "ambient air quality standards and ambient air quality limits for the concentration of atmospheric wastes in the relevant portion of the environment" (Environmental Protection Authority WA, 1999). Limits can be described as 'concentrations of atmospheric waste that shall not be exceeded', and standards can be described as 'concentrations of atmospheric waste that should desirably not be exceeded'.

Limits and standards are provided in the *Environmental Protection (Kwinana) (Atmospheric Waste) Regulations 1992* (Environmental Protection Authority WA, 2014) (the Regulations), which fall under the Kwinana EPP. The limits and standards are divided into three categories, applying to three areas based on geographical location. These are:

- Area A – Core heavy industrial area
- Area B – Buffer area beyond area A
- Area C – Beyond Areas A and B, rural and residential

The predominant land use for the project is predominately rural and residential in consideration with the sensitive and cultural receptors. Therefore, Area C limits and standards have been adopted for this assessment and are presented in Table 3.4.

**Table 3.4** Kwinana EPP Ambient Air Quality Standards and Limits for TSP (Area C)

Area	Averaging period	Standard ( $\mu\text{g}/\text{m}^3$ )	Limit ( $\mu\text{g}/\text{m}^3$ )
C	24-hour	90	150
<i>Note: All criteria are referenced to 0 °C and 1 atm.</i>			

### 3.3 Summary of adopted assessment criteria

Table 3.5 shows a summary of the adopted criteria used in this assessment.

**Table 3.5** Adopted assessment criteria

Pollutant	Averaging period	Criteria	Source
TSP	Maximum 24-hour	90 $\mu\text{g}/\text{m}^3$	<i>Kwinana EPP (Area C)</i>
PM <sub>10</sub>	Maximum 24-hour	50 $\mu\text{g}/\text{m}^3$	<i>Air NEPM</i>
	Annual	25 $\mu\text{g}/\text{m}^3$	<i>Draft Guideline – Dust Emissions</i>
PM <sub>2.5</sub>	Maximum 24-hour	25 $\mu\text{g}/\text{m}^3$	<i>Draft Guideline – Dust Emissions</i>
	Annual	8 $\mu\text{g}/\text{m}^3$	
Deposited dust (TSP)	Maximum increase	2 $\text{g}/\text{m}^2/\text{month}$	<i>Draft Guideline – Dust Emissions</i>
	Maximum total	4 $\text{g}/\text{m}^2/\text{month}$	
<i>Note: All criteria are referenced to 0 °C and 1 atm.</i>			

# 4. Existing environment

## 4.1 Receptors

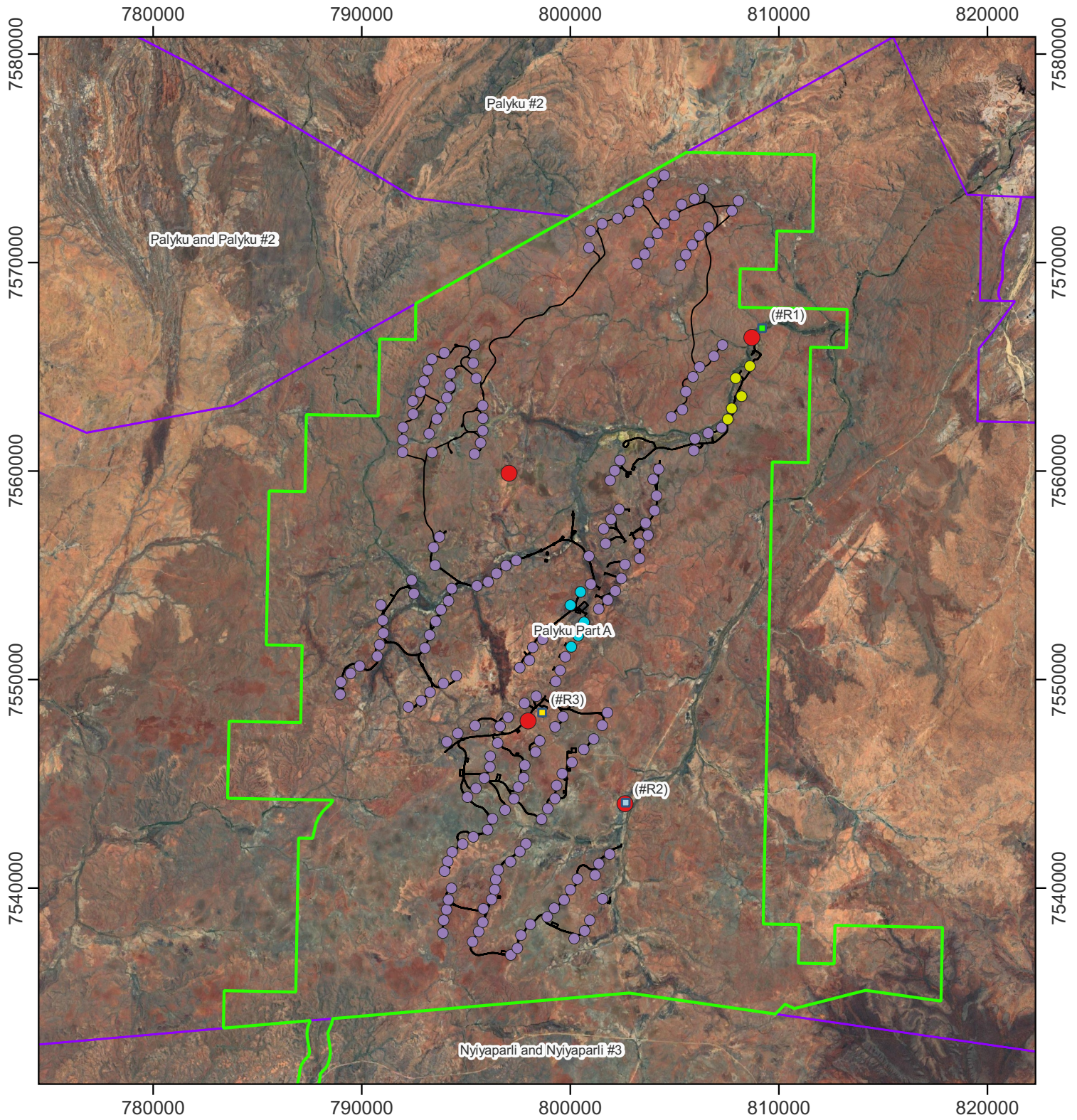
A sensitive receptor is defined as “places where people live or regularly spend time, and which are therefore sensitive to emissions from industry with implications for human health or amenity. They include, but are not limited to, residences, healthcare establishments, places of accommodation, places of study, childcare facilities, shopping centres, places of recreation and some public buildings” (DWER, 2021).

A cultural receptor is a specific heritage place or location that contains cultural values or is used to undertake traditional activities (such as hunting, camping, resource gathering, or ceremonial use), that may be impacted (directly or indirectly) by high noise levels generated from the proposed development. Cultural receptors are identified through consultation with the relevant Native Title party and traditional knowledge holders.

The sensitive receptor sites were provided to GHD by Fortescue. The receptor locations and their respective categories are shown in and Table 4.1 and Figure 4.1.

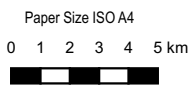
**Table 4.1** Sensitive and cultural receptor locations

Receptor #	Easting	Northing	Site ID	Receptor classification
#R1	809200	7566859	Bonnie Pool	Cultural receptor
#R2	802660	7544099	Bonney Downs homestead	Sensitive receptor
#R3	798652	7548421	Proposed Bonney Downs camp	

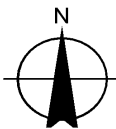


**Legend**

- ▭ Native title determination area
- ▭ Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- North region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead



Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm

**Sensitive and cultural receptors**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 4.1**

## 4.2 Topography and geology

Situated within the North Pilbara terrain of the Pilbara Craton, the surrounding topography of the Project area is variable. The regional architecture is characterised by large granitic complexes separated by greenstone belts, high strain zones and faults. The main geological units surrounding the Project area are the McPhee Dome and Mosquito Creek Basin (Sahul Exploration, 2018).

## 4.3 Surrounding land use

The surrounding land use in the region is dominated by pastoral activities, mining or unallocated Crown land. Nearby mining operations located in the region (within 50 km) include:

- Carnaby Resources Warrawoona Gold Project
- Calidus Resources Ltd Warrawoona Project
- Christmas Creek Mining Project
- De Grey Mining Limited Hemi Gold Project
- Novo Resources Beatons Creek Project
- New Age Exploration Limited Mallina-Whim Creek Basin Project
- Sahul Exploration Bonney Downs Project

## 4.4 Climate

Climate of the Pilbara region is hot and arid, with very hot summers, mild winters, and low, variable rainfall. The Australian specific climate classification of a new modification of Köppen's classification of world climates (Stern, De Hoedt, & Ernst, 2000) has the region around the project, and further west, as Grassland, and the areas to the south as Desert – both have a subclassification of 'Hot (persistently dry)'. Maximum summer temperatures easily exceed 40 °C, and rainfall peaks in the months of summer and autumn. In winter, average temperatures are around 20 °C.

The effect of climatic conditions and meteorology are an important consideration when assessing the air quality of a site with reference to how this will impact sensitive and cultural receptors. For this report, meteorological data has been derived from the Bureau of Meteorology station operated at Marble Bar (ID: 004106). The station is located approximately ~100 km north of the Project. Data for all relevant parameters has been analysed for the years 2001 – 2024. A plot of the mean monthly temperature, rainfall and relative humidity is presented in Figure 4.2 and seasonal and annual wind roses are presented in Figure 4.3.

Mean maximum temperature is highest in January and December, exceeding 40 °C. Mean maximum temperatures only fall below 30 °C in May, June, July and August. Mean minimum temperatures follow a similar trend, peaking in January and December at around 27 °C and falling below 20 °C in May through to September.

Tropical cyclones characterise the Pilbara climate, occurring in summer (the wet season) and can account for up to 21 percent of the annual rainfall (Sudmeyer, 2016). This typically aligns with the trend seen in Figure 4.2, where rainfall is highest in summer months of January and February.

Relative humidity is variable, peaking in February, with secondary peaks in June/July before dropping in October and rising again in November/December. This pattern closely follows the variable monthly rainfall which reaches 107 mm in January and is very low throughout April to December.

Marble Bar sits in the tropical zone and is influenced by the Trade Winds from the east to south-easterly direction. The highest wind speeds (> 7.5 m/s) are most common during summer and spring, when there are also westerly winds.

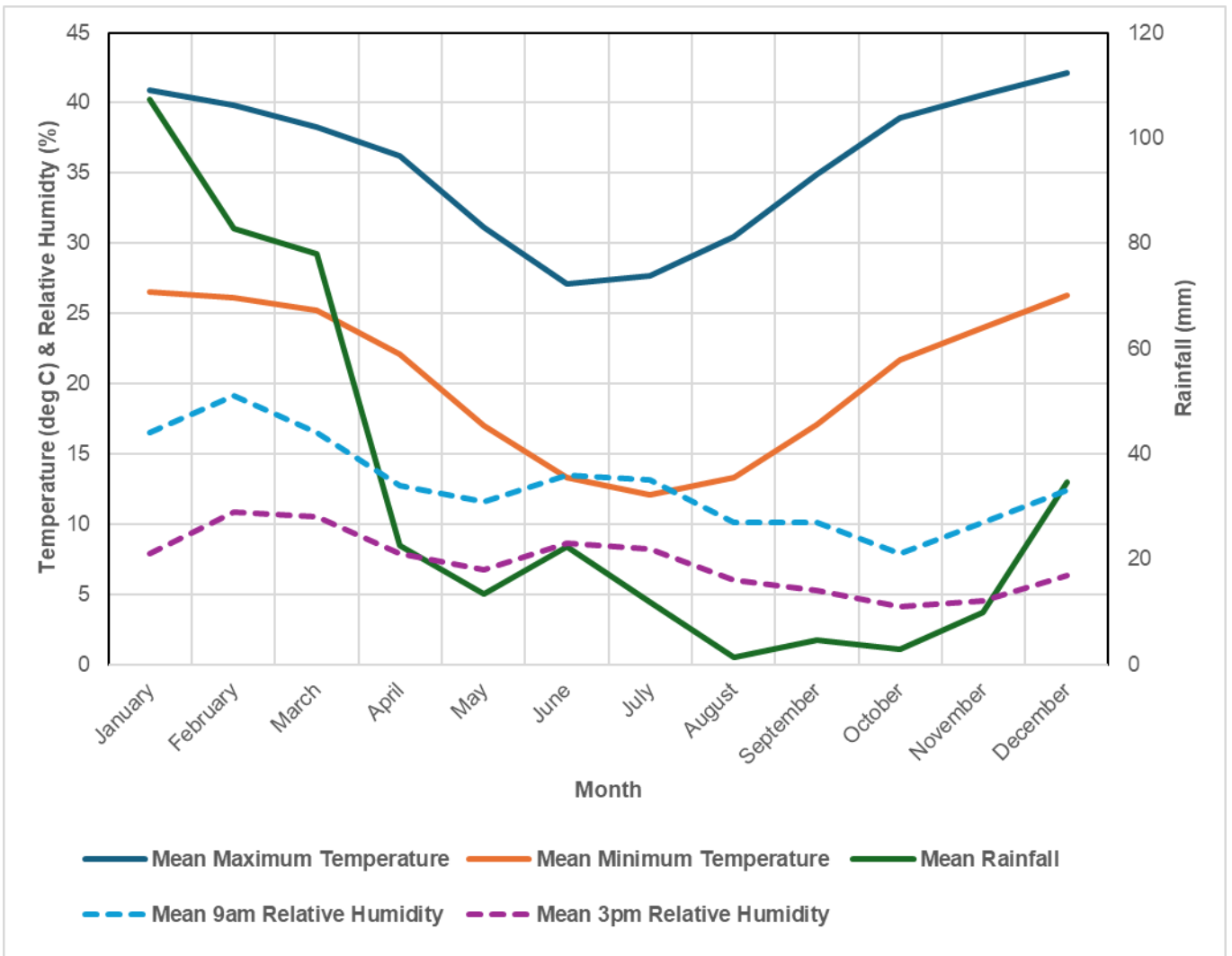


Figure 4.2 Mean monthly climate statistics recorded at Marble Bar (2001 – 2024)

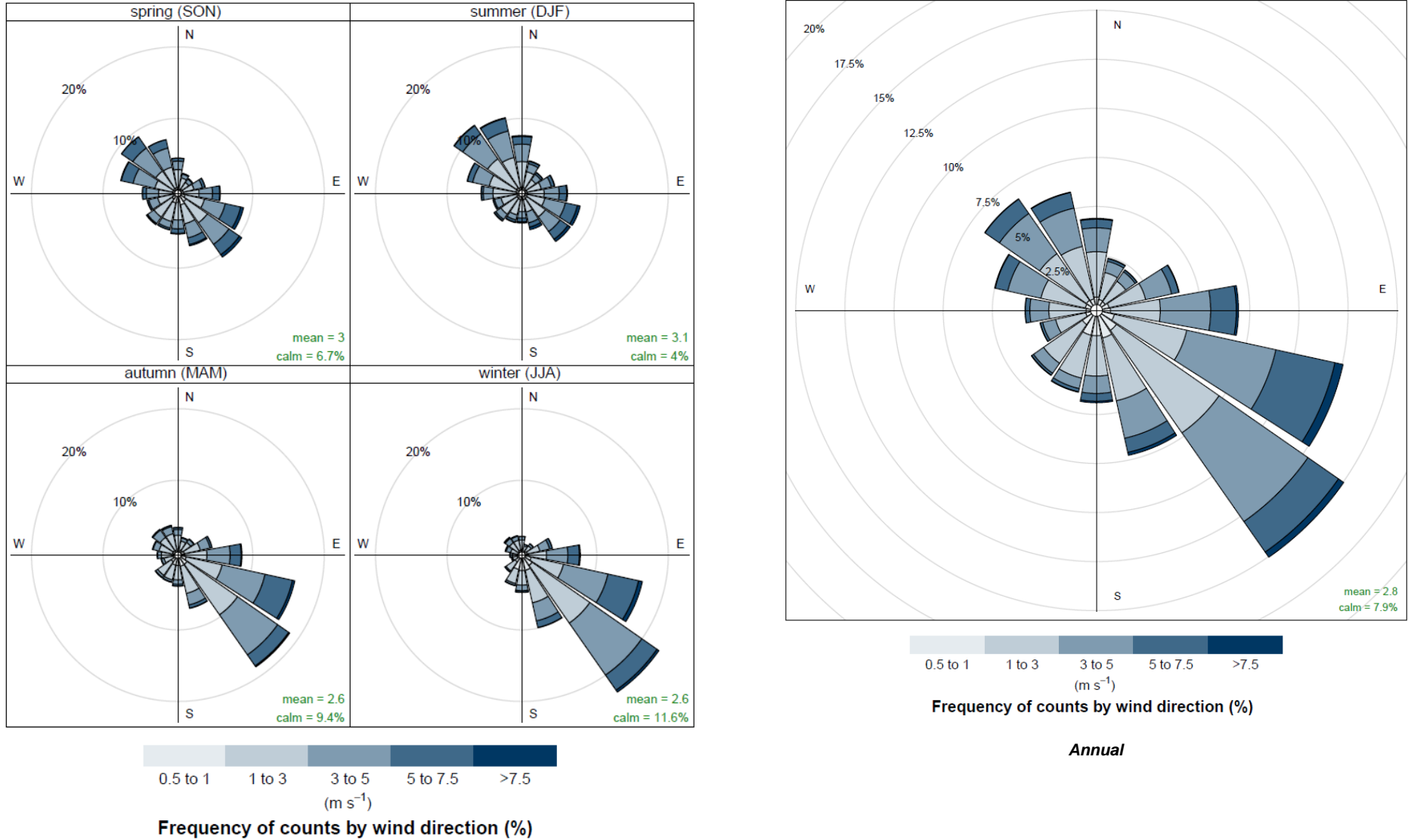


Figure 4.3 Seasonal and annual wind roses for Marble Bar sub-set data from January 2014 to December 2023

## 5. Potential impacts of dust on surrounding environment

Given the scale of the project, construction activities associated with the development of wind turbines in the Bonney Downs region are anticipated to generate a significant amount of dust, which has the potential to adversely impact the social surroundings. A description of the potential impacts of dust on the surrounding environment is presented below.

### 5.1 Impacts of dust on surrounding atmosphere and human health

The interaction between construction related dust particles and other pollutants from sources such as vehicles, can have significant impacts on both the environment and human health. The interaction mechanisms between dust and other pollutants have been documented as below.

#### *Interaction mechanisms*

- **Adsorption:** Dust particles can adsorb gaseous pollutants like nitrogen oxides (NO<sub>x</sub>) and sulphur dioxide (SO<sub>2</sub>) from vehicle emissions, creating more complex and potentially more harmful compounds. Adsorption is a surface phenomenon where gas molecules are attracted to and held on the surface of a solid, such as dust particles (Wang, et al., 2024; Chang & Xiang, 2022).
- **Chemical reactions:** Dust can act as a catalyst for chemical reactions in the atmosphere, leading to the formation of secondary pollutants like ozone (O<sub>3</sub>) and finer particulate matter (PM<sub>2.5</sub>). Furthermore, dust particles can physically combine with other airborne pollutants, increasing the overall particulate load in the air (Ramli, Yusof, Shith, & Suroto, 2020).

#### *Environmental impacts*

- **Air quality degradation:** The combination of dust and vehicle emissions can lead to higher concentrations of particulate matter in the air. This can reduce air quality, contributing to smog formation and visibility issues (US EPA, 2024a).
- **Climate change:** Some pollutants, like black carbon from vehicle emissions, can absorb sunlight and contribute to global warming. When mixed with dust, these effects can be exacerbated. Black carbon is a potent climate forcer that absorbs sunlight and heats the atmosphere. When combined with dust, it can enhance these warming effects (Cho, 2016).

#### *Human health impacts*

- **Respiratory impacts:** The combined exposure to dust and other pollutants can exacerbate respiratory conditions such as asthma, bronchitis, and COPD. Fine particles can penetrate deep into the lungs, causing inflammation and reducing lung function (US EPA, 2024b; WHO, 2024).
- **Cardiovascular impacts:** Pollutants can enter the bloodstream through the lungs, increasing the risk of heart attacks, strokes, and other cardiovascular diseases (US EPA, 2024b; WHO, 2024).
- **Cancer risk:** Long-term exposure to certain pollutants, including those found in vehicle emissions, can increase the risk of lung cancer. The adsorption of dust particles with other pollutants can exacerbate this risk (US EPA, 2024b; WHO, 2024).
- **Acute health effects:** Short-term exposure can lead to symptoms like coughing, throat irritation, and shortness of breath (US EPA, 2024b; WHO, 2024).

### 5.2 Mitigation strategies

The following dust control strategies can be implemented to minimise and mitigate the risk associated with dust.

- **Exposure reduction:** Reducing exposure of workers on high dust days (US EPA, 2021).

- **Emissions reduction:** Using cleaner fuels and technologies (such as electric vehicles), for vehicles and machinery can lower the emission of harmful pollutants. This strategy is supported by various environmental guidelines and practices (Ravi, Osipov, & Turner, 2023).
- **Dust control:** Implementing dust control measures on construction sites, such as water spraying and using barriers, can help reduce dust emissions. This is a common practice to minimize dust generation and dispersion (US EPA, 2021).
- **Monitoring and regulation:** Regular monitoring of air quality and strict enforcement of environmental regulations can help mitigate the impacts of dust. This approach ensures compliance with environmental standards and reduces health risks (US EPA, 2021; US EPA, 2024c).
- **Dust suppressants:** Applying chemical dust suppressants, such as acrylic polymers, can bind dust particles together, making them less likely to become airborne (Ninja De-Icer, 2023).
- **Windbreaks and barriers:** Installing physical barriers like fences or vegetation can reduce wind speed and prevent dust from spreading (Finch, Brandle, & Sherman).
- **Covering materials:** Covering stockpiles of materials and soil with tarps or other coverings can prevent dust from being blown away by the wind (California Stormwater BMP Handbook, 2012).
- **Speed limits:** Reducing the speed of vehicles on construction sites can significantly decrease the amount of dust generated (U.S. Department of Transportation, 2008).
- **Stabilizing soil:** Using soil stabilizers can help to keep the ground intact and reduce dust generation (Substrata Solutions, 2020).
- **Good housekeeping:** Regular cleaning of equipment and work areas can prevent the accumulation of dust.
- **Training and PPE:** Providing proper training for workers on dust control techniques and ensuring they use personal protective equipment (PPE) can reduce exposure to harmful dust (U.S. Department of Labor).

## 6. Dust emissions

Dust and other air pollutants may arise from a range of natural and man-made sources causing nuisance and visibility impacts. At the site, there are the following emissions:

- Number of haul trucks and light vehicles onsite – five semi-tippers, six haul trucks, six water carts and 50 light vehicles
- Four front end loaders
- Four excavators
- Five dozers
- Five graders
- Blasting with a maximum depth of 5 m for a period of an hour
- Drilling an area of approximately 315 m<sup>2</sup> per turbine
- Wind erosion from stockpiles, cleared areas and waste rock dumps

### 6.1 Emissions calculations

Estimated dust emissions from the Project were used as input into the air dispersion model for each identified potential dust source associated with the Project. Emissions were estimated for TSP, PM<sub>10</sub> and PM<sub>2.5</sub> using information provided by Fortescue and approved methods for emission estimation. Where required information or data were not available from Fortescue, appropriate default values were used, or informed assumptions were made.

Emission estimations were calculated using the methods from the

- *National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining* (DSEWPC, 2012)
- Information on mining equipment, pit areas, etc, provided by Fortescue

A total of 10 dust emissions inventories were prepared for each of the modelling scenarios respectively to predict the impact of TSP, dust deposition, PM<sub>10</sub> and PM<sub>2.5</sub> on sensitive and cultural receptors. An overview of the scenarios considered can be seen in Table 6.1.

**Table 6.1** Overview of scenarios

Scenario	Classification	Description	Region
SC1	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	South
SC2		Incremental emissions from construction of one wind turbine with management measures	
SC3		Incremental emissions from construction of five wind turbine without management measures	
SC4		Incremental emissions from construction of five wind turbine with management measures	
SC5	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	North
SC6		Incremental emissions from construction of one wind turbine with management measures	
SC7		Incremental emissions from construction of five wind turbine without management measures	
SC8		Incremental emissions from construction of five wind turbine with management measures	
SC9	Turbine operations	Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) without management measures	North & south

Scenario	Classification	Description	Region
SC10		Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) with management measures	

Five turbines were selected as the worst case scenario where at any given point a maximum of five turbines would be constructed simultaneously and one turbine was selected as the minimum case scenario. The project's operational footprint considered a total of 200 constructed turbine hardstands.

Note that the emission sources for the construction fleet in all cases are assumed to be the same through operations. Only the wind erosion sources change.

Cumulative emissions were not considered in the assessment due to a lack of available background monitoring data.

### 6.1.1 Wind erosion

Wind erosion (wind-blown dust) sources included cleared areas. An hourly variable dust emissions file was created for these sources, as wind erosion is dependent on the instantaneous (variable) wind speed. As the dispersion model relies on input at a timescale resolution of 1-hour, an hourly variable wind erosion dust emissions file was created.

The hourly varying emissions for wind erosion sources were calculated using the equation below, adjusted according to the cube of the hourly average wind speed, and normalised so the total emission over all hours in the year adds up to the estimated annual total emission.

$$E_i = E_{annual} \times \frac{U_i^3}{\sum_{i=1}^N U_i^3}, WS_T \geq 5.4$$

Where:

$E_i$  = emissions for hour i

$E_{annual}$  = annual emissions

$U_i^3$  = wind speed cubed for hour i

$N$  = number of hours of wind speed

$WS_T$  = wind speed threshold

### 6.1.2 Mechanically generated dust

Mechanically generated dust included emissions associated with construction fleet. The emission factor is multiplied by the amount of product being handled to provide an emission rate per unit time as shown by the equation below.

$$E = A \times EF \times \left[ \frac{1 - CE}{100} \right]$$

Where:

$E$  = emission rate

$A$  = activity rate

$EF$  = uncontrolled emission factor

$CE$  = overall control efficiency

### 6.1.3 Wheel generated dust from vehicles and graders

Wheel generated dust occurs when vehicles traverse an unsealed road. Emissions from haul trucks and LVs on the access road were calculated based on the default emission factor for "wheel generated dust from unpaved

roads” provided in the NPI. The emission factor is multiplied by the distance travelled by the vehicle as shown by the equation below.

$$E = D \times EF \times \left[ \frac{1 - CE}{100} \right]$$

Where:

$E$  = emission rate

$D$  = distance travelled

$EF$  = uncontrolled emission factor

$CE$  = overall control efficiency

## 6.2 Modelled emissions

Modelled emissions rates used in the four scenarios for the south region are presented in Table 6.2 and Table 6.3, and modelled emissions rates used in the four scenarios for the north region are presented in Table 6.4 and Table 6.5, and modelled emission rates used in the operations scenarios are presented in Table 6.6.

**Table 6.2** Emissions estimation for Scenarios 1 and 2 (one turbine, with construction in the south region)

Source	Scenario 1 (g/s, no controls)			Scenario 2 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	0.01	0.006	0.0009	0.01	0.003	0.0005
Front end loaders	0.02	0.01	0.002	0.01	0.01	0.001
Compactors	0.002	0.0008	0.0001	0.001	0.0004	0.0001
Truck dumping	0.73	0.26	0.04	0.36	0.13	0.02
Graders	7.48	2.07	0.31	3.74	1.04	0.16
Haulage - Semi tipper	0.20	0.06	0.008	0.01	0.003	0.0004
Haulage - 40T articulated truck	1.80	0.73	0.11	0.09	0.04	0.01
Dozers	0.04	0.01	0.002	0.02	0.01	0.001
Blasting	0.0001	0.00003	0.000004	0.0001	0.00003	0.000004
Drilling	0.001	0.0008	0.0001	0.001	0.0008	0.0001
Wind erosion of cleared land	0.00004	0.00002	0.000003	0.00002	0.00001	0.000001
Wind erosion of borrow pits	0.00001	0.000003	0.000001	0.000003	0.000002	0.0000003

**Table 6.3** Emissions estimation for Scenarios 3 and 4 (five turbines, with construction in the south region)

Source	Scenario 3 (g/s, no controls)			Scenario 4 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	0.06	0.03	0.005	0.03	0.02	0.002
Front end loaders	0.12	0.06	0.008	0.06	0.03	0.004
Compactors	0.008	0.004	0.0006	0.004	0.002	0.0003
Truck dumping	3.64	1.30	0.20	1.82	0.65	0.10
Graders	37.4	10.4	1.56	18.7	5.2	0.78
Haulage - Semi tipper	0.99	0.28	0.042	0.05	0.01	0.002
Haulage - 40T articulated truck	9.02	3.67	0.55	0.45	0.18	0.03
Dozers	0.20	0.06	0.009	0.10	0.03	0.004
Blasting	0.0003	0.0001	0.00002	0.0003	0.0001	0.00002

Source	Scenario 3 (g/s, no controls)			Scenario 4 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Drilling	0.007	0.004	0.0006	0.007	0.004	0.0006
Wind erosion of cleared land	0.0002	0.0001	0.00001	0.0001	0.00005	0.00001
Wind erosion of borrow pits	0.00003	0.00002	0.000003	0.00002	0.00001	0.000001

Table 6.4 Emissions estimation for Scenarios 5 and 6 (one turbine, with construction in the north region)

Source	Scenario 6 (g/s, no controls)			Scenario 6 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	0.01	0.006	0.001	0.01	0.003	0.0005
Front end loaders	0.02	0.01	0.002	0.01	0.006	0.001
Compactors	0.002	0.001	0.0001	0.001	0.0004	0.0001
Truck dumping	0.73	0.26	0.04	0.36	0.13	0.02
Graders	7.48	2.08	0.31	3.74	1.04	0.16
Haulage - Semi tipper	0.20	0.06	0.008	0.01	0.003	0.0004
Haulage - 40T articulated truck	1.80	0.73	0.11	0.09	0.04	0.006
Dozers	0.04	0.01	0.002	0.02	0.006	0.001
Blasting	0.0001	0.00003	0.000004	0.0001	0.00003	0.000004
Drilling	0.001	0.001	0.0001	0.001	0.001	0.0001
Wind erosion of cleared land	0.00004	0.00002	0.000003	0.00002	0.00001	0.000001
Wind erosion of borrow pits	0.00001	0.000003	0.000001	0.000003	0.000002	0.0000003

Table 6.5 Emissions estimation for Scenarios 7 and 8 (five turbines, with construction in the north region)

Source	Scenario 7 (g/s, no controls)			Scenario 8 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	0.06	0.03	0.005	0.03	0.02	0.002
Front end loaders	0.12	0.06	0.008	0.06	0.03	0.004
Compactors	0.008	0.004	0.0006	0.004	0.002	0.0003
Truck dumping	3.64	1.30	0.20	1.82	0.65	0.10
Graders	37.4	10.4	1.56	18.7	5.19	0.78
Haulage - Semi tipper	0.99	0.28	0.04	0.05	0.01	0.002
Haulage - 40T articulated truck	9.02	3.67	0.55	0.45	0.18	0.03
Dozers	0.20	0.06	0.009	0.10	0.03	0.004
Blasting	0.0003	0.0001	0.00002	0.0003	0.0001	0.00002
Drilling	0.007	0.004	0.0006	0.007	0.004	0.0006
Wind erosion of cleared land	0.0002	0.0001	0.00001	0.0001	0.00005	0.00001
Wind erosion of borrow pits	0.00003	0.00002	0.000003	0.00002	0.00001	0.000001

Table 6.6 Emissions estimation for Scenarios 9 and 10 (operations across full region, no construction)

Source	Scenario 9 (g/s, no controls)			Scenario 10 (g/s, with controls)		
	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Wind erosion	0.02	0.008	0.0012	0.01	0.004	0.0006

# 7. Air dispersion modelling

The AERMOD dispersion modelling system was used for this assessment, which is in line with the requirements of the Department of Environment's *Air Quality Modelling Guidance Notes* (2006) and DWER's *Draft Guideline: Air Emissions (Section 10 – Detailed Analysis)* (2019) for air quality dispersion modelling.

## 7.1 AERMET

The AERMOD modelling system consists of two pre-processors and the dispersion model. The first includes the meteorological pre-processor, AERMET, which provides AERMOD with the meteorological information (morning soundings of winds, temperature and dew point from the nearest upper air station; and onsite wind, temperature, turbulence, pressure, and radiation measurements) it needs to characterise the boundary layer (e.g. mixing height, friction velocity). The second pre-processor, AERMAP, characterises the terrain and generates receptor grids and elevations for the dispersion model.

AERMET requires site representative meteorological data containing a minimum of one year of hourly data in the form of both a surface meteorological and file upper air file. This is essential to determine the general wind climate at the site in question, and to conduct dispersion modelling of emissions to air.

As per Fortescue's request in the scope of works, observations from the Marble Bar Bureau of Meteorology (BoM) station were used for meteorological inputs into AERMET (BoM, 2024). The following onsite meteorological observations were used for input to the surface file into AERMET:

- Wind speed
- Wind direction
- Temperature
- Relative humidity
- Mean sea level pressure
- Cloud tenths
- Cloud height
- Bowen ration
- Albedo
- Cloud cover
- Surface roughness

In 'onsite' observation mode AERMET was then used to synthesise the AERMOD meteorological file. Raw hourly meteorological data obtained from appropriate land use categorisations were used to generate a surface data file (sfc) and profile data file (pfl). The option of ADJ\_U\* was used to counteract AERMOD's tendency to overpredict concentrations under low wind speed, stable atmosphere conditions, by adjusting the modelled wind speed to better reflect actual conditions and improve the accuracy of the dispersion model.

Appropriate values for albedo, Bowen ratio and surface roughness were input into AERMET to define the surface characteristics, which affect dispersion at the site. These surface characteristics were determined using guidance from EPA Victoria (EPA Victoria, 2013) and the United States Environmental Protection Agency (US Environmental Protection Agency, 2024). The breakdown of the distribution of the Bowen ratio and albedo across each sector and season can be seen in Figure 7.1, Table 7.1 and Table 7.2.

Output from AERMET provided a surface meteorological file and upper air meteorological file to input into AERMOD.

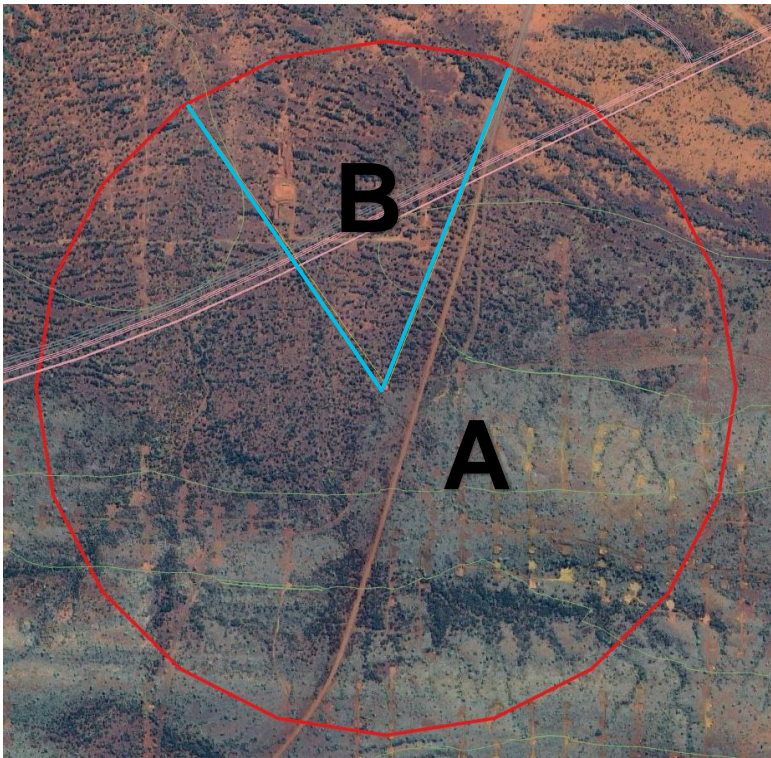


Figure 7.1 Area used to calculate surface roughness  $Z_0$

Table 7.1 Surface roughness used in each sector (A)

Sector	Degrees included (true north)	Surface roughness
A	10 – 325	0.17
B	325 – 10	0.17

Table 7.2 AERMET albedo and Bowen ratio parameters

Season	Albedo	Bowen ratio
Summer (Dec – Feb)	0.243	3.75
Autumn (Mar – May)	0.243	5.55
Winter (Jun – Aug)	0.243	5.55
Spring (Sep – Nov)	0.243	2.85

## 7.2 Representative year selection

A representative year for modelling was chosen based on review and analysis of BoM data recorded at the Marble Bar weather station for 10 years (01/01/2014 – 31/12/2023).

The year 2019 was selected as the meteorological year as it most closely aligned with the trends of the long-term data observed. The criteria of selection of the representative meteorological year was based on comparison of temperature, rain fall and wind data for each contending year against historical average data (2014-2023).

Figure 7.2 show temperature for the chosen representative year of 2019 in comparison with mean temperature for the ten-year period from 2014 to 2023. Temperature pattern for 2019 is shown to align closely with long-term average and shows little seasonal variation. Figure 7.3 show rainfall for 2019 in comparison with mean rainfall for the ten-year period. Rainfall for 2019 is shown to be much lower than long term average and indicates strong influence from the El Niño event in 2019. There is a spike observed in March 2019 in comparison to the long-term average, however, the general trend still aligns and is lower than that of the historical data. A summary of the annual and seasonal wind behaviour observed at Marble Bar for the 10-year period and 2019 are shown in Figure 4.3 and Figure 7.4 respectively. The average wind speed for 2023 was 2.8 m/s which is the same as the

average wind speed for the ten-year period at 2.8 m/s and is predominantly from the south-east direction. Seasonal wind patterns for 2019 were also observed to be representative of the seasonal wind patterns for the ten-year period.

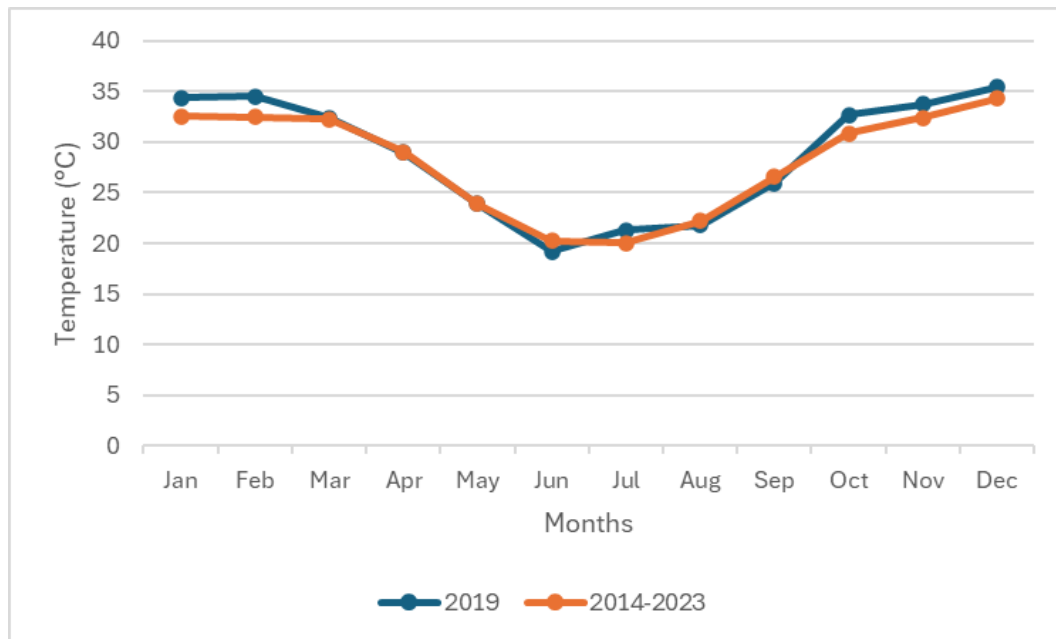


Figure 7.2 Monthly mean temperature for 2019 and ten-year period (2014 to 2023) TAPM data

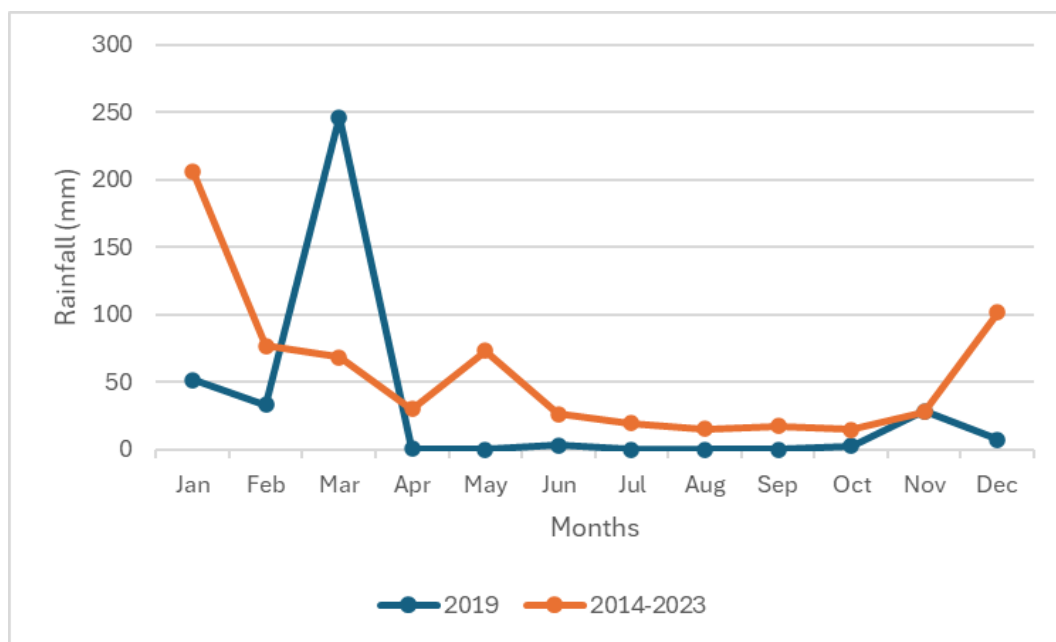
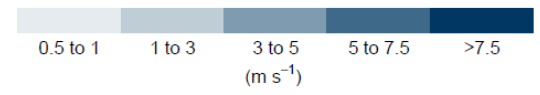
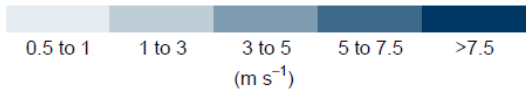
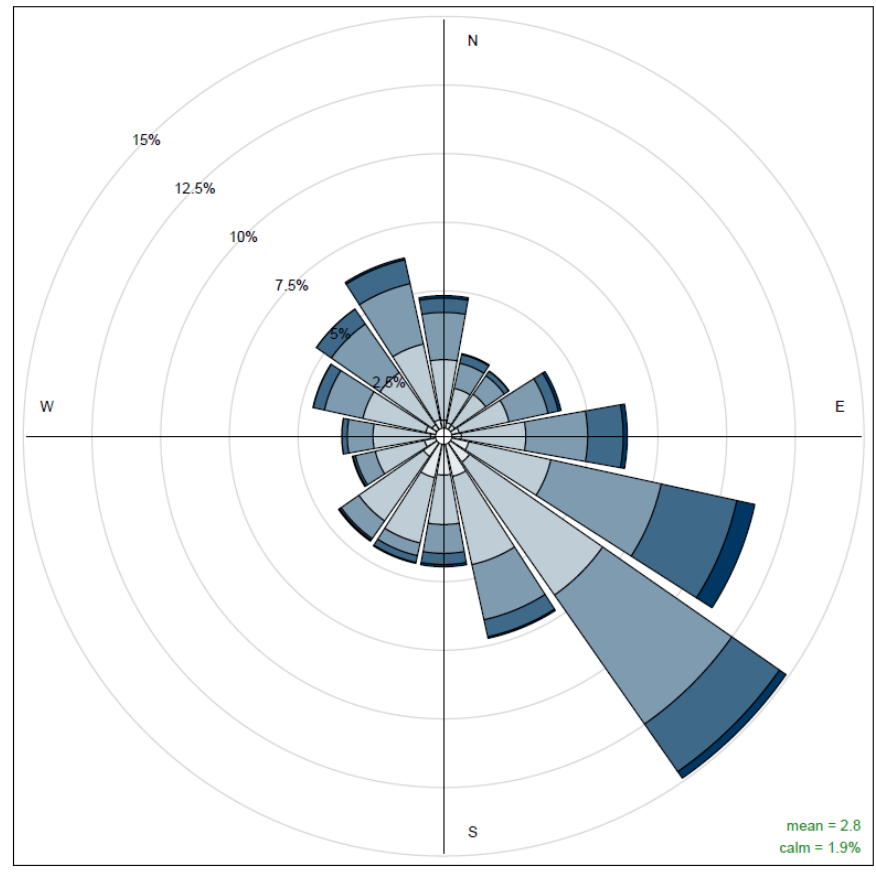
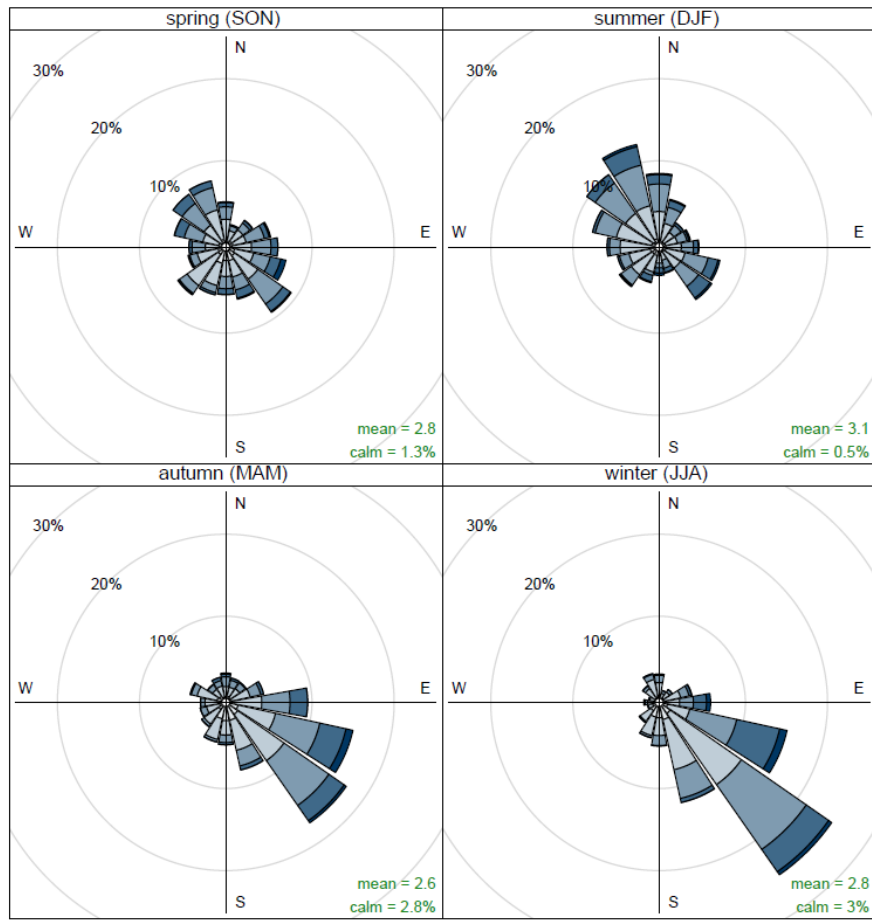


Figure 7.3 Mean monthly rainfall for 2019 and ten-year period (2014 to 2023) TAPM data



Frequency of counts by wind direction (%)

Annual

Figure 7.4 Seasonal and annual wind roses for Marble Bar BoM station for meteorological year 2019

## 7.3 AERMOD

The atmospheric dispersion modelling completed that has been used for this assessment is the US EPA approved model, AERMOD. The model is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

It is recognised that AERMOD concentration predictions for area sources in the current approved version of AERMOD are likely to be overestimated under very light wind conditions (i.e. for wind speeds less than 1 m/sec).

Consequently, emissions from extensive areas were represented by volume sources in AERMOD for this assessment. The model configuration is summarised in Table 7.3.

Table 7.3 AERMOD model configuration

Parameter	Setting
Averaging times	24-hour and annual
Terrain data source	Default AERMAP databases
Surrounding land use (AERMOD)	Quarry and arid shrub
Grid domain	47 km x 47 km
Grid resolution	0.5 km
Centre grid point (easting, northing)	776,638 m; 7,531,997 m (Zone 50)

## 7.4 Dust deposition particle characteristics

Dry deposition of TSP was modelled to predict the dust deposition at each receptor. AERMOD Method One, the US EPA default method, was used for modelling dry deposition. This method requires input of particle characteristics for each source. For this assessment, the following three bins were modelled:

- Particles with a diameter greater than 10 µm
- Particles with a diameter between 6 and 10 µm
- Particles with a diameter less than 2.5 µm.

The TSP model run was configured to output dry deposition. One emission file was generated for each particle size category for TSP with the ore modelling results. One emission file was generated with corresponding particle size distributions. Following the methodology of Method One, the AERMOD particle size distribution was taken from the AP-42 *Compilation of Air Pollutant Emission Factors from Stationary Sources Appendix B. 2* (US EPA, 1996). Particulate size distribution data was not provided by Fortescue. Particle density was assumed to be 1 g/cm<sup>3</sup> as per an average density calculated over a variety of dust types (Bin Master, 2025). The particle mass fractions used to calculate deposited dust from TSP are shown in Table 7.4.

Table 7.4 Character particle source emissions

Particle diameter	Mass fractions (%)	Particulate density (1 g/m <sup>3</sup> )
2.5	15	1
6	34	1
10	51	1

## 8. Results

This section presents the predicted incremental GLCs for the pollutants at the receptors located near the Project site.

### 8.1 Particulate matter as PM<sub>10</sub>

PM<sub>10</sub> has been assessed with respect to the human health criteria for the maximum allowable 24-hour criteria and the annual average criteria.

The predicted maximum incremental PM<sub>10</sub> GLCs for the south region construction scenarios are presented in Table 8.1 and Table 8.2 for 24-hour and annual averaging periods, respectively. Contour plots for each of the south region construction scenarios and respective averaging periods are presented in Figure 8.1 to Figure 8.8.

The predicted maximum incremental PM<sub>10</sub> GLCs for the north region construction scenarios are presented in Table 8.3 and Table 8.4 for 24-hour and annual averaging periods, respectively. Contour plots for each of the north region construction scenarios and respective averaging periods are presented in Figure 8.9 to Figure 8.16.

The predicted maximum incremental PM<sub>10</sub> GLCs for the operations scenarios are presented in Table 8.5 and Table 8.6 for 24-hour and annual averaging periods, respectively. Contour plots for each of the operations scenarios and respective averaging periods are presented in Figure 8.17 to Figure 8.20.

No exceedances of the human health criteria were predicted for either the maximum 24-hour or annual average PM<sub>10</sub> criteria at any of the receptor locations for all modelled turbines in the south location.

Although exceedances of the human health criteria are predicted for scenario 7, it is important to note the close proximity of these receptors to the construction operations, which are typically anticipated to have elevated concentrations of dust, especially when no controls are applied to manage or mitigate the dust impacts.

Comparing scenarios 7 and 8, it is evident that the implementation of control measures such as water sprays can greatly assist with compliance, with controls providing significant emission reduction between scenario 7 and 8.

Additional analysis was undertaken surrounding the frequency/number of exceedances predicted at each receptor by the model for each scenario (scenario 7) where exceedances were prevalent, which can be seen in Table 8.7. The exceedance frequency analysis identified the one exceedance of the 24-hour averaging criteria at receptor #1 (Bonnie Pool) for scenario 7.

**Table 8.1** *PM<sub>10</sub> incremental ground level concentrations for south region construction scenarios, 24-hour averaging period*

ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.82	2%	0.24	<1%	4.29	9%	1.29	3%	50
#R2	1.51	3%	0.60	1%	5.60	11%	1.88	4%	
#R3	5.98	12%	2.60	5%	14.8	30%	6.10	12%	

**Table 8.2** *PM<sub>10</sub> incremental ground level concentrations for south region construction scenarios, annual averaging period*

ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.06	<1%	0.02	<1%	0.34	1%	0.12	<1%	25
#R2	0.15	<1%	0.06	<1%	0.63	3%	0.26	1%	
#R3	0.27	1%	0.12	<1%	0.96	4%	0.40	2%	

**Table 8.3** *PM<sub>10</sub> incremental ground level concentrations for north region construction scenarios, 24-hour averaging period*

ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	23.0	46%	10.4	21%	57.5	115%	23.2	46%	50
#R2	0.69	1%	0.28	<1%	3.16	6%	1.24	2%	
#R3	1.05	2%	0.45	<1%	3.44	7%	1.29	3%	

**Table 8.4** *PM<sub>10</sub> incremental ground level concentrations for north region construction scenarios, annual averaging period*

ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	1.91	8%	0.86	3%	5.17	21%	2.12	8%	25
#R2	0.02	<1%	0.01	<1%	0.10	<1%	0.04	<1%	
#R3	0.02	<1%	0.01	<1%	0.11	<1%	0.04	<1%	

**Table 8.5** *PM<sub>10</sub> incremental ground level concentrations for operations scenarios, 24-hour averaging period*

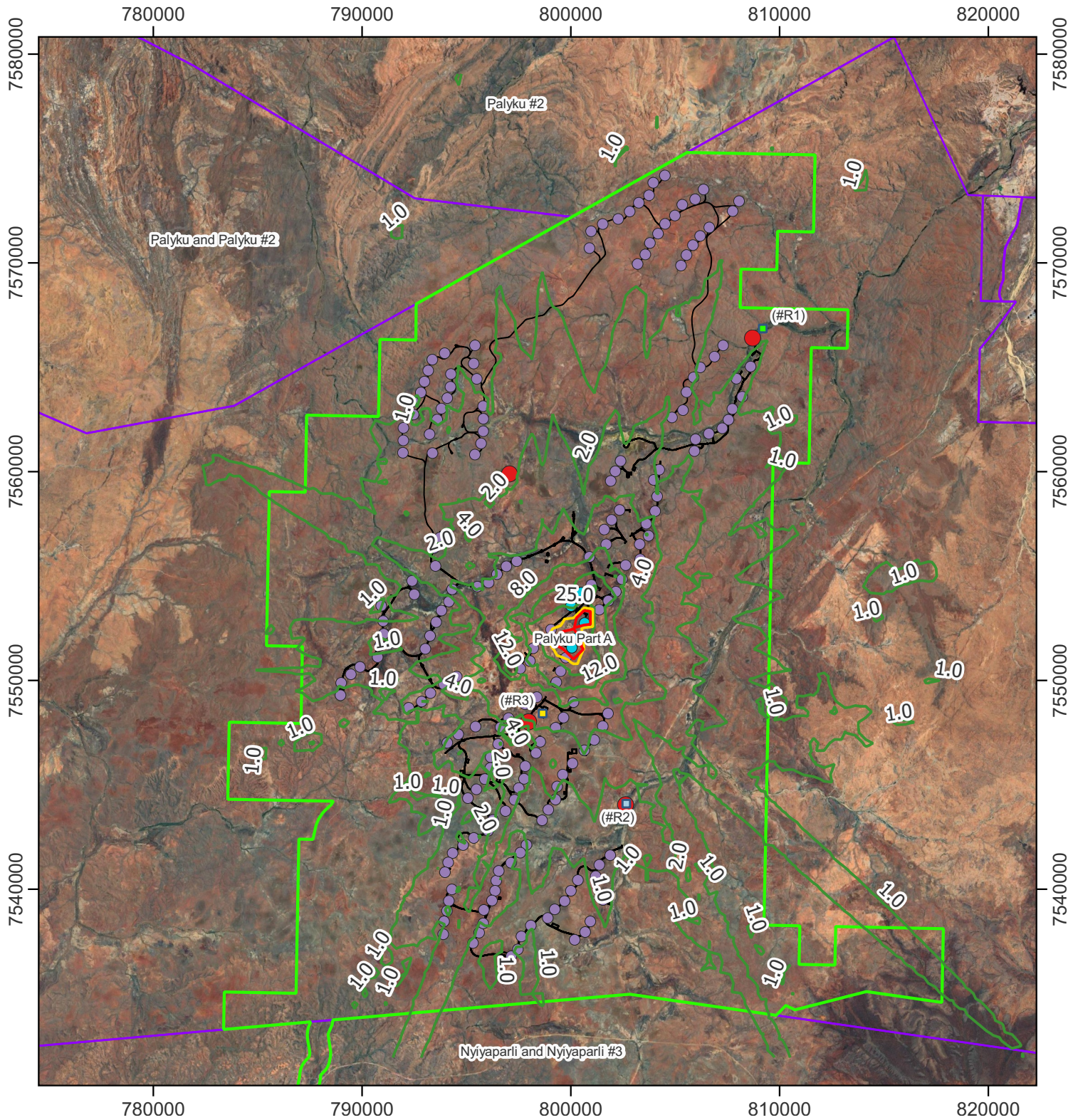
ID	Scenario 9		Scenario 10		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.07	<1%	0.03	<1%	50
#R2	0.01	<1%	0.003	<1%	
#R3	0.02	<1%	0.01	<1%	

**Table 8.6** *PM<sub>10</sub> incremental ground level concentrations for operations scenarios, annual averaging period*

ID	Scenario 9		Scenario 10		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.001	<1%	0.001	<1%	25
#R2	0.0004	<1%	0.0002	<1%	
#R3	0.001	<1%	0.001	<1%	

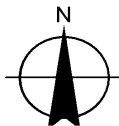
**Table 8.7** *PM<sub>10</sub> frequency of exceedances for receptors with predicted exceedances of the 24-hour averaging period*

ID	Description ID	Scenario 7 (5T in the north, no controls)
		# of Exceedances
#R1	Bonnie Pool	1



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - All turbines
  - South region selected turbines
  - Tracks
  - Proposed Bonney Downs Camp
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

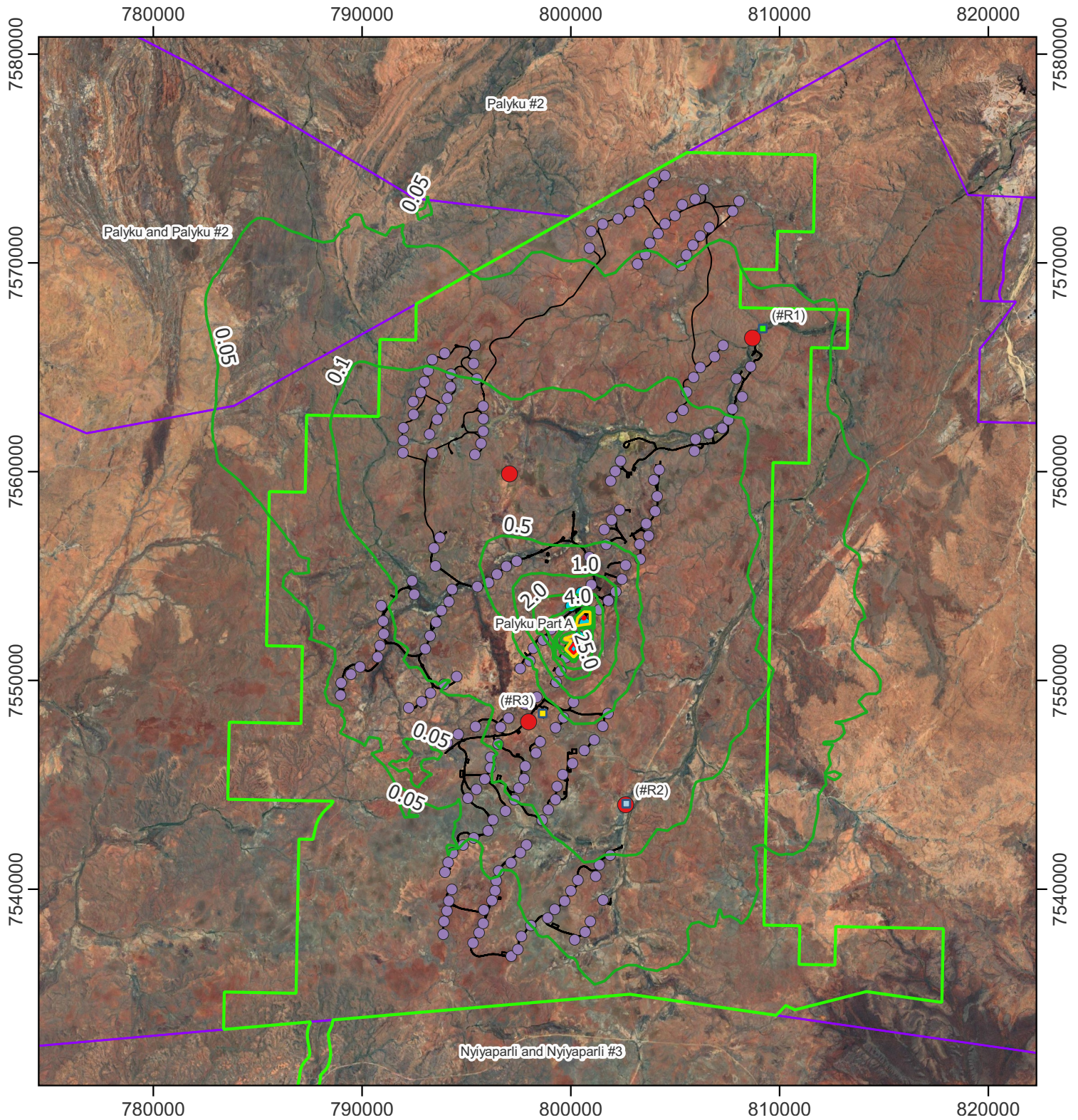
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 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC1: Predicted maximum 24-hour average  
 PM<sub>10</sub> concentration in the south region - 1  
 turbine construction scenario without controls

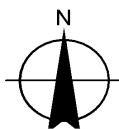
Project No. 12643037  
 Revision No. 0  
 Date. 06/06/2025

**FIGURE 8.1**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

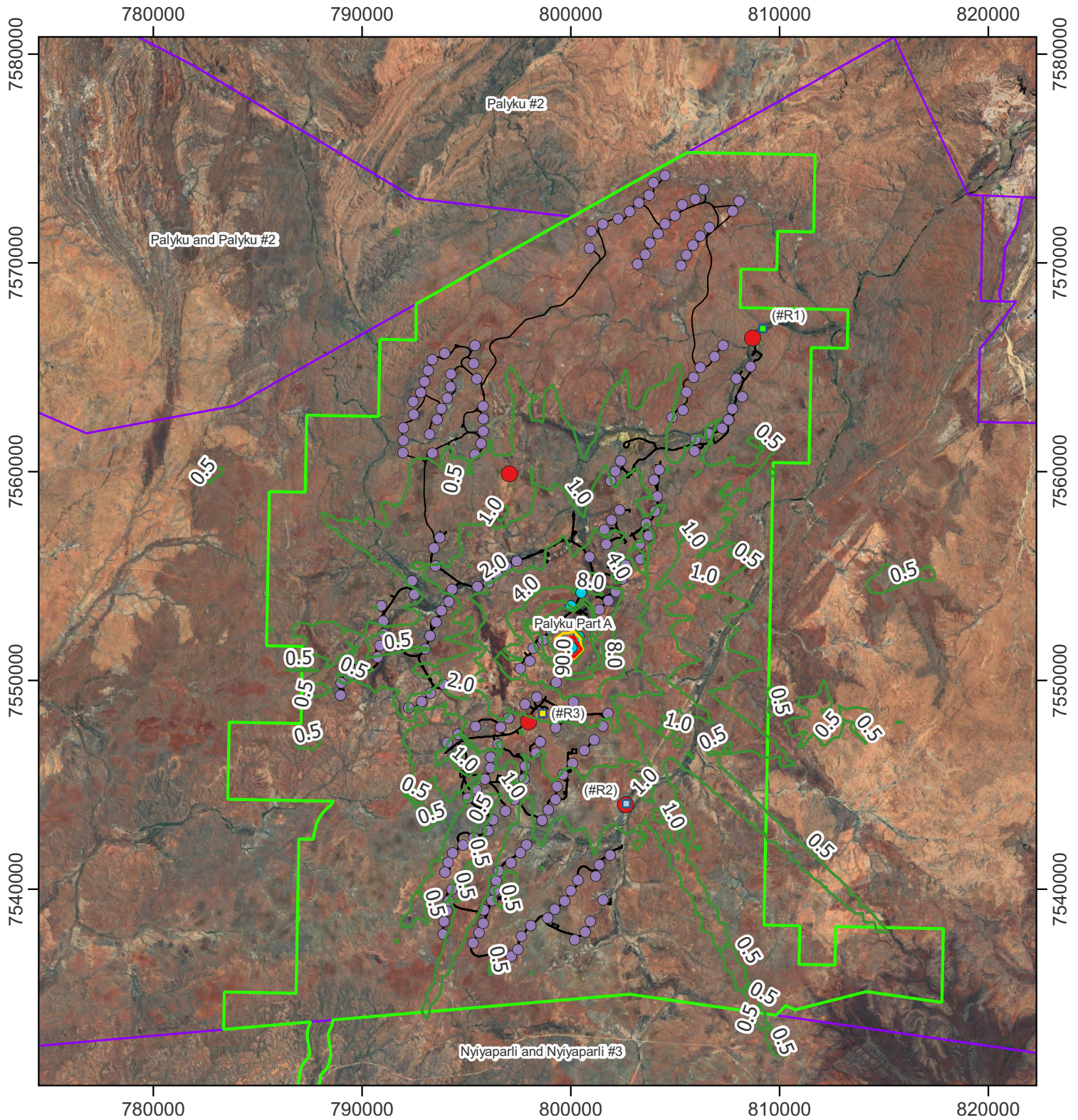
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 Grid: WGS 84 / UTM zone 50S



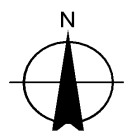
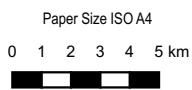
Fortescue - Bonney Downs - Wind Farm  
**SC1: Predicted annual average  
 PM<sub>10</sub> concentration in the south region - 1  
 turbine construction scenario without controls**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.2**



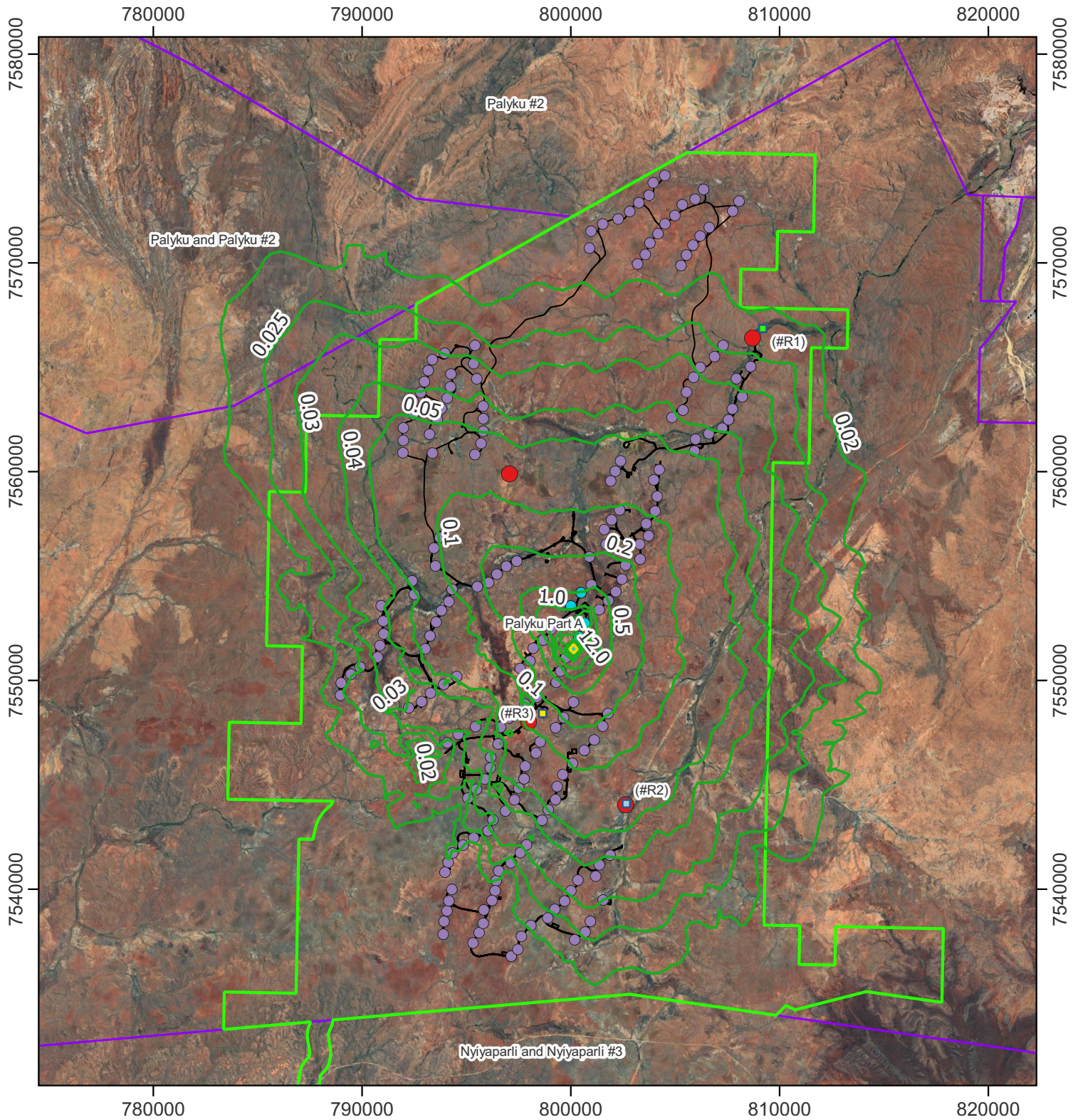
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC2: Predicted maximum 24-hour average PM<sub>10</sub> concentration in the south region - 1 turbine construction scenario with controls**

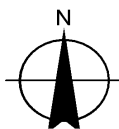
Project No. **12643037**  
 Revision No. **0**  
 Date: **06/06/2025**

**FIGURE 8.3**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

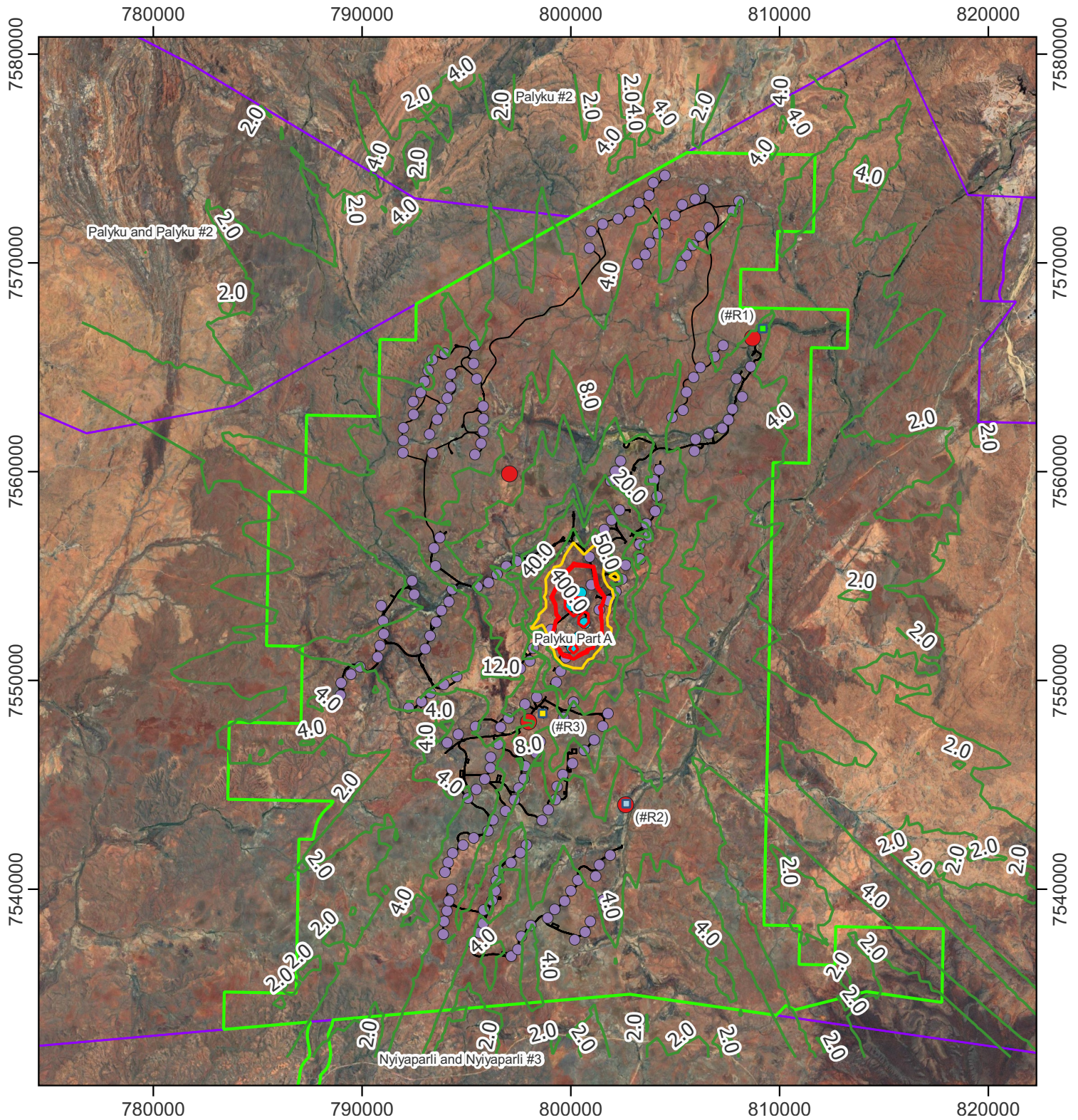
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 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
**SC2: Predicted annual average  
 PM<sub>10</sub> concentration in the south region - 1  
 turbine construction scenario with controls**

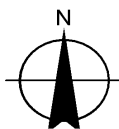
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.4**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

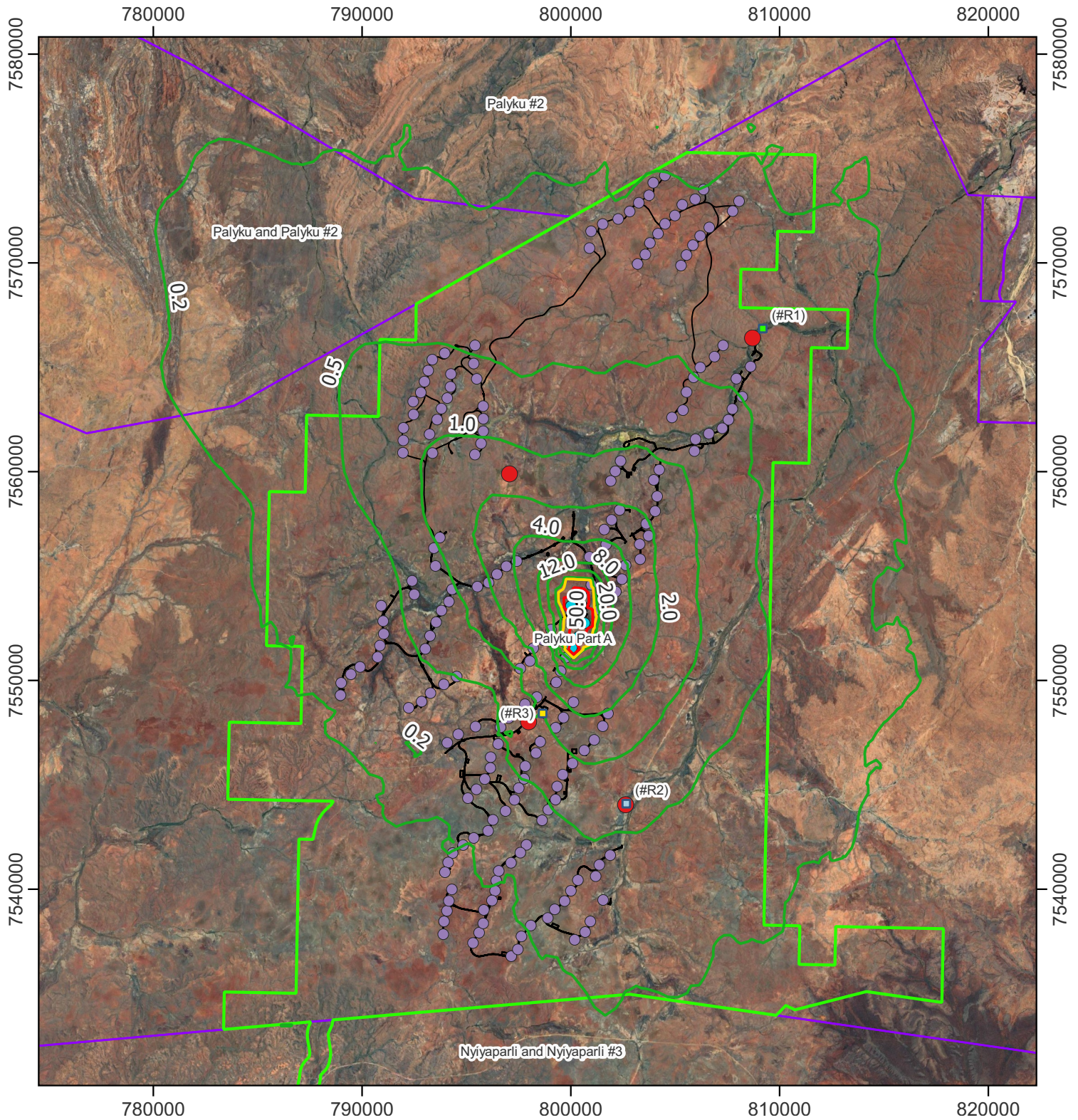
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 Grid: WGS 84 / UTM zone 50S



**Fortescue - Bonney Downs - Wind Farm**  
**SC3: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration in the south region - 5**  
**turbines construction scenario without controls**

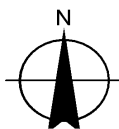
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.5**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - South region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

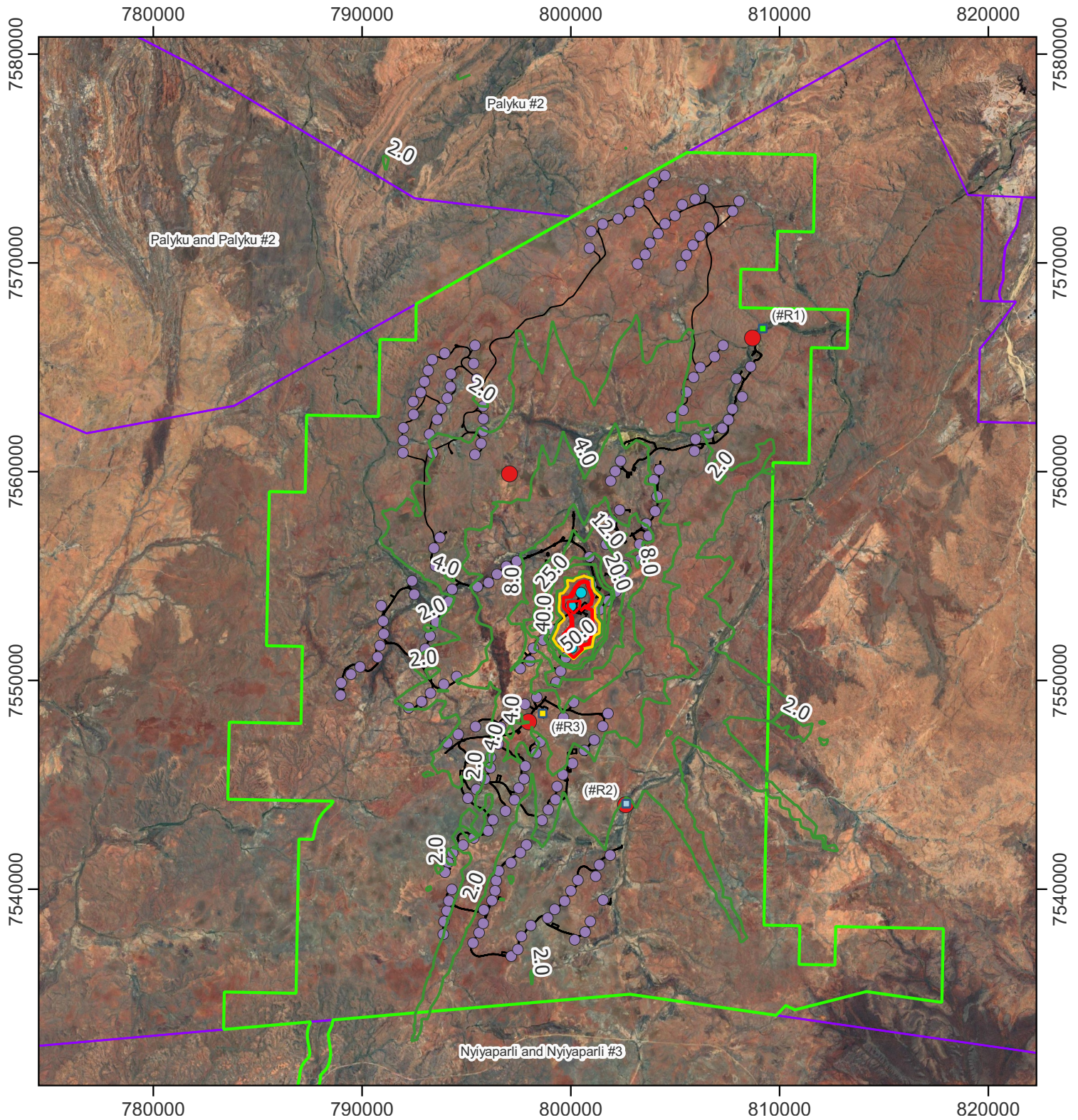
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 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC3: Predicted annual average  
 PM<sub>10</sub> concentration in the south region - 5  
 turbines construction scenario without controls

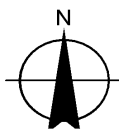
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.6**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

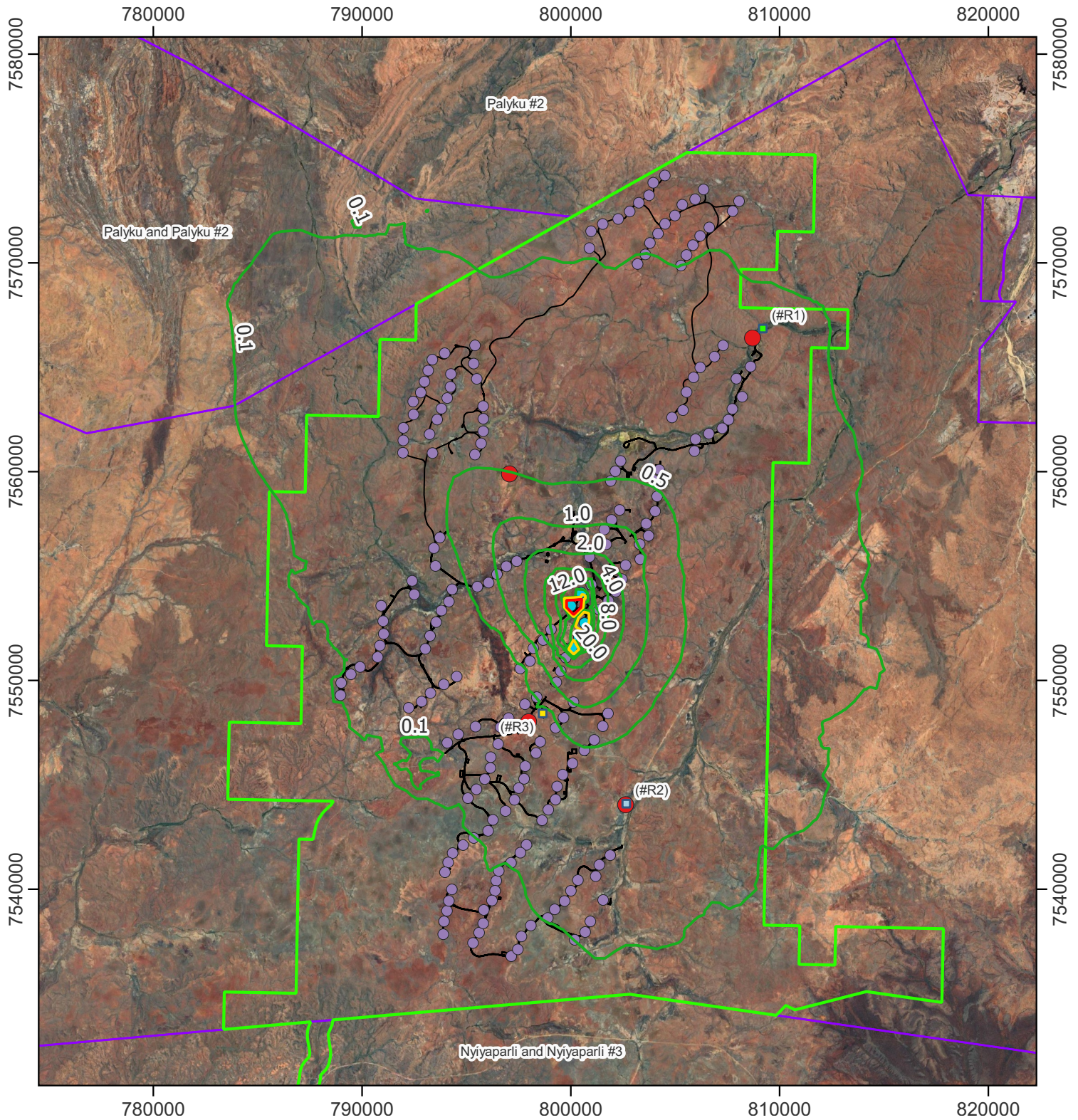
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Fortescue - Bonney Downs - Wind Farm  
 SC4: Predicted maximum 24-hour average  
 PM<sub>10</sub> concentration in the south region - 5  
 turbines construction scenario with controls

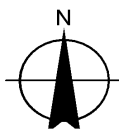
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.7**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

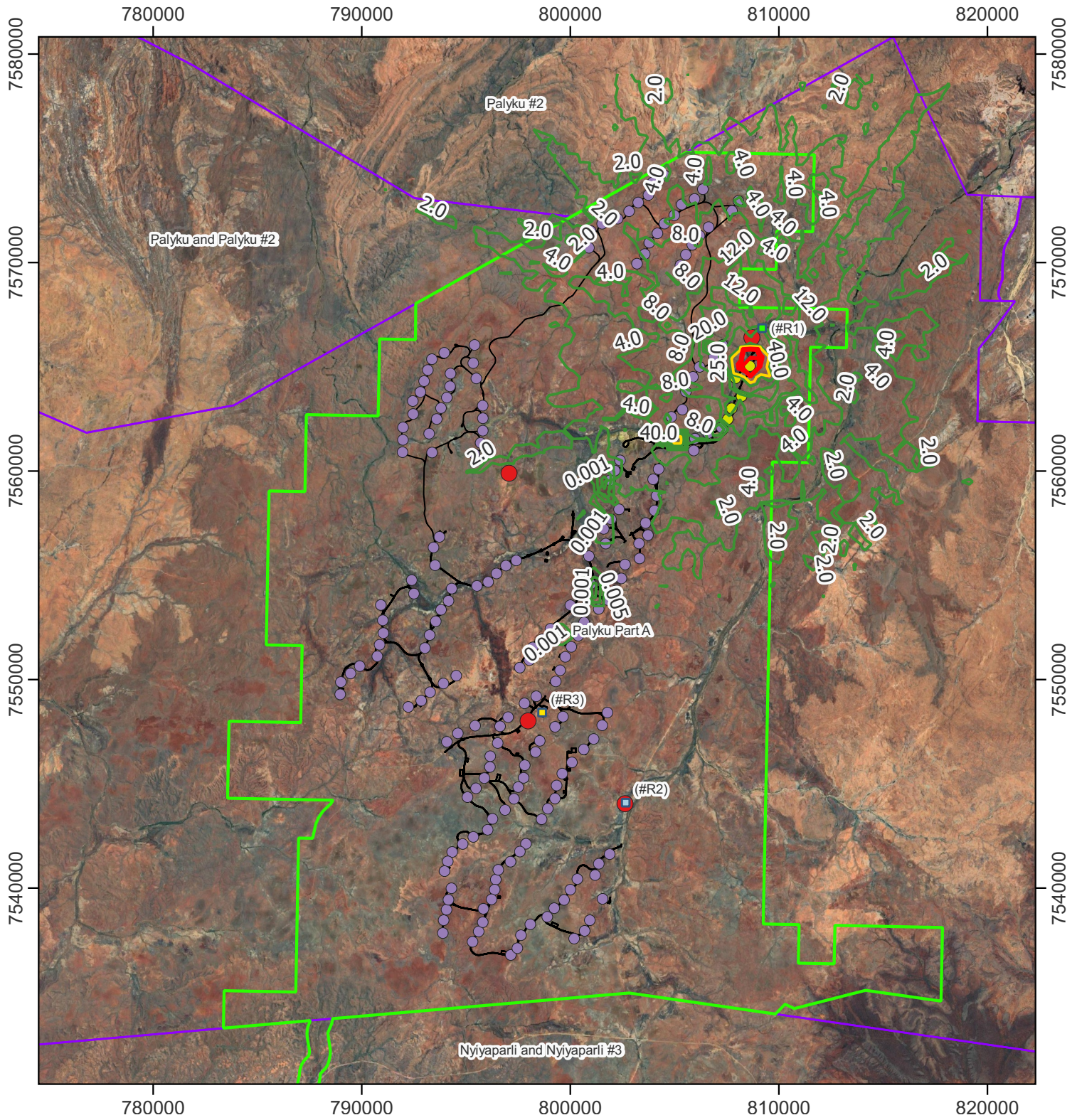
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Fortescue - Bonney Downs - Wind Farm  
**SC4: Predicted annual average  
 PM<sub>10</sub> concentration in the south region - 5  
 turbines construction scenario with controls**

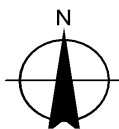
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.8**



- Legend**
- ▭ Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - ▭ Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - ▭ Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - ▭ Bonnie Pool
  - ▭ Bonney Downs Homestead

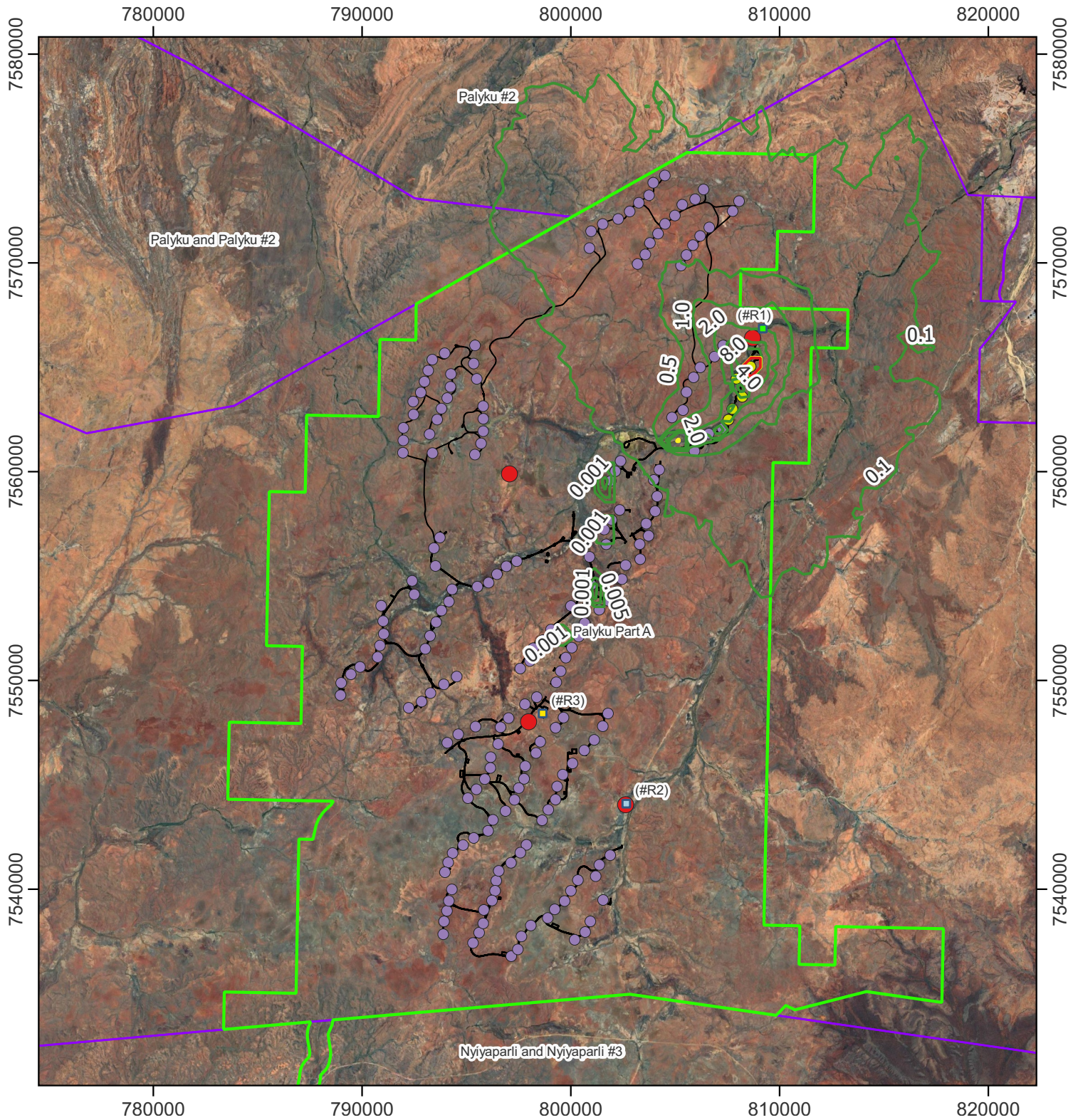
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 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC5: Predicted maximum 24-hour average  
 PM<sub>10</sub> concentration in the north region - 1 turbine  
 construction scenario without controls

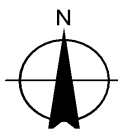
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.9**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

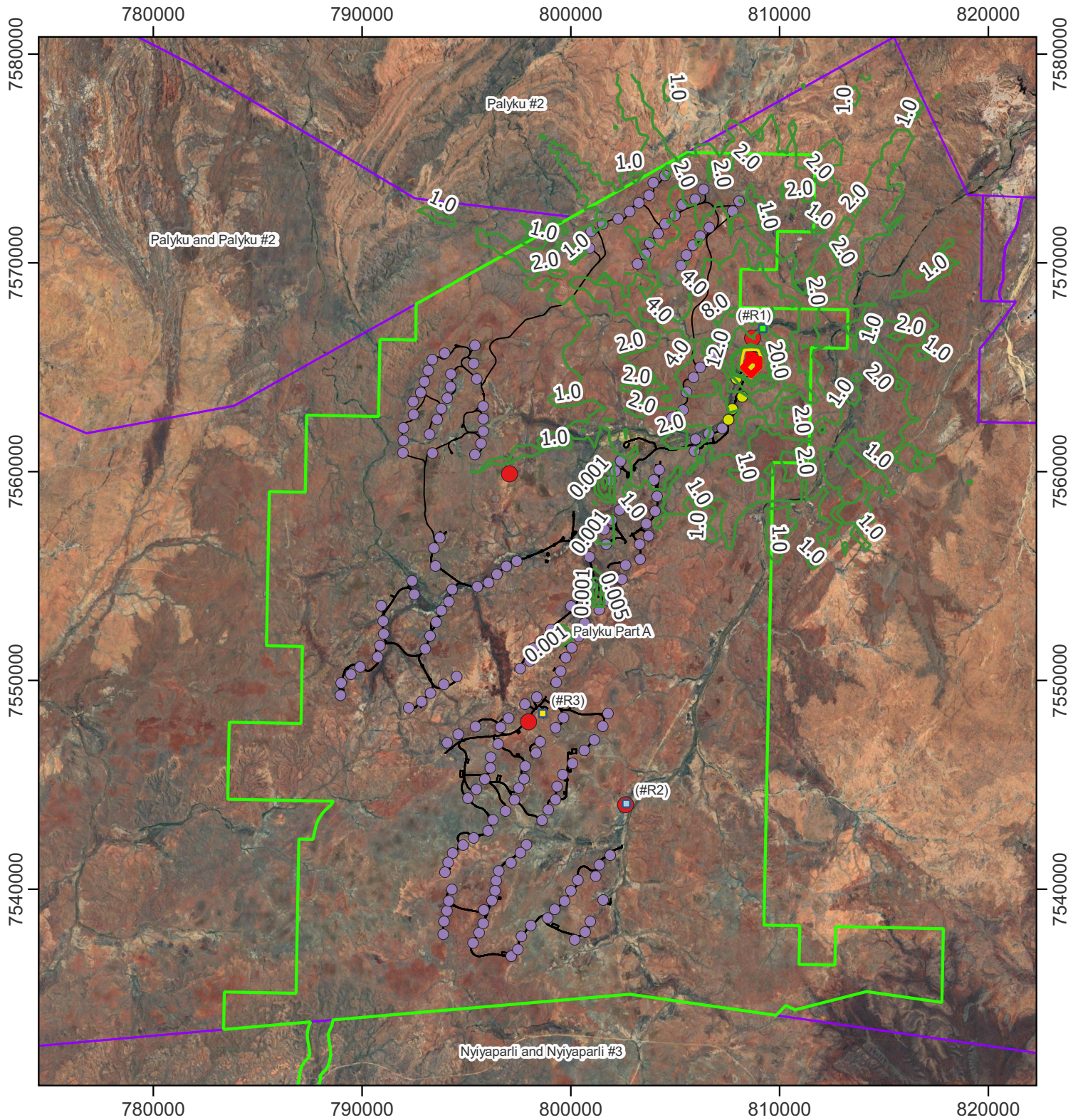
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



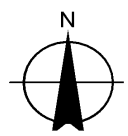
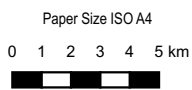
Fortescue - Bonney Downs - Wind Farm  
 SC5: Predicted annual average  
 PM<sub>10</sub> concentration in the north region - 1 turbine  
 construction scenario without controls

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.10**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

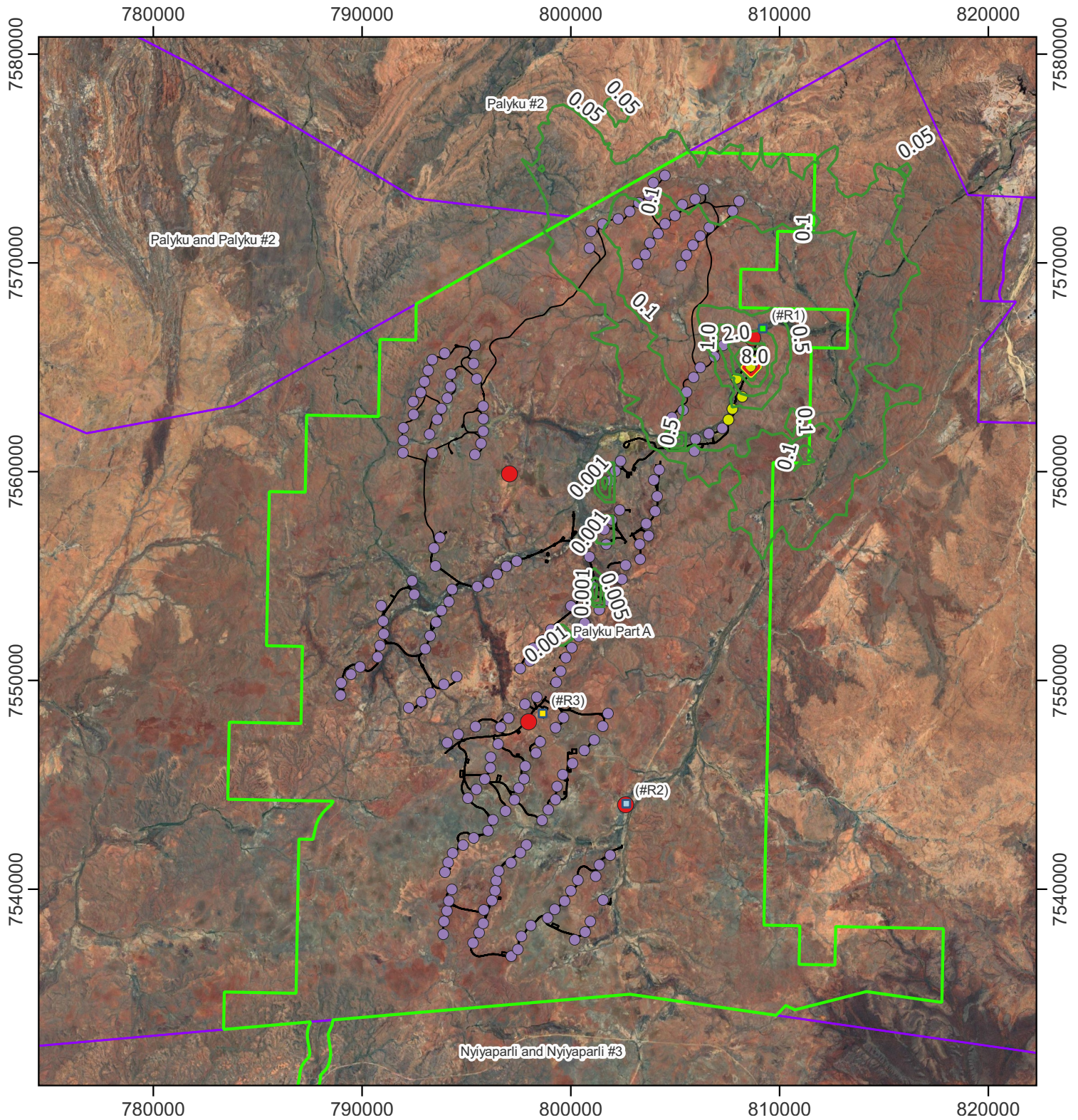


Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

**Fortescue - Bonney Downs - Wind Farm**  
**SC6: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration in the north region - 1 turbine**  
**construction scenario with controls**

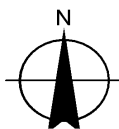
Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.11**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

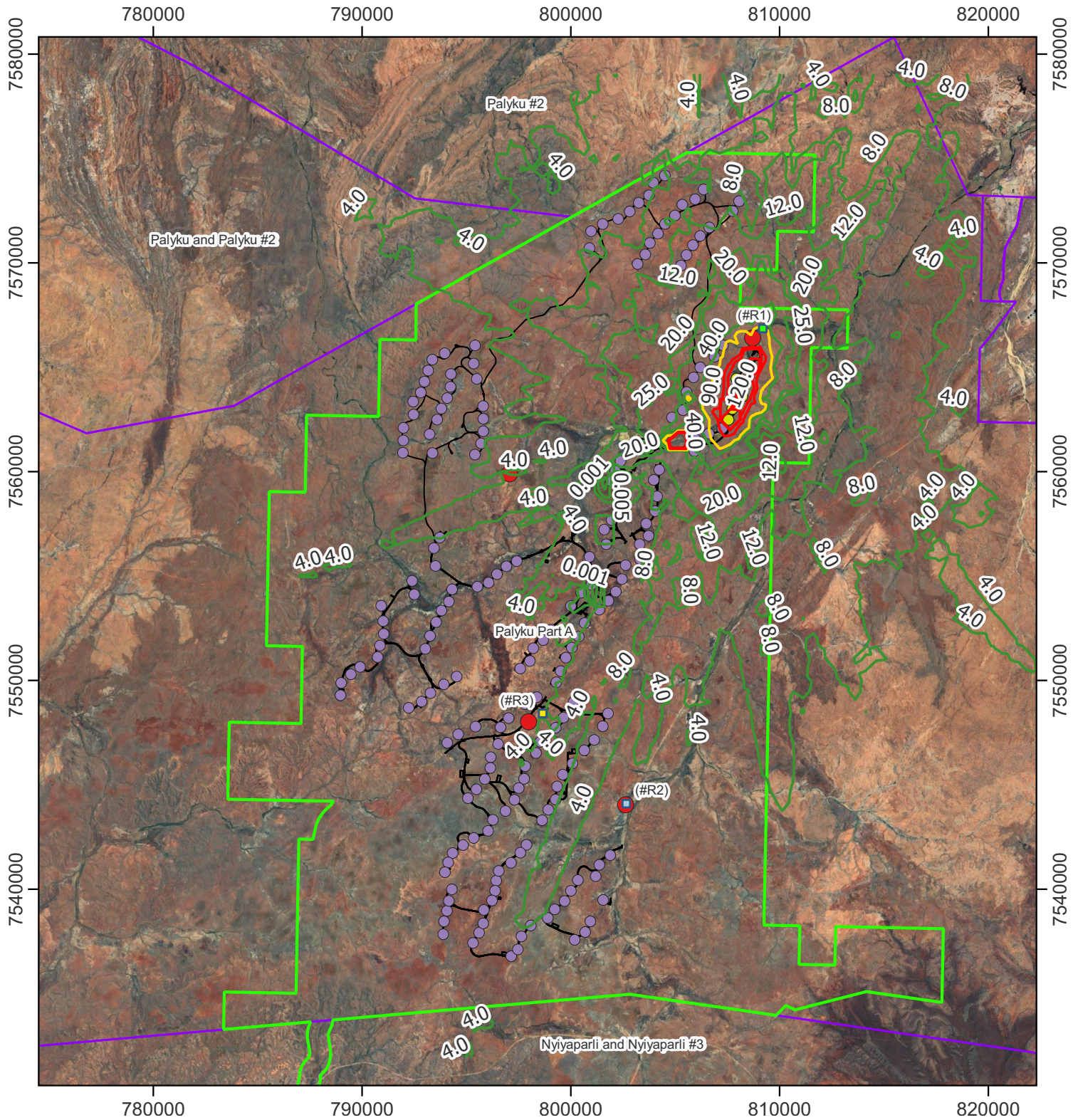
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



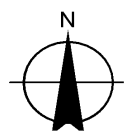
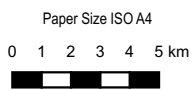
Fortescue - Bonney Downs - Wind Farm  
 SC6: Predicted annual average  
 PM<sub>10</sub> concentration in the north region - 1 turbine  
 construction scenario with controls

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.12**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

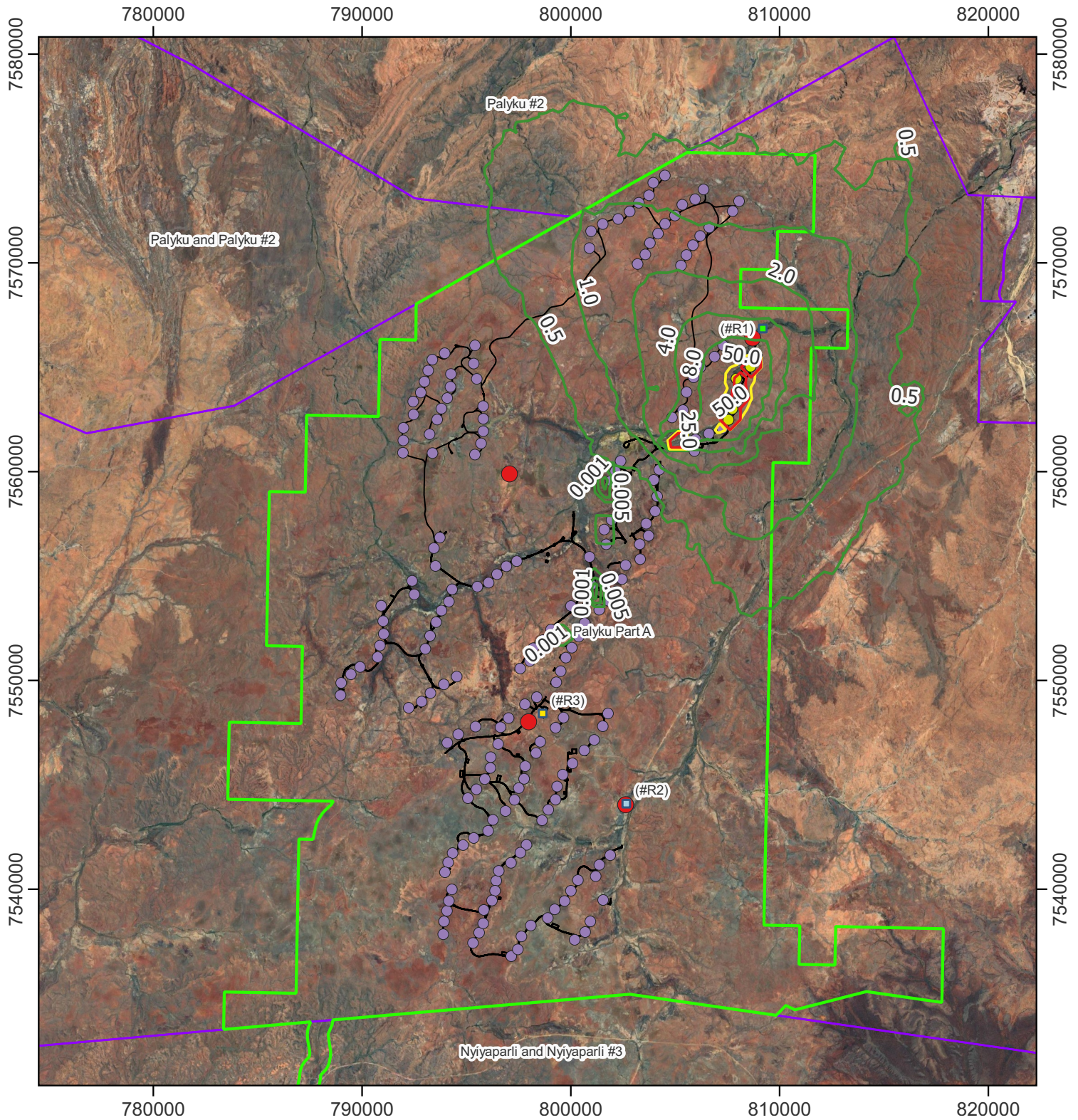


Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

**Fortescue - Bonney Downs - Wind Farm**  
**SC7: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration in the north region - 5**  
**turbines construction scenario without controls**

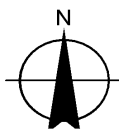
Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.13**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - All turbines
  - North region selected turbines
  - Tracks
  - Dust monitors
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

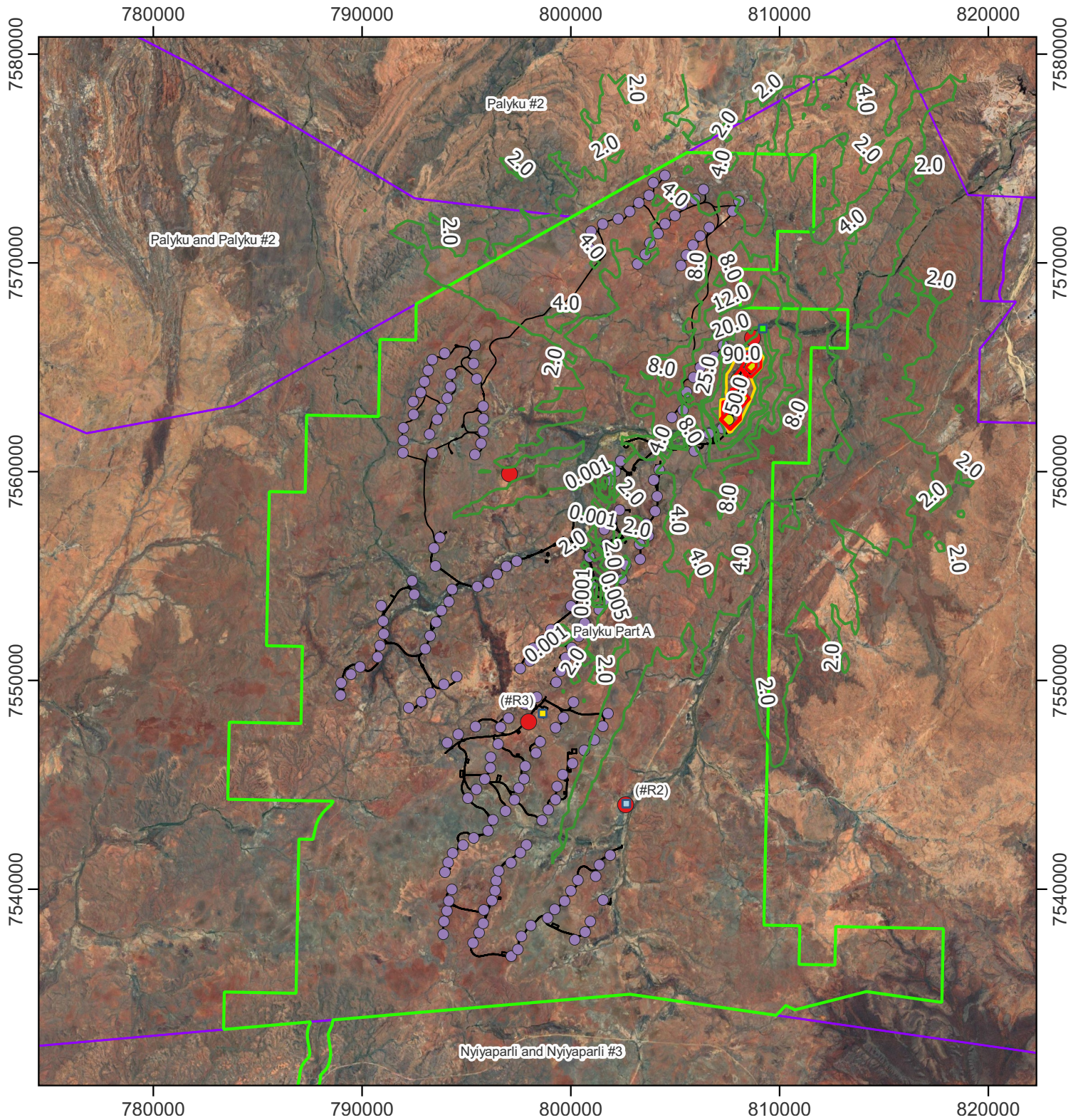
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



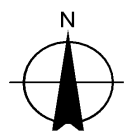
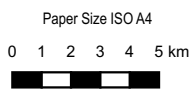
Fortescue - Bonney Downs - Wind Farm  
**SC7: Predicted annual average  
 PM<sub>10</sub> concentration in the north region - 5  
 turbines construction scenario without controls**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.14**



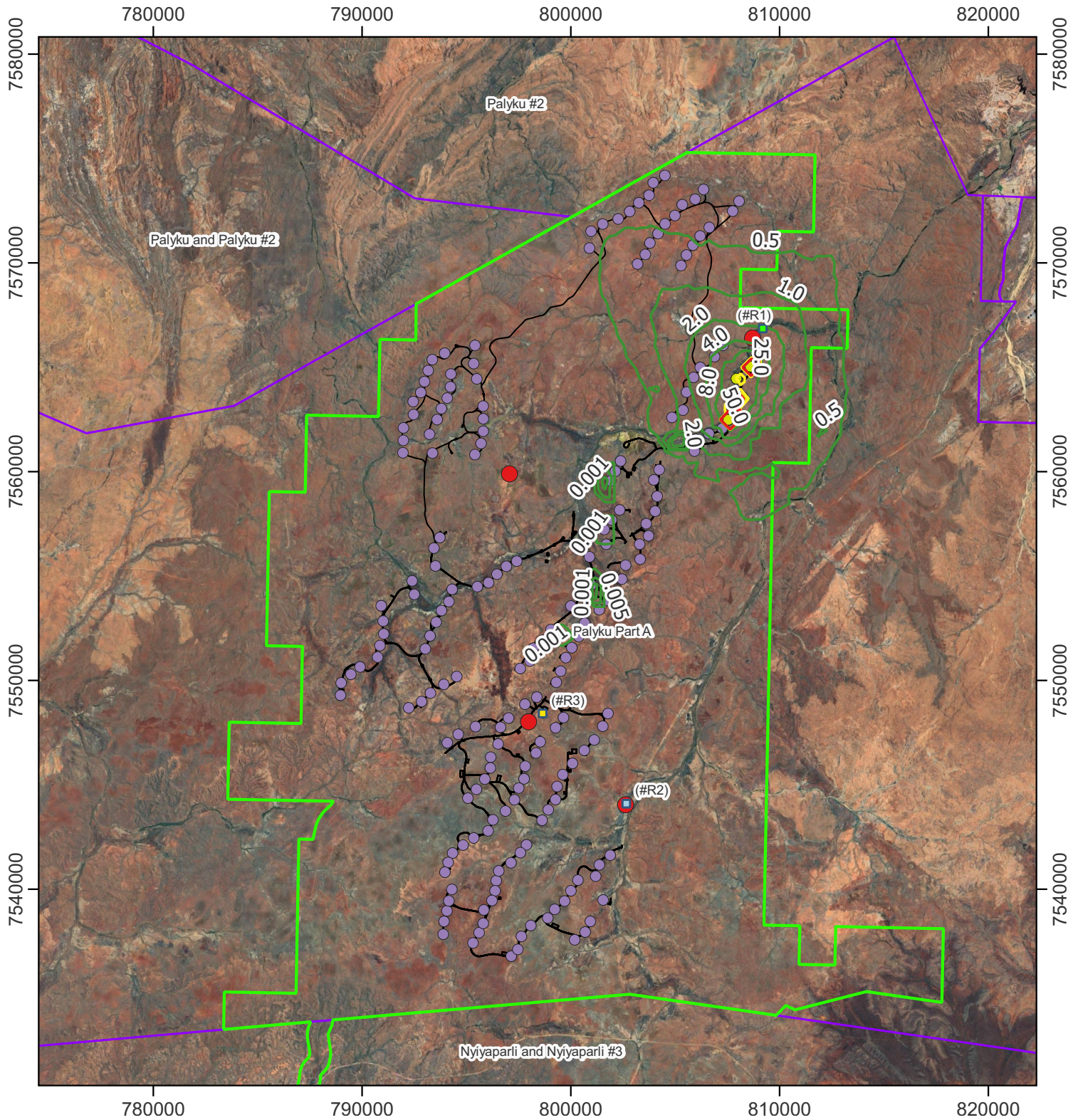
- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - All turbines
  - North region selected turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC8: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration in the north region - 5**  
**turbines construction scenario with controls**

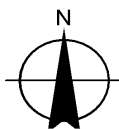
Project No. **12643037**  
 Revision No. **0**  
 Date: **06/06/2025**

**FIGURE 8.15**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - North region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

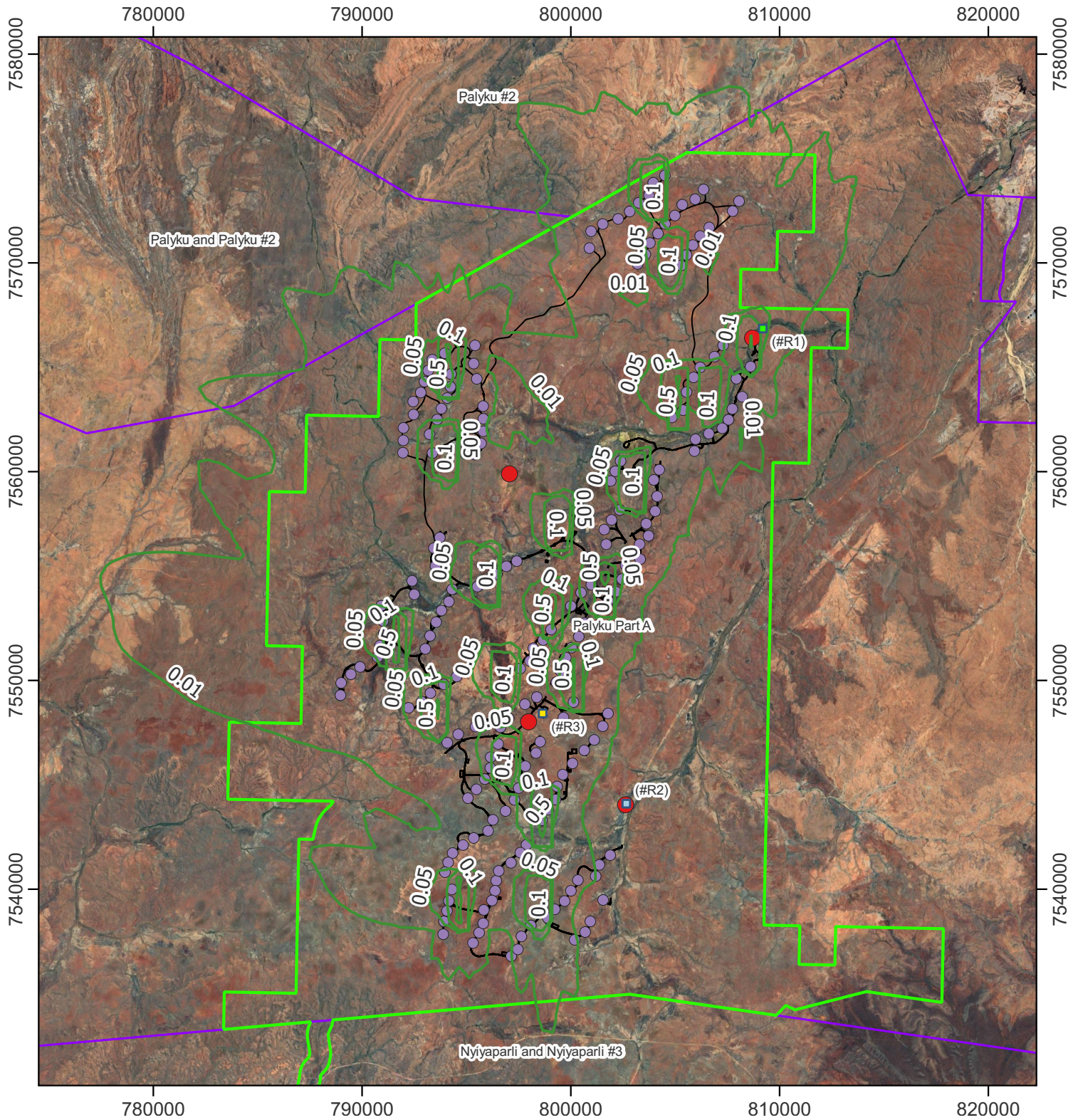
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



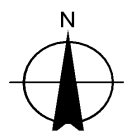
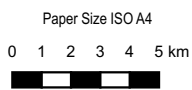
Fortescue - Bonney Downs - Wind Farm  
**SC8: Predicted annual average  
 PM<sub>10</sub> concentration in the north region - 5  
 turbines construction scenario with controls**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.16**



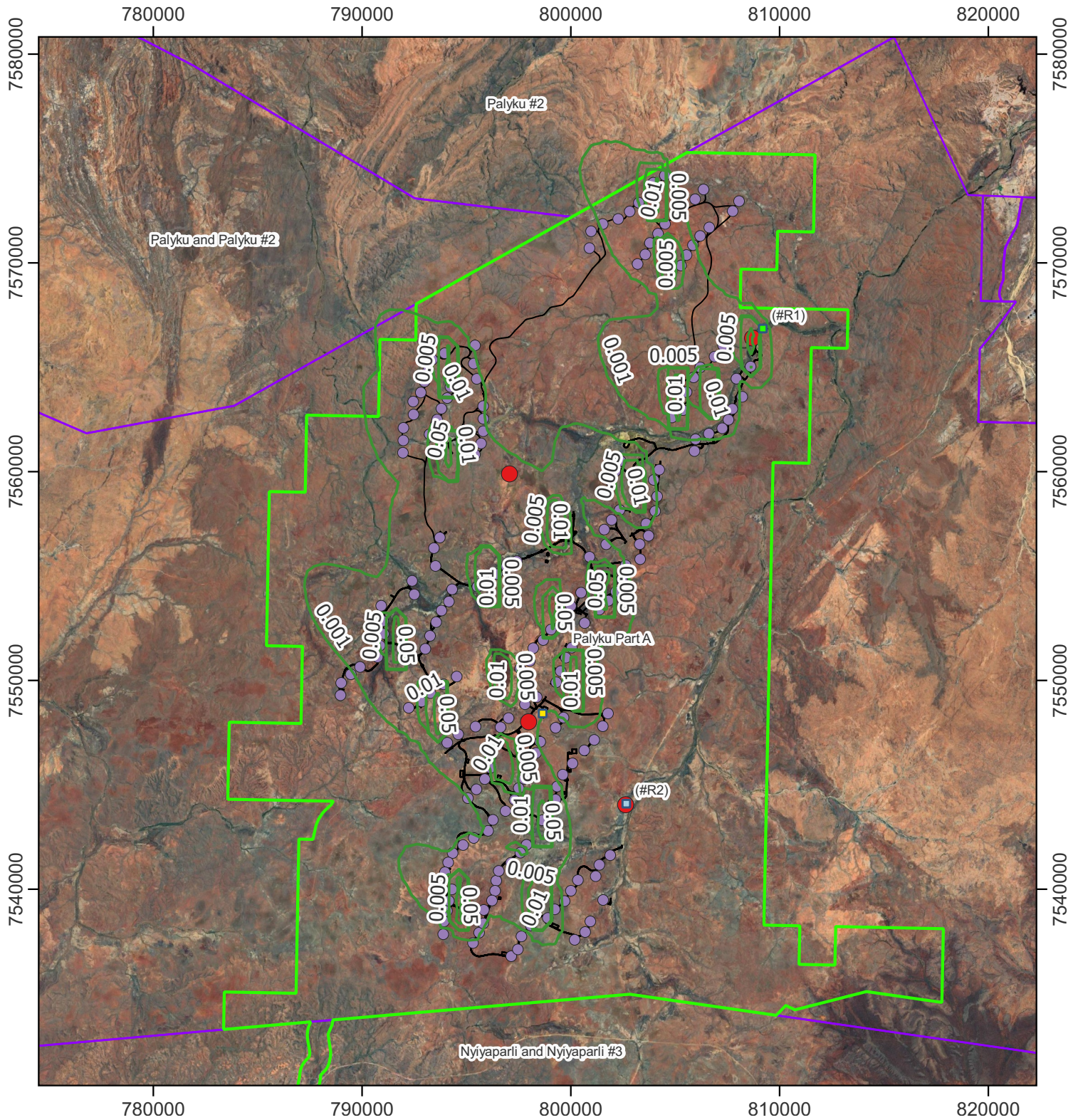
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



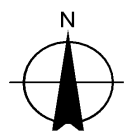
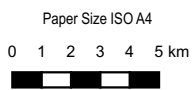
**Fortescue - Bonney Downs - Wind Farm**  
**SC9: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration - Operations scenario**  
**without controls**

Project No. **12643037**  
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 Date: **06/06/2025**

**FIGURE 8.17**



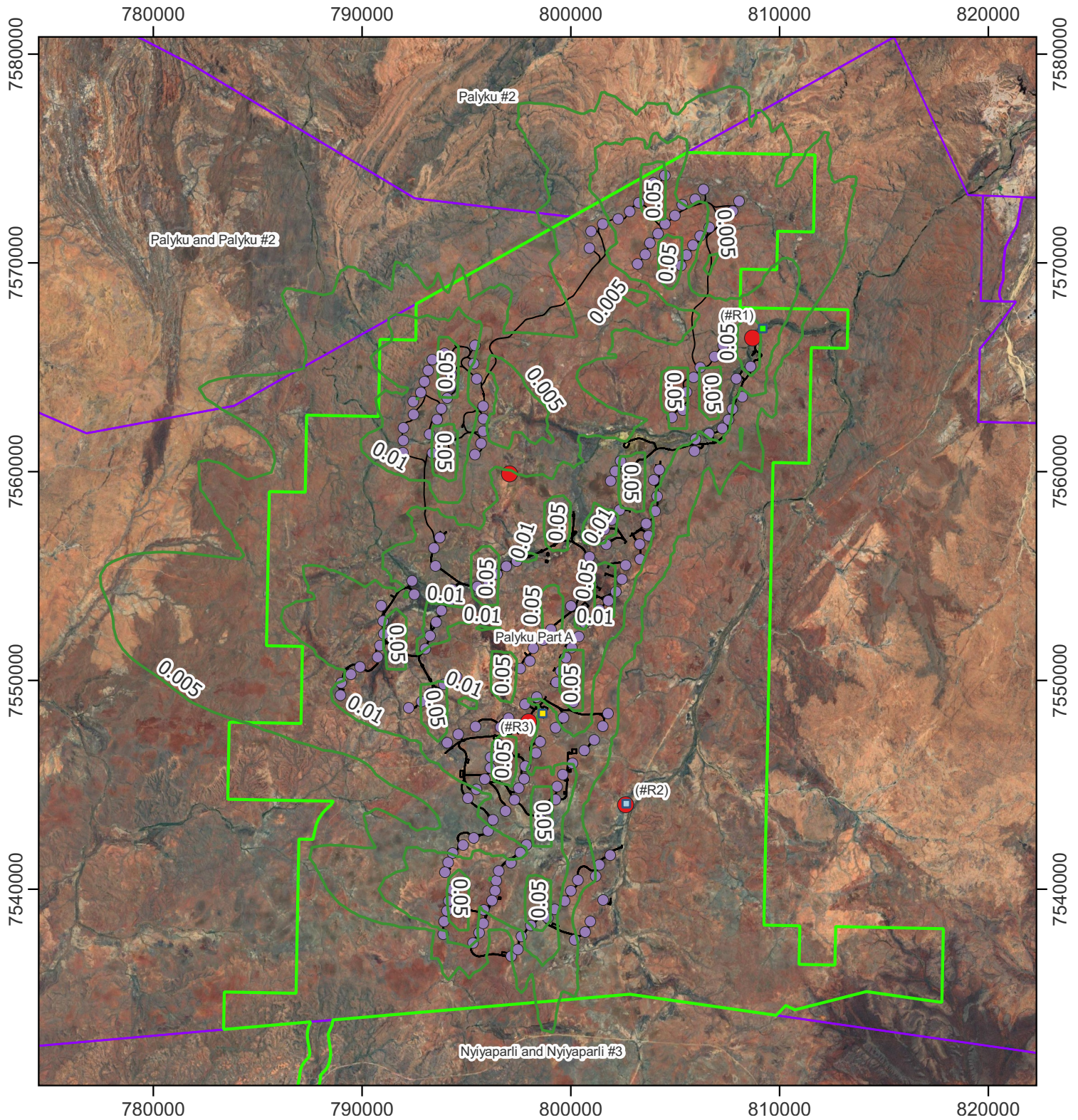
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC9: Predicted annual average**  
**PM<sub>10</sub> concentration - Operations scenario**  
**without controls**

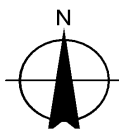
Project No. **12643037**  
 Revision No. **0**  
 Date. **06/06/2025**

**FIGURE 8.18**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $50 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead

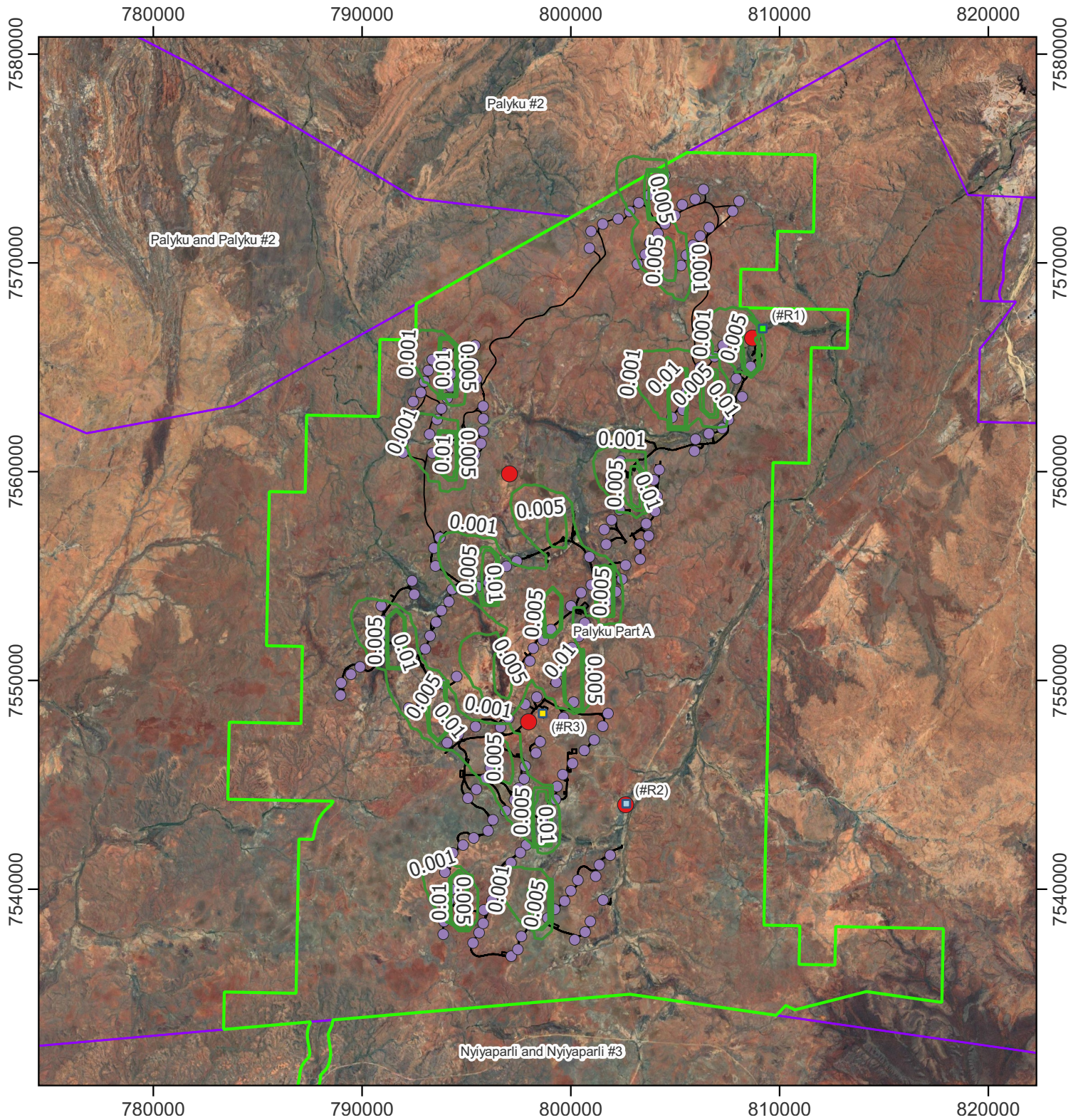
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



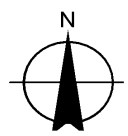
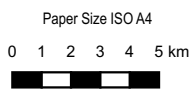
**Fortescue - Bonney Downs - Wind Farm**  
**SC10: Predicted maximum 24-hour average**  
**PM<sub>10</sub> concentration - Operations scenario with**  
**controls**

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.19**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC10: Predicted annual average**  
**PM<sub>10</sub> concentration - Operations scenario with controls**

Project No. **12643037**  
 Revision No. **0**  
 Date. **06/06/2025**

**FIGURE 8.20**

## 8.2 Particulate matter as PM<sub>2.5</sub>

PM<sub>2.5</sub> has been assessed with respect to the human health criteria for the maximum allowable 24-hour criteria and the annual average criteria.

The predicted maximum incremental PM<sub>2.5</sub> GLCs for the south region construction scenarios are presented in Table 8.8 and Table 8.9 for 24-hour and annual averaging periods, respectively. Contour plots for each of the south region construction scenarios and respective averaging periods are presented in Figure 8.21 to Figure 8.28.

The predicted maximum incremental PM<sub>2.5</sub> GLCs for the north region construction scenarios are presented in Table 8.10 and Table 8.11 for 24-hour and annual averaging periods, respectively. Contour plots for each of the north region construction scenarios and respective averaging periods are presented in Figure 8.29 to Figure 8.36.

The predicted maximum incremental PM<sub>2.5</sub> GLCs for the operations scenarios are presented in Table 8.12 and Table 8.13 for 24-hour and annual averaging periods, respectively. Contour plots for each of the operations scenarios and respective averaging periods are presented in Figure 8.37 to Figure 8.40.

No exceedances of the human health criteria were predicted for either the maximum 24-hour or annual average PM<sub>2.5</sub> criteria at any of the receptor locations for all modelled construction and operations scenarios.

**Table 8.8** *PM<sub>2.5</sub> incremental ground level concentrations for south region construction scenarios, 24-hour averaging period*

ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.12	<1%	0.04	<1%	0.64	3%	0.19	<1%	25
#R2	0.23	<1%	0.09	<1%	0.84	3%	0.28	1%	
#R3	0.90	4%	0.39	2%	2.22	9%	0.91	4%	

**Table 8.9** *PM<sub>2.5</sub> incremental ground level concentrations for south region construction scenarios, annual averaging period*

ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.01	<1%	0.003	<1%	0.05	<1%	0.02	<1%	8
#R2	0.02	<1%	0.01	<1%	0.10	1%	0.04	<1%	
#R3	0.04	<1%	0.02	<1%	0.14	2%	0.06	<1%	

**Table 8.10** *PM<sub>2.5</sub> incremental ground level concentrations for north region construction scenarios, 24-hour averaging period*

ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	3.45	14%	1.56	6%	8.64	35%	3.49	14%	25
#R2	0.10	<1%	0.04	<1%	0.47	2%	0.19	<1%	
#R3	0.16	<1%	0.07	<1%	0.52	2%	0.19	<1%	

**Table 8.11** *PM<sub>2.5</sub> incremental ground level concentrations for north region construction scenarios, annual averaging period*

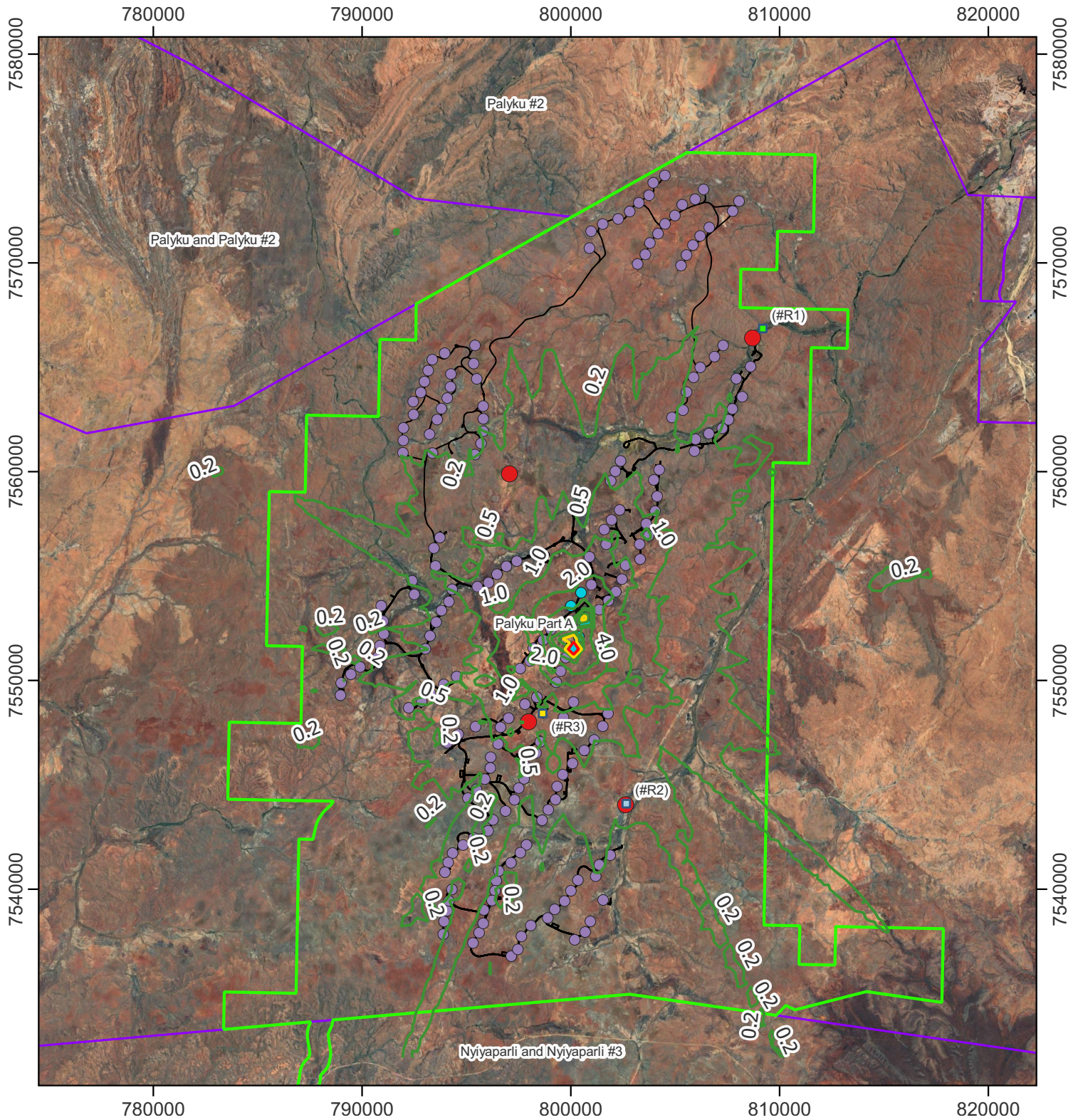
ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Criteria (µg/m <sup>3</sup> )
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	
#R1	0.29	4%	0.13	2%	0.78	10%	0.32	4%	8
#R2	0.003	<1%	0.001	<1%	0.015	<1%	0.006	<1%	
#R3	0.003	<1%	0.001	<1%	0.017	<1%	0.007	<1%	

**Table 8.12** *PM<sub>2.5</sub> incremental ground level concentrations for operations scenarios, 24-hour averaging period*

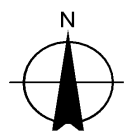
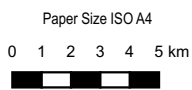
ID	Scenario 9		Scenario 10		Criteria
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )
#R1	0.01	<1%	0.005	<1%	25
#R2	0.001	<1%	0.0005	<1%	
#R3	0.003	<1%	0.001	<1%	

**Table 8.13** *PM<sub>2.5</sub> incremental ground level concentrations for operations scenarios, annual averaging period*

ID	Scenario 9		Scenario 10		Criteria
	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )	% of criteria	GLC (µg/m <sup>3</sup> )
#R1	0.0002	<1%	0.0001	<1%	8
#R2	0.0001	<1%	0.00003	<1%	
#R3	0.0002	<1%	0.0001	<1%	



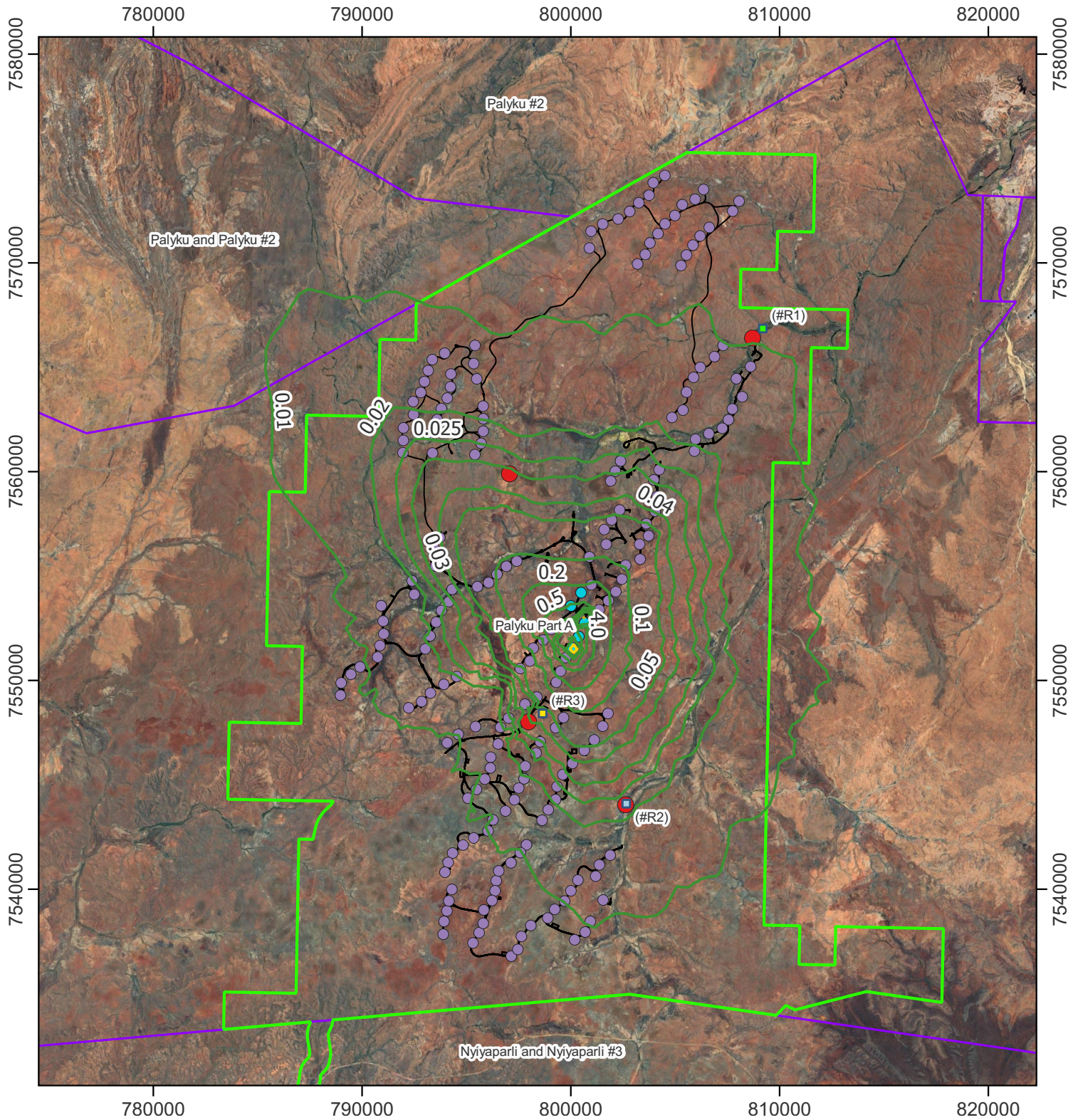
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC1: Predicted maximum 24-hour average**  
**PM<sub>2.5</sub> concentration in the south region - 1**  
**turbine construction scenario without controls**

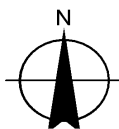
Project No. **12643037**  
Revision No. **0**  
Date: **06/06/2025**

**FIGURE 8.21**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

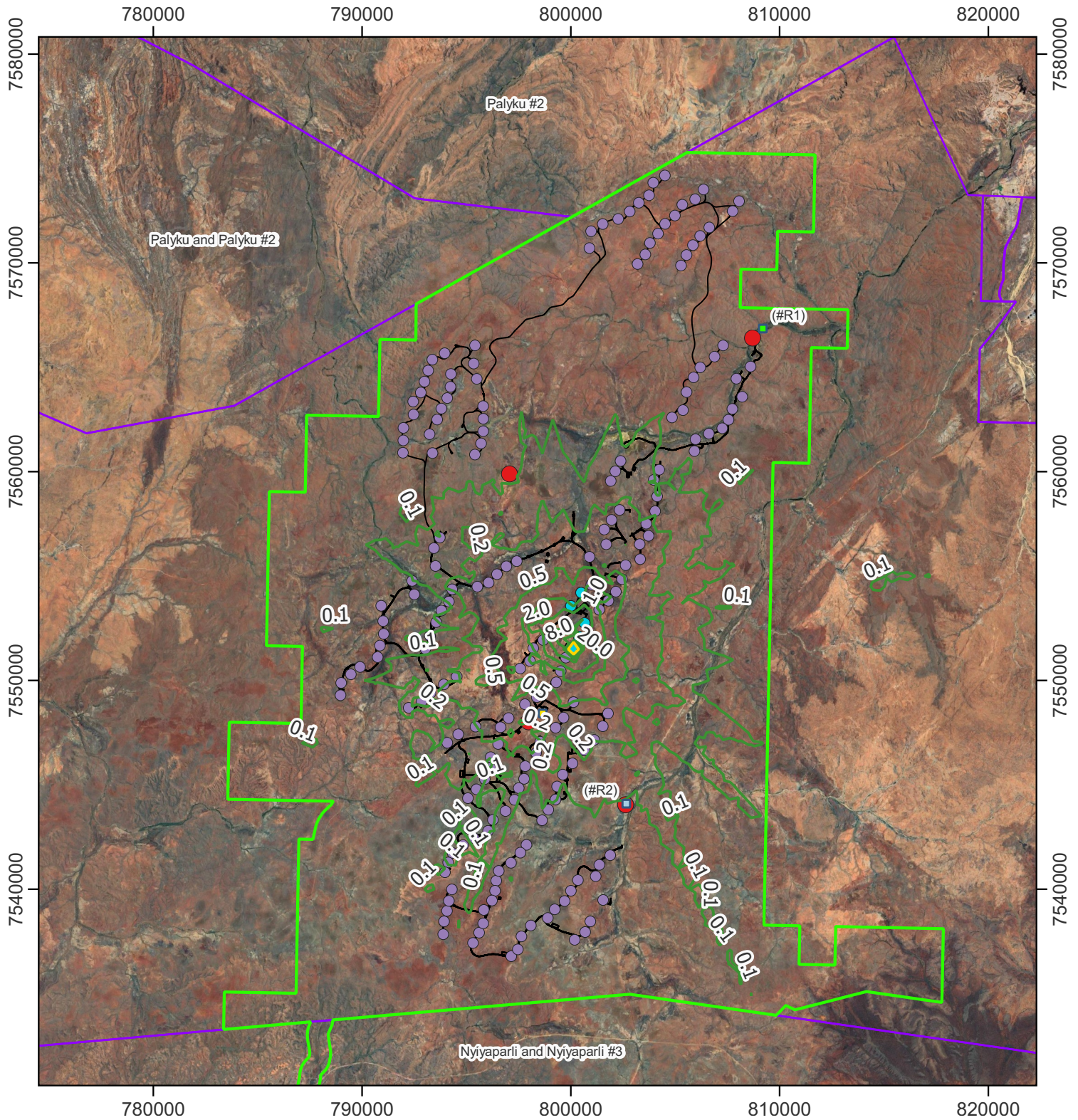
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
**SC1: Predicted annual average  
 PM<sub>2.5</sub> concentration in the south region - 1  
 turbine construction scenario without controls**

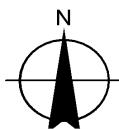
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.22**



- Legend**
- ▭ Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - ▭ Bonney Downs development envelope
  - South region selected turbines
  - ▭ Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - ▭ Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - ▭ Bonnie Pool
  - ▭ Bonney Downs Homestead

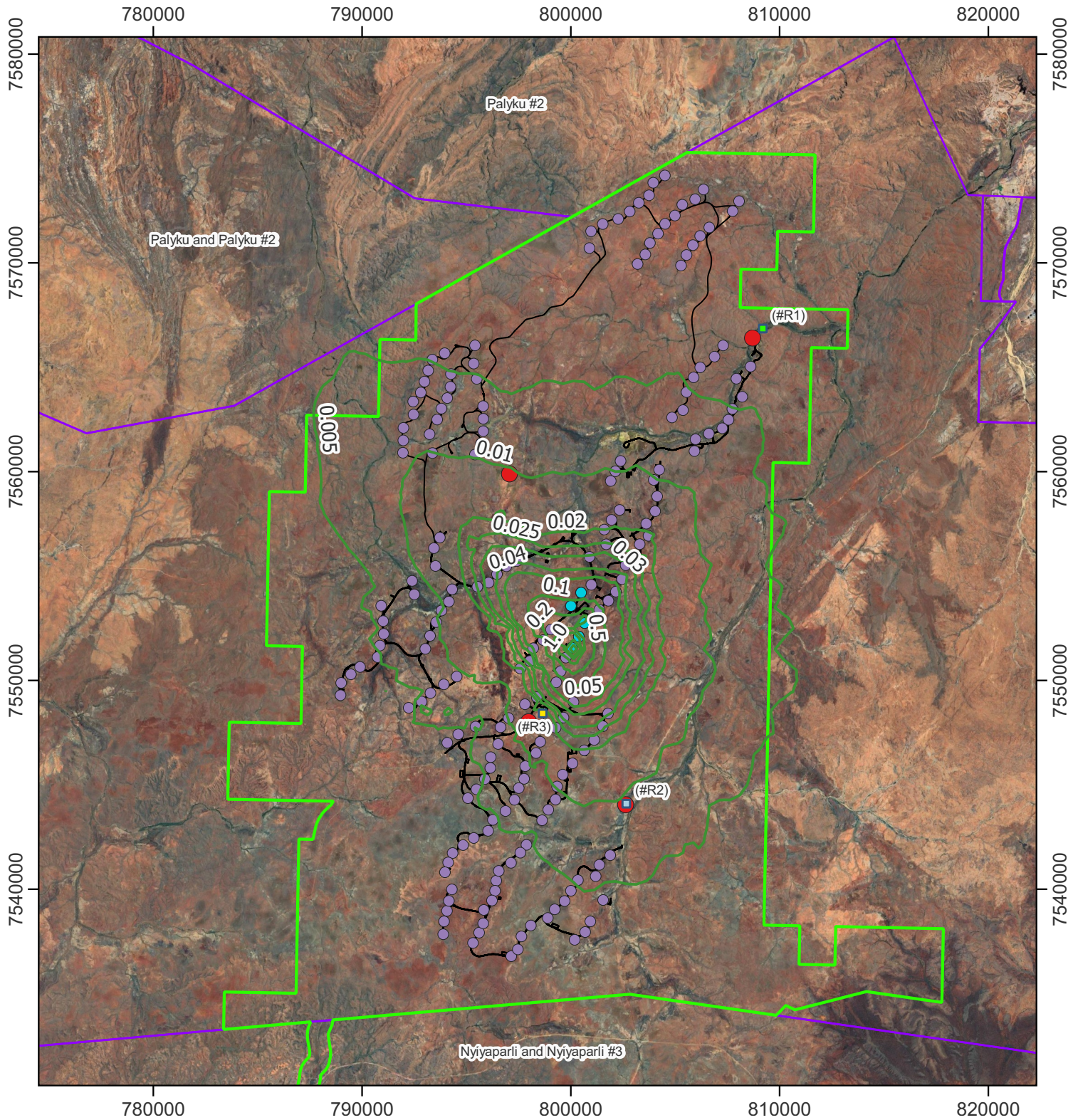
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC2: Predicted maximum 24-hour average  
 PM<sub>2.5</sub> concentration in the south region - 1  
 turbine construction scenario with controls

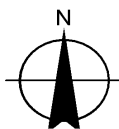
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.23**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

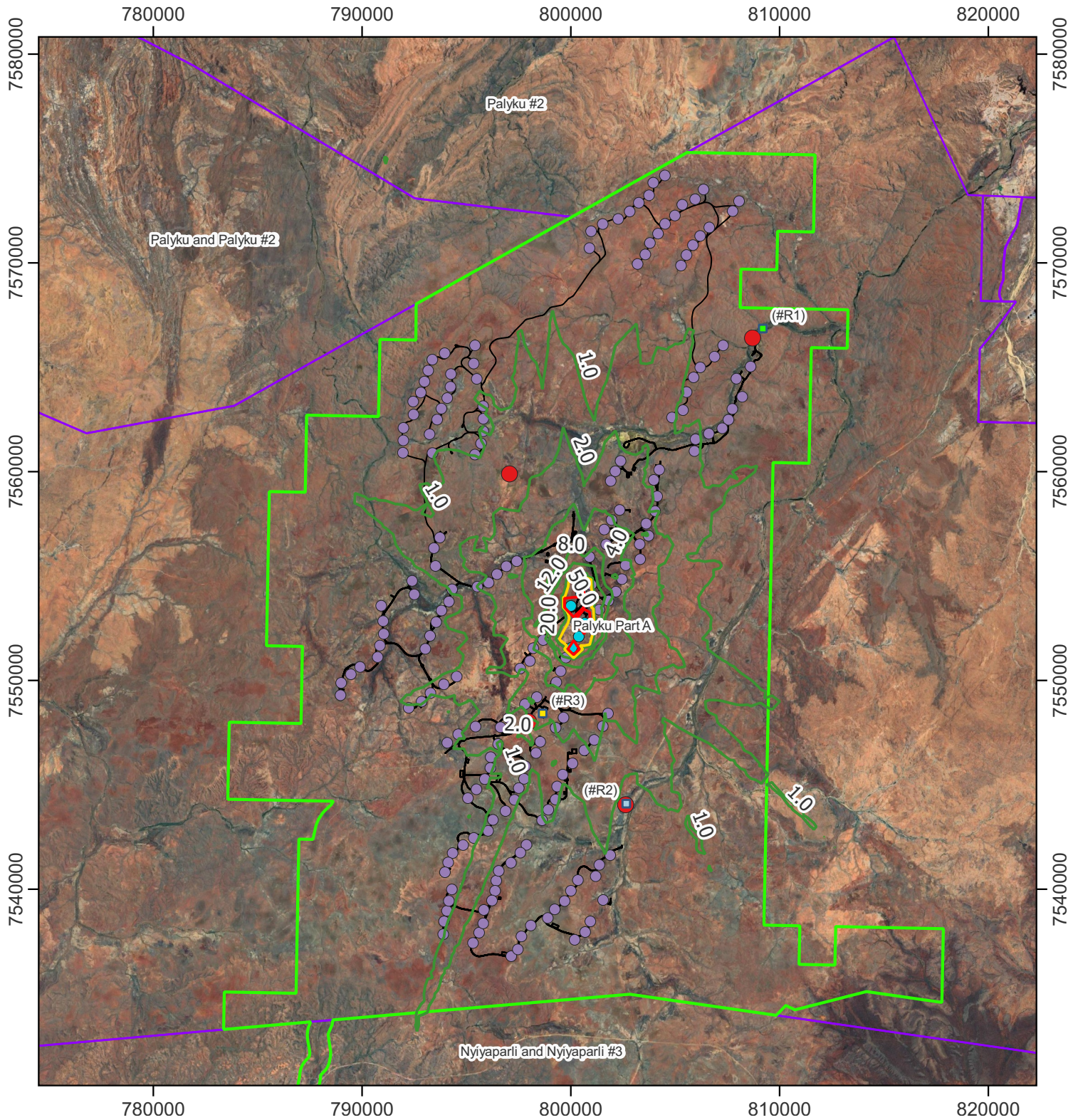
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC2: Predicted annual average  
 PM<sub>2.5</sub> concentration in the south region - 1  
 turbine construction scenario with controls

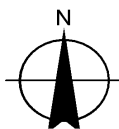
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.24**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

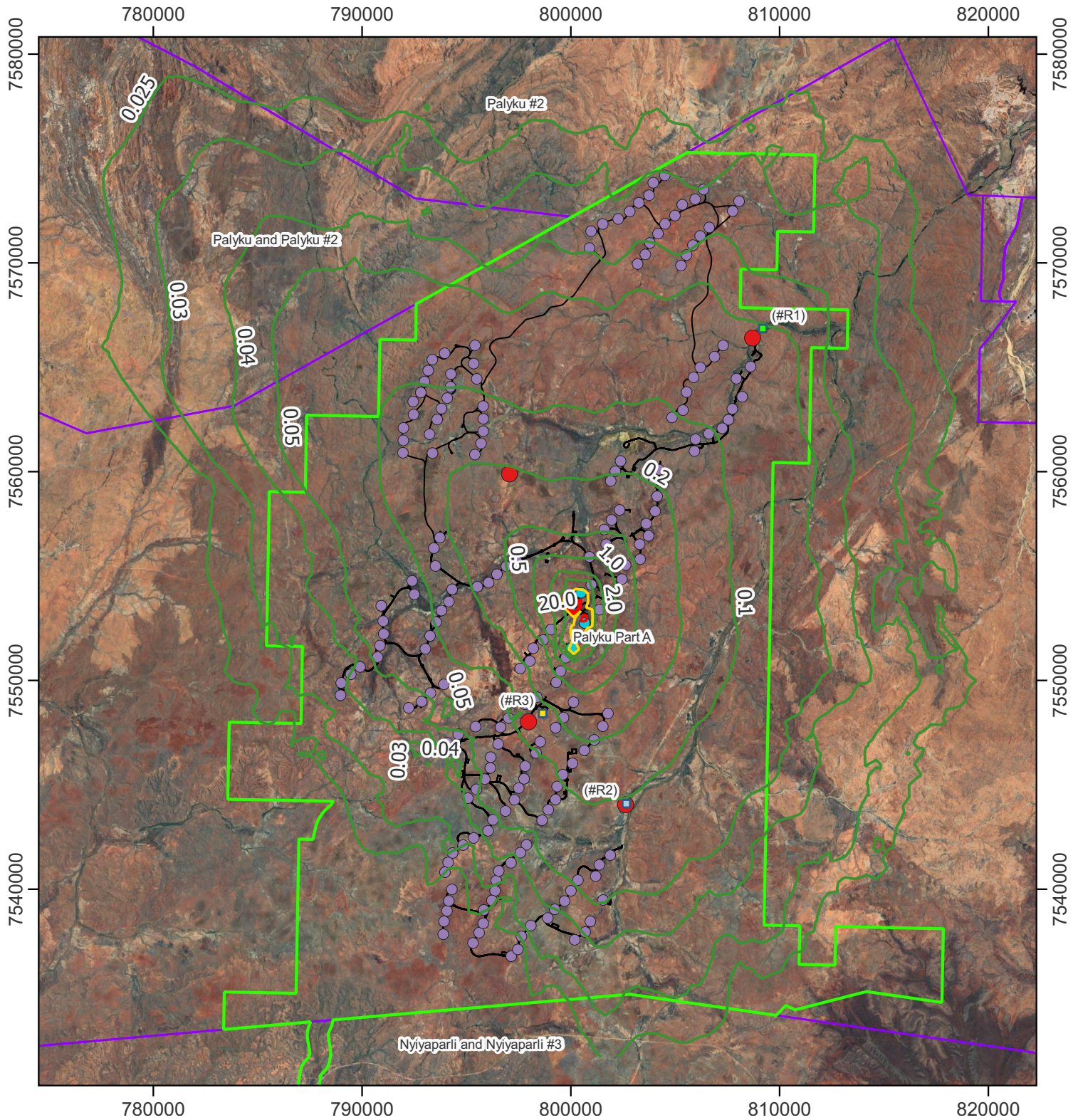
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC3: Predicted maximum 24-hour average  
 PM<sub>2.5</sub> concentration in the south region - 5  
 turbines construction scenario without controls

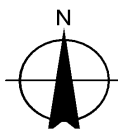
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.25**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

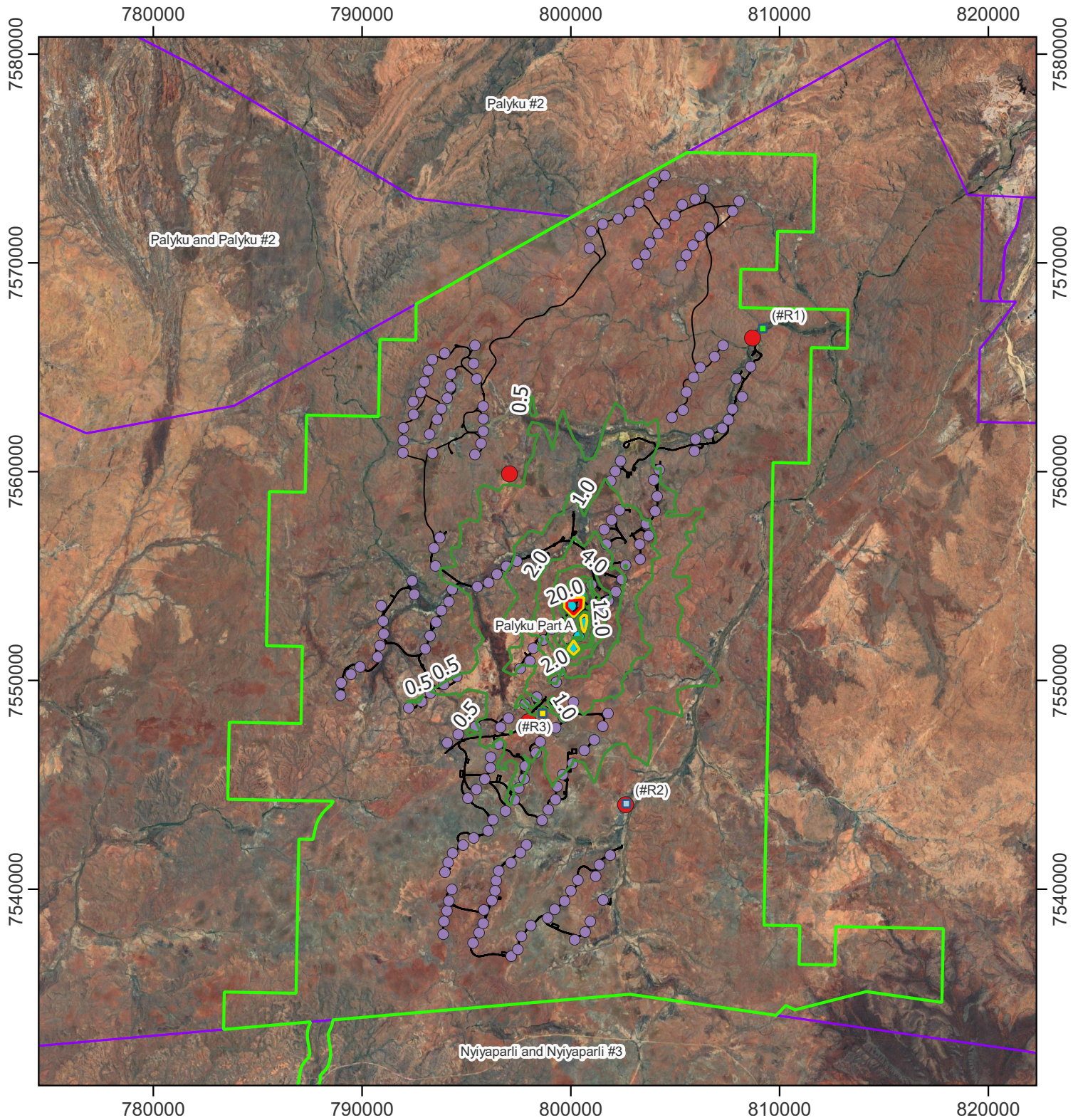
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
**SC3: Predicted annual average  
 PM<sub>2.5</sub> concentration in the south region - 5  
 turbines construction scenario without controls**

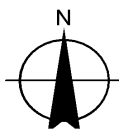
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.26**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

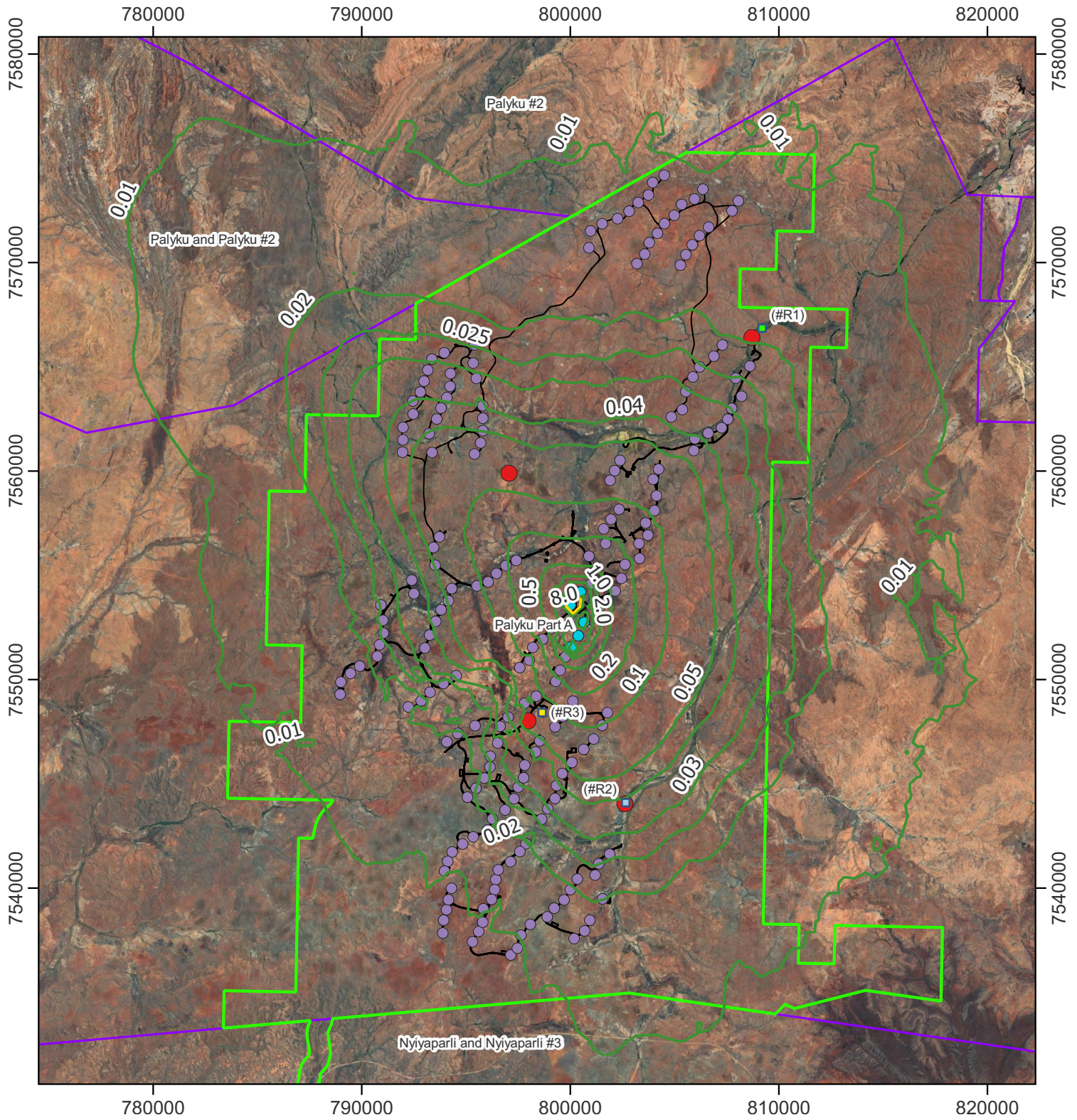
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



**Fortescue - Bonney Downs - Wind Farm**  
**SC4: Predicted maximum 24-hour average PM<sub>2.5</sub> concentration in the south region - 5 turbines construction scenario with controls**

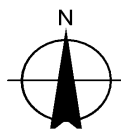
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.27**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

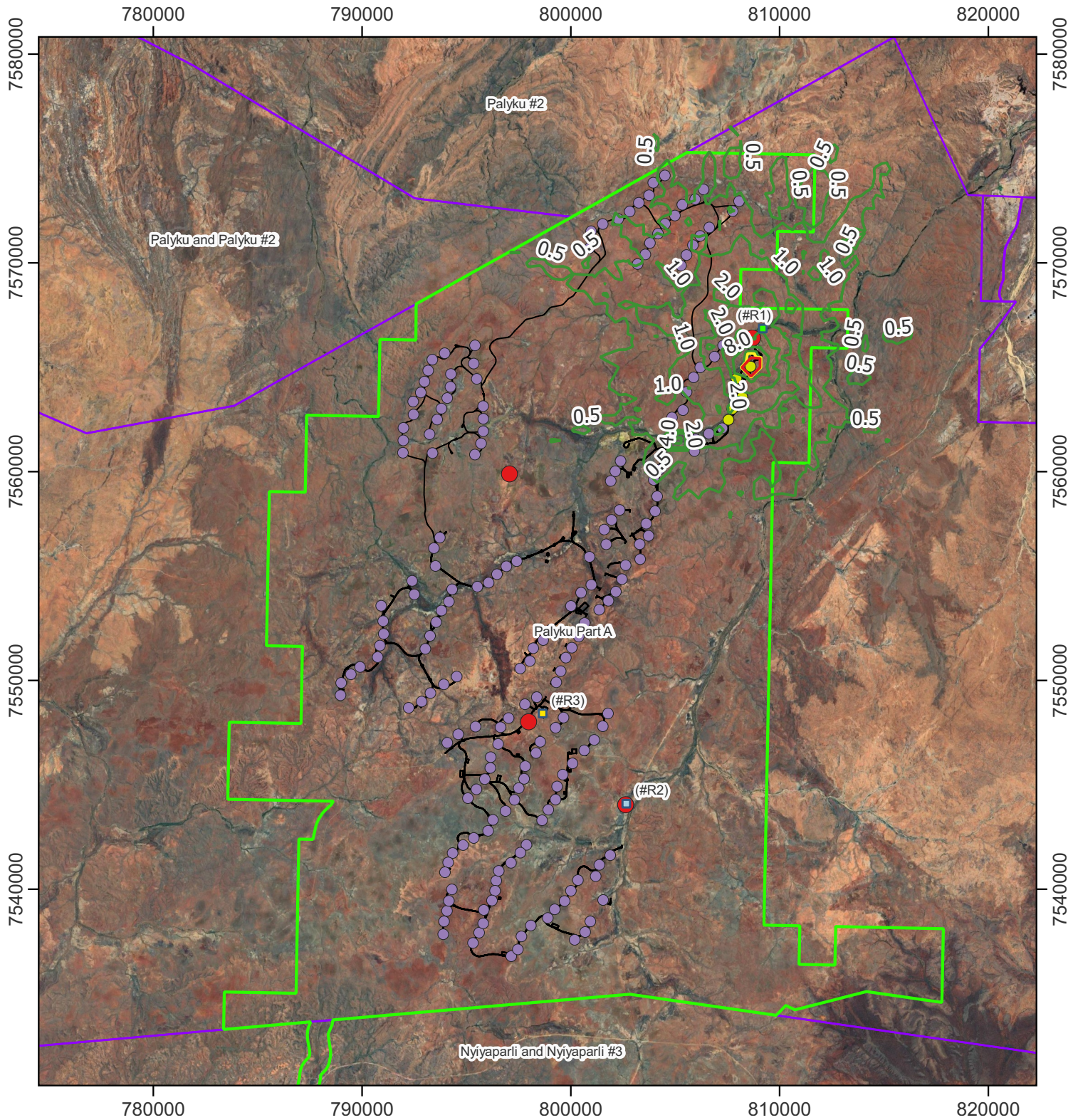
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC4: Predicted annual average  
 PM<sub>2.5</sub> concentration in the south region - 5  
 turbines construction scenario with controls

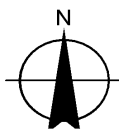
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.28**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

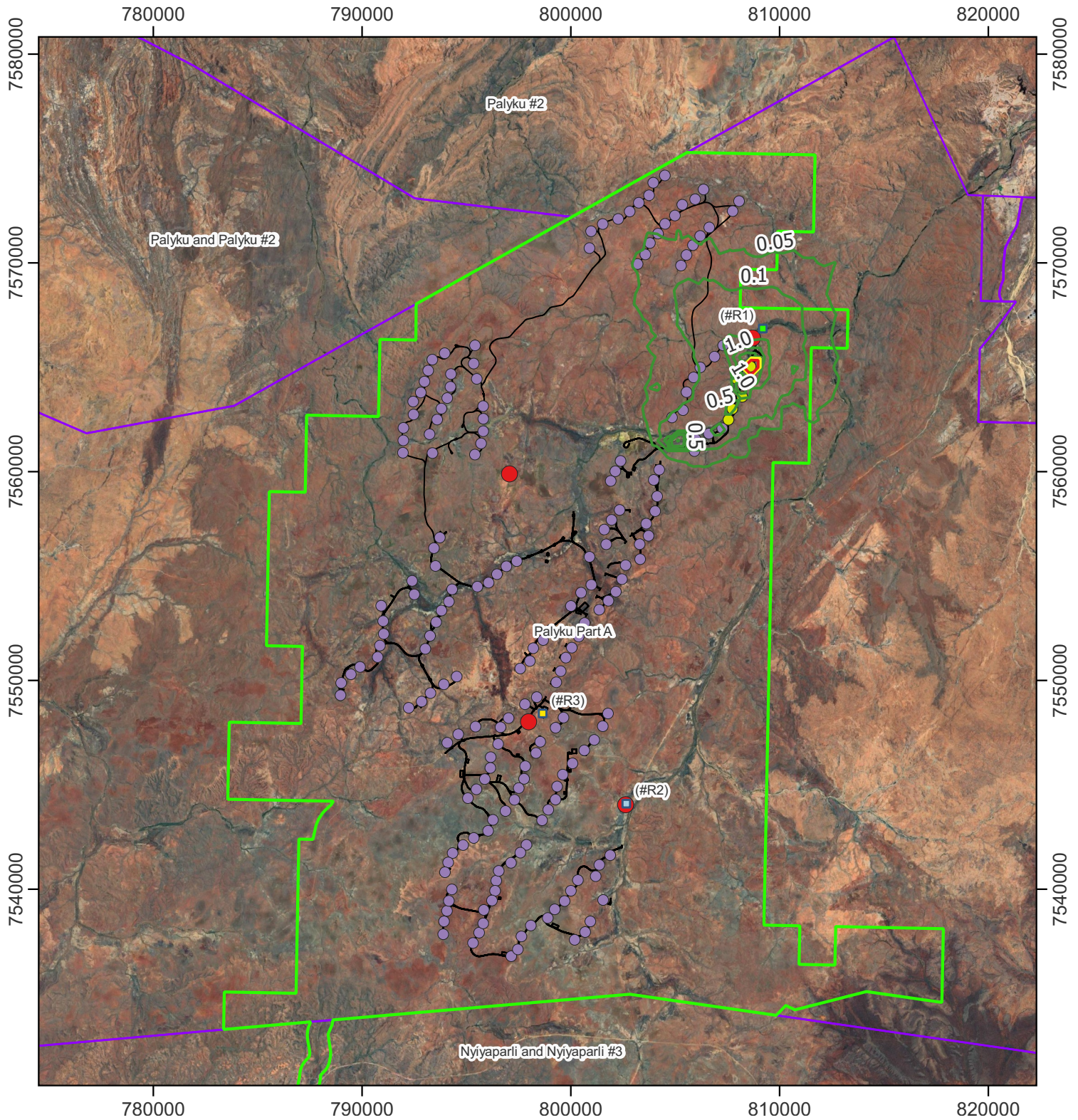
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



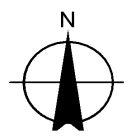
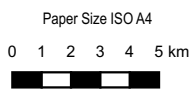
Fortescue - Bonney Downs - Wind Farm  
 SC5: Predicted maximum 24-hour average  
 PM<sub>2.5</sub> concentration in the north region - 1  
 turbine construction scenario without controls

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**FIGURE 8.29**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - North region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

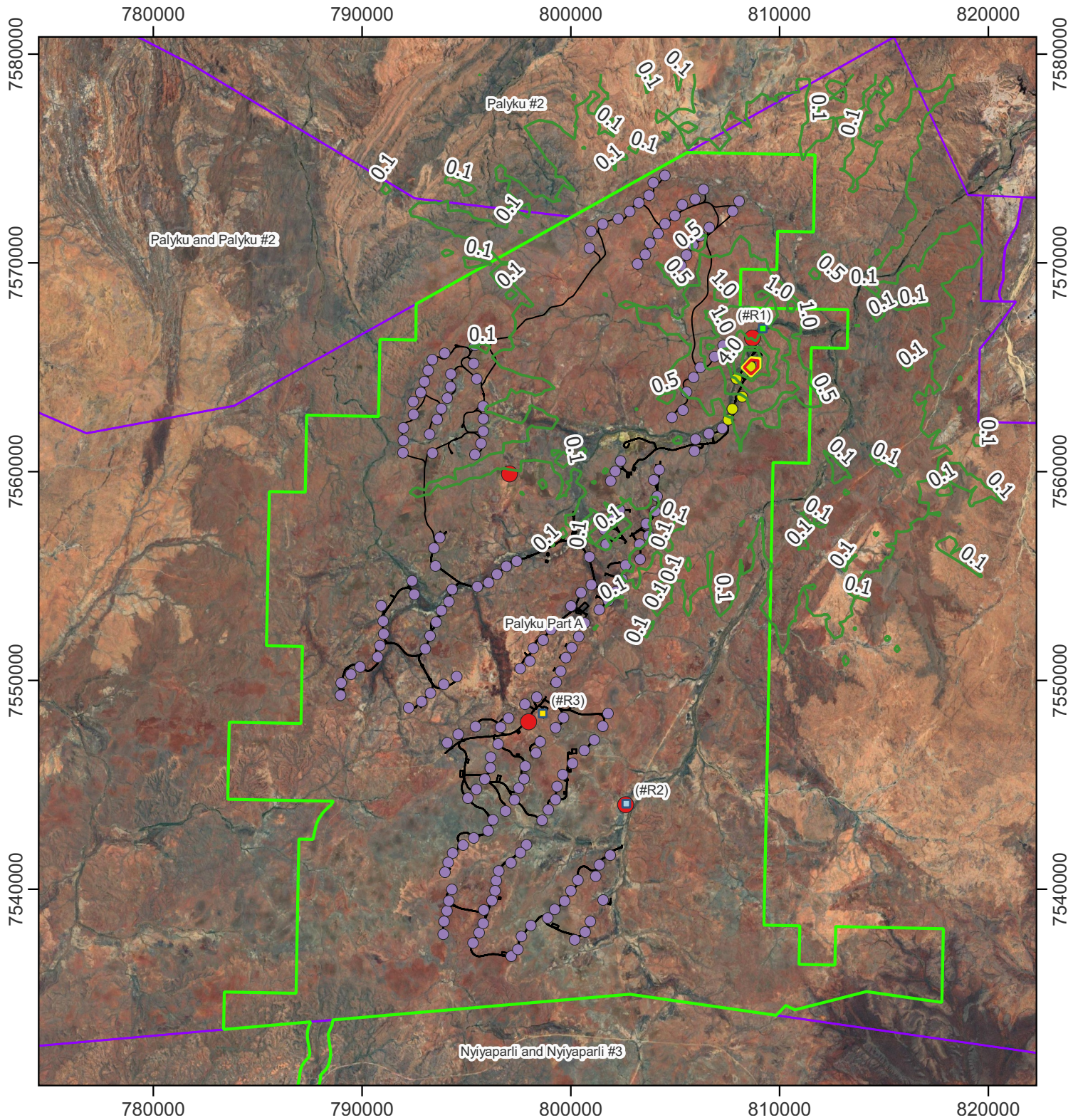


Fortescue - Bonney Downs - Wind Farm

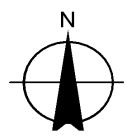
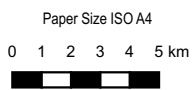
**SC5: Predicted annual average  
PM<sub>2.5</sub> concentration in the north region - 1  
turbine construction scenario without controls**

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**FIGURE 8.30**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

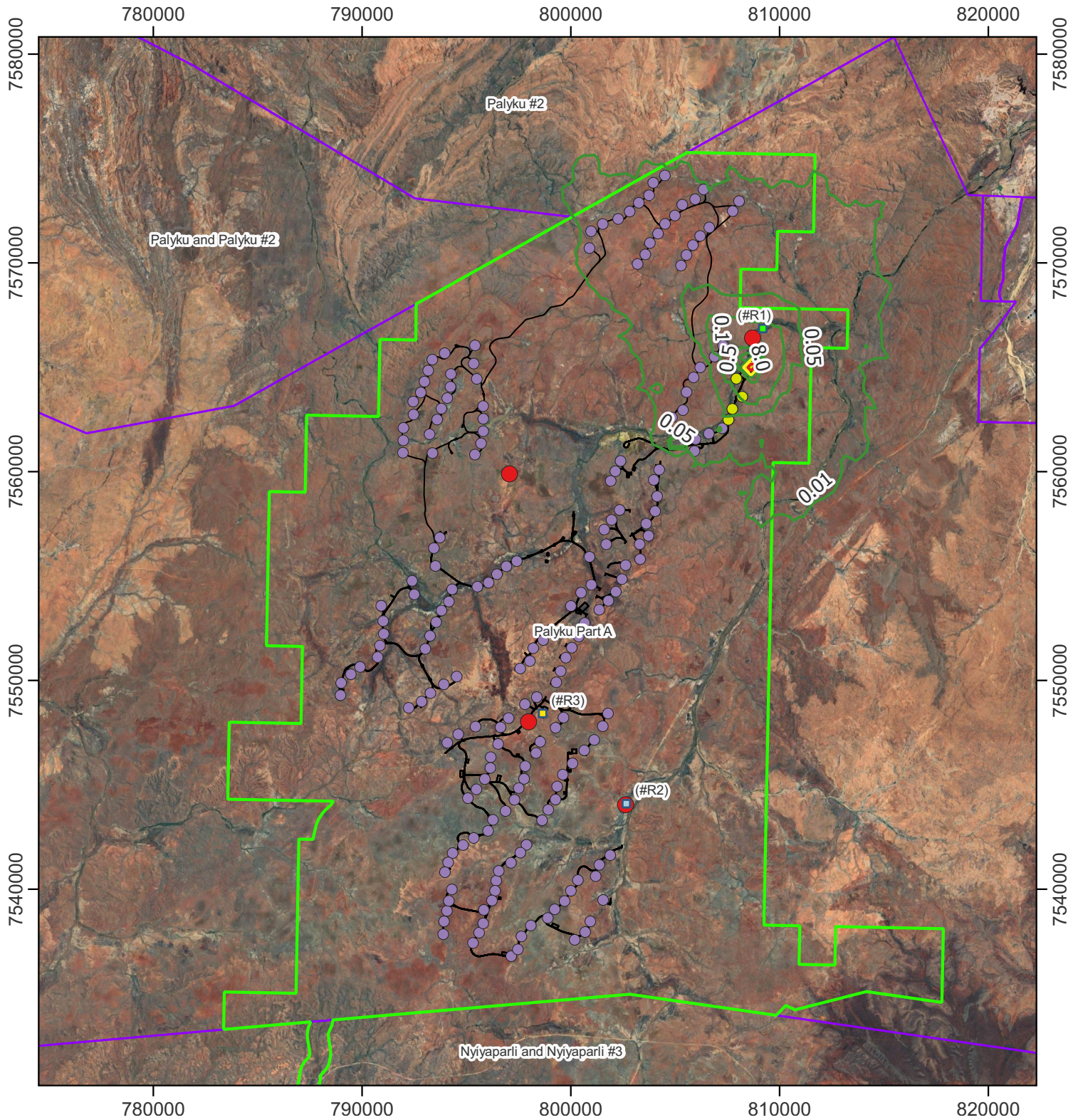


Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

**Fortescue - Bonney Downs - Wind Farm**  
**SC6: Predicted maximum 24-hour average PM<sub>2.5</sub> concentration in the north region - 1 turbine construction scenario with controls**

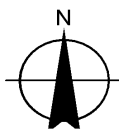
Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.31**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - North region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

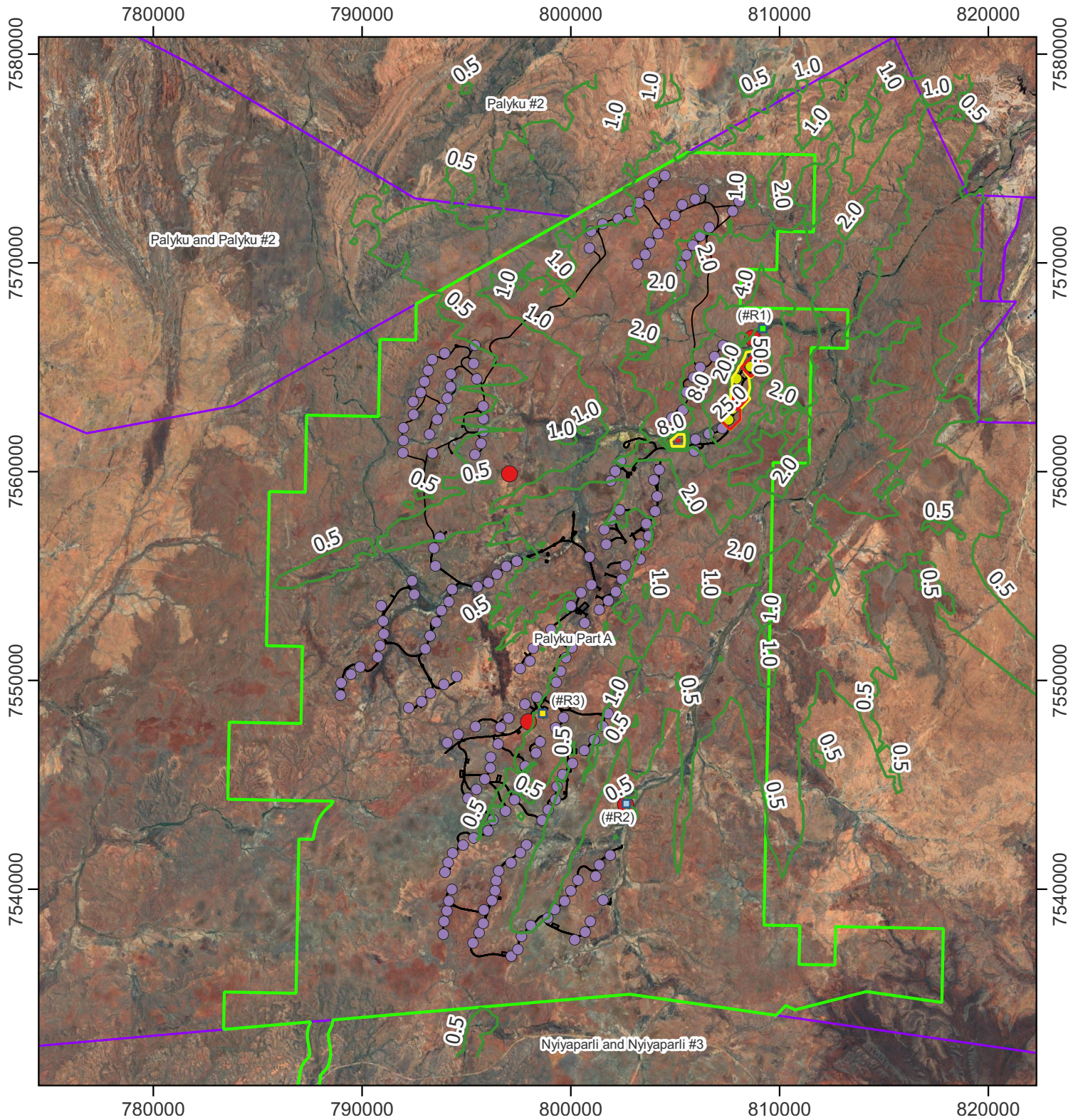
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
**SC6: Predicted annual average  
 PM<sub>2.5</sub> concentration in the north region - 1  
 turbine construction scenario with controls**

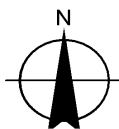
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.32**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

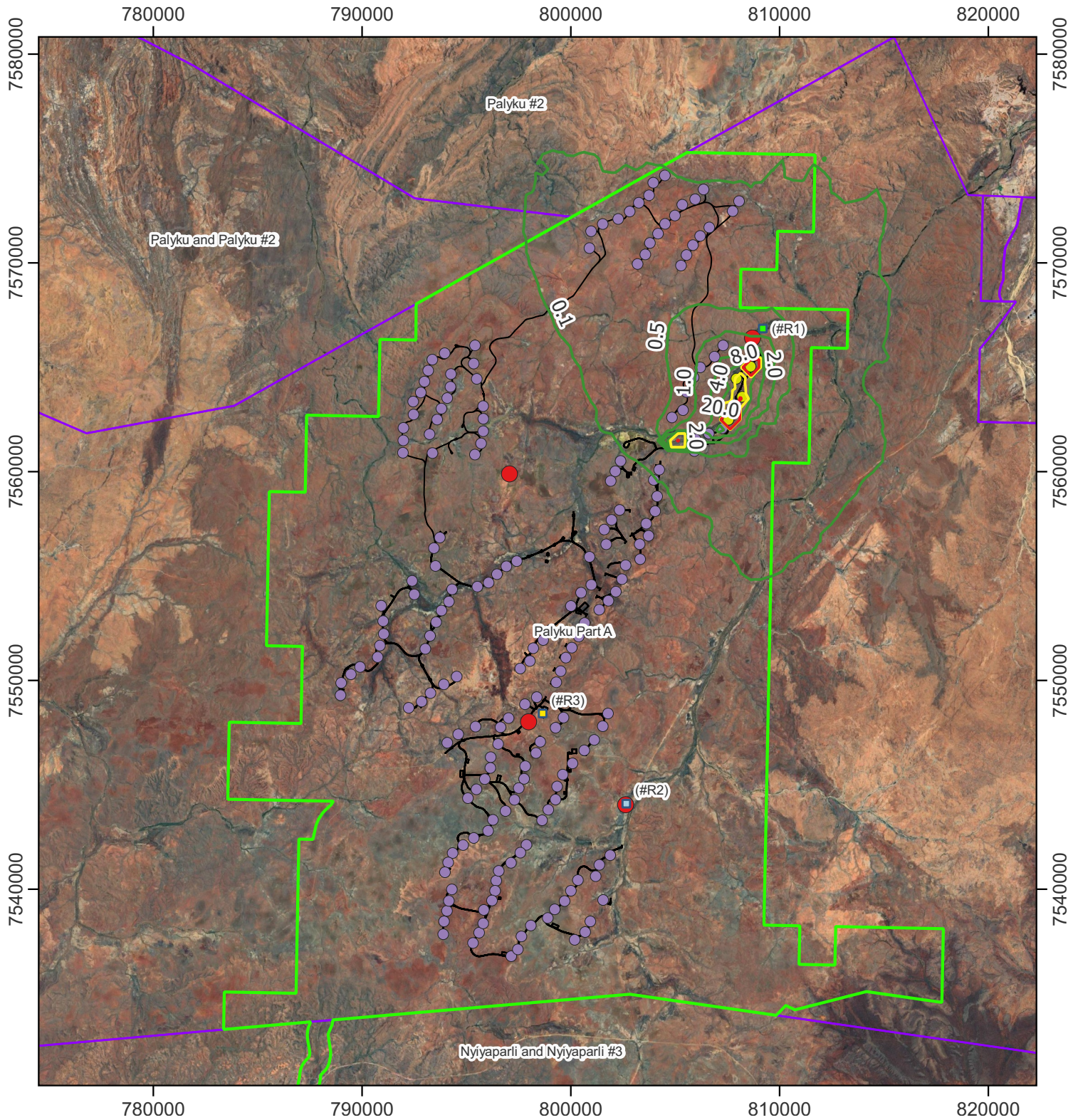
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC7: Predicted maximum 24-hour average  
 PM<sub>2.5</sub> concentration in the north region - 5  
 turbines construction scenario without controls

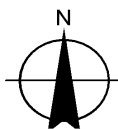
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.33**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - North region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

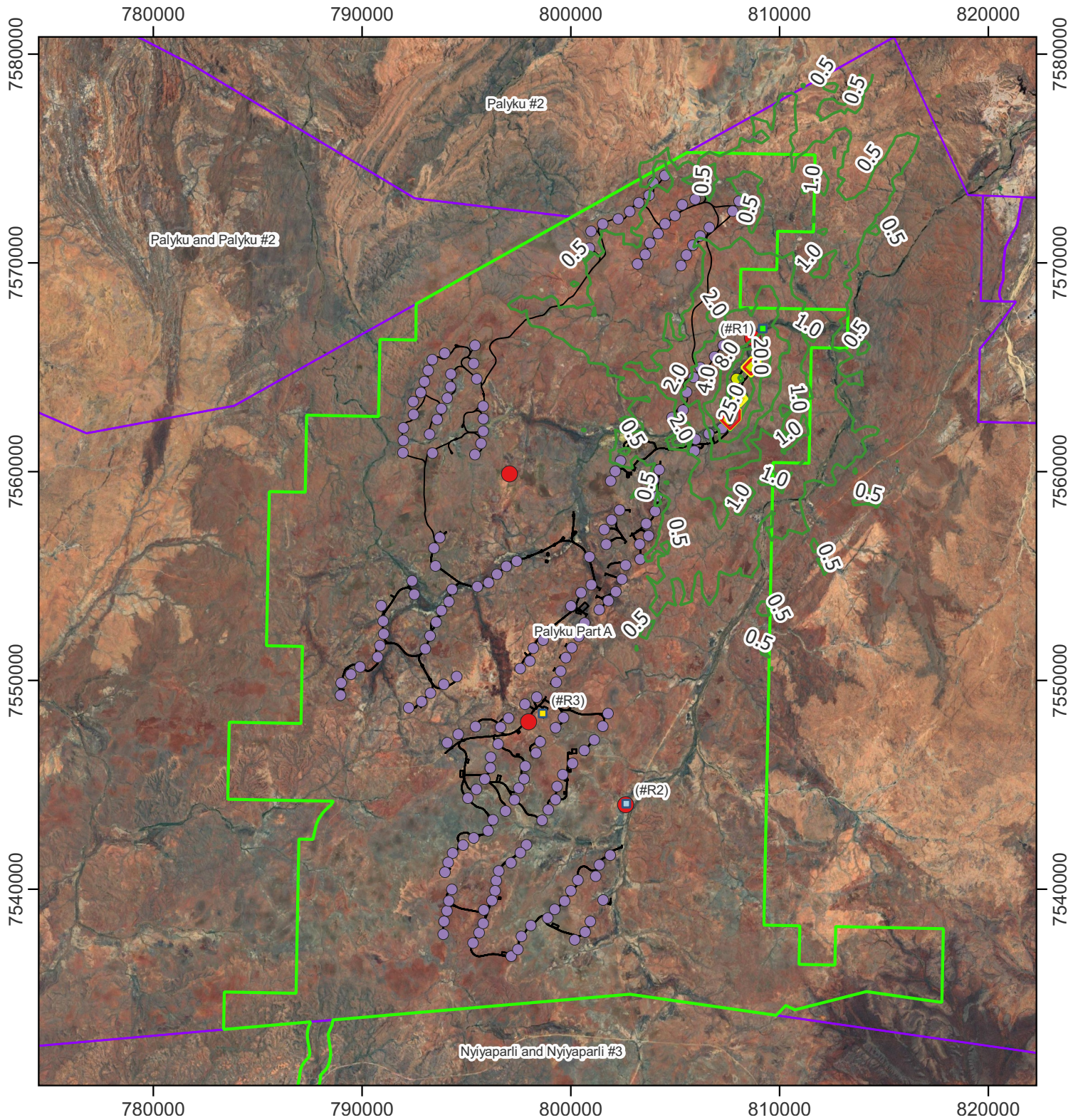
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



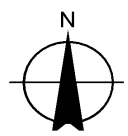
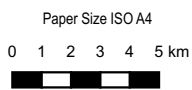
Fortescue - Bonney Downs - Wind Farm  
**SC7: Predicted annual average  
 PM<sub>2.5</sub> concentration in the north region - 5  
 turbines construction scenario without controls**

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**FIGURE 8.34**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

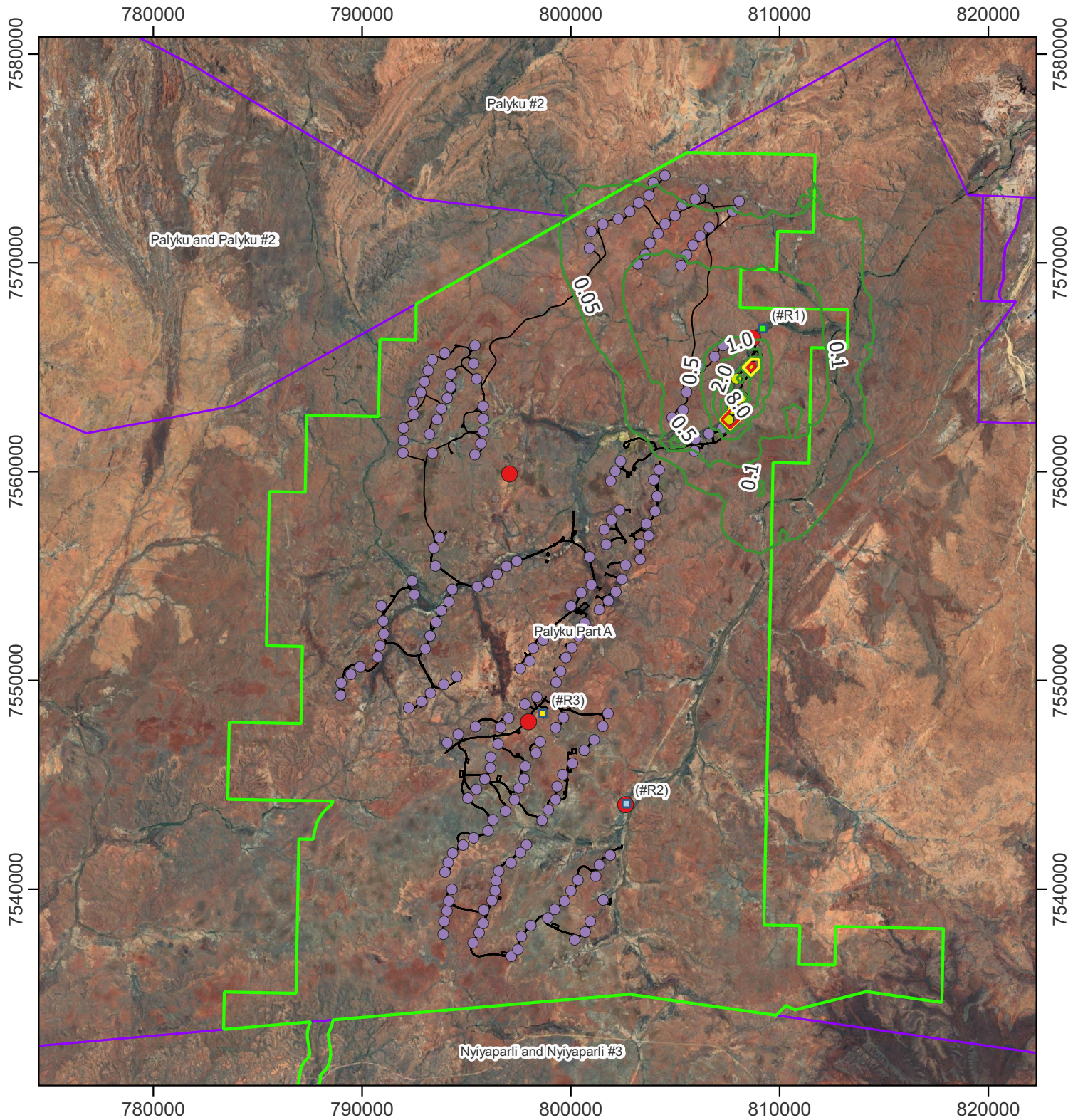


Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

**Fortescue - Bonney Downs - Wind Farm**  
**SC8: Predicted maximum 24-hour average PM<sub>2.5</sub> concentration in the north region - 5 turbines construction scenario with controls**

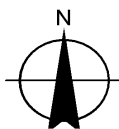
Project No. 12643037  
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Date: 06/06/2025

**FIGURE 8.35**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

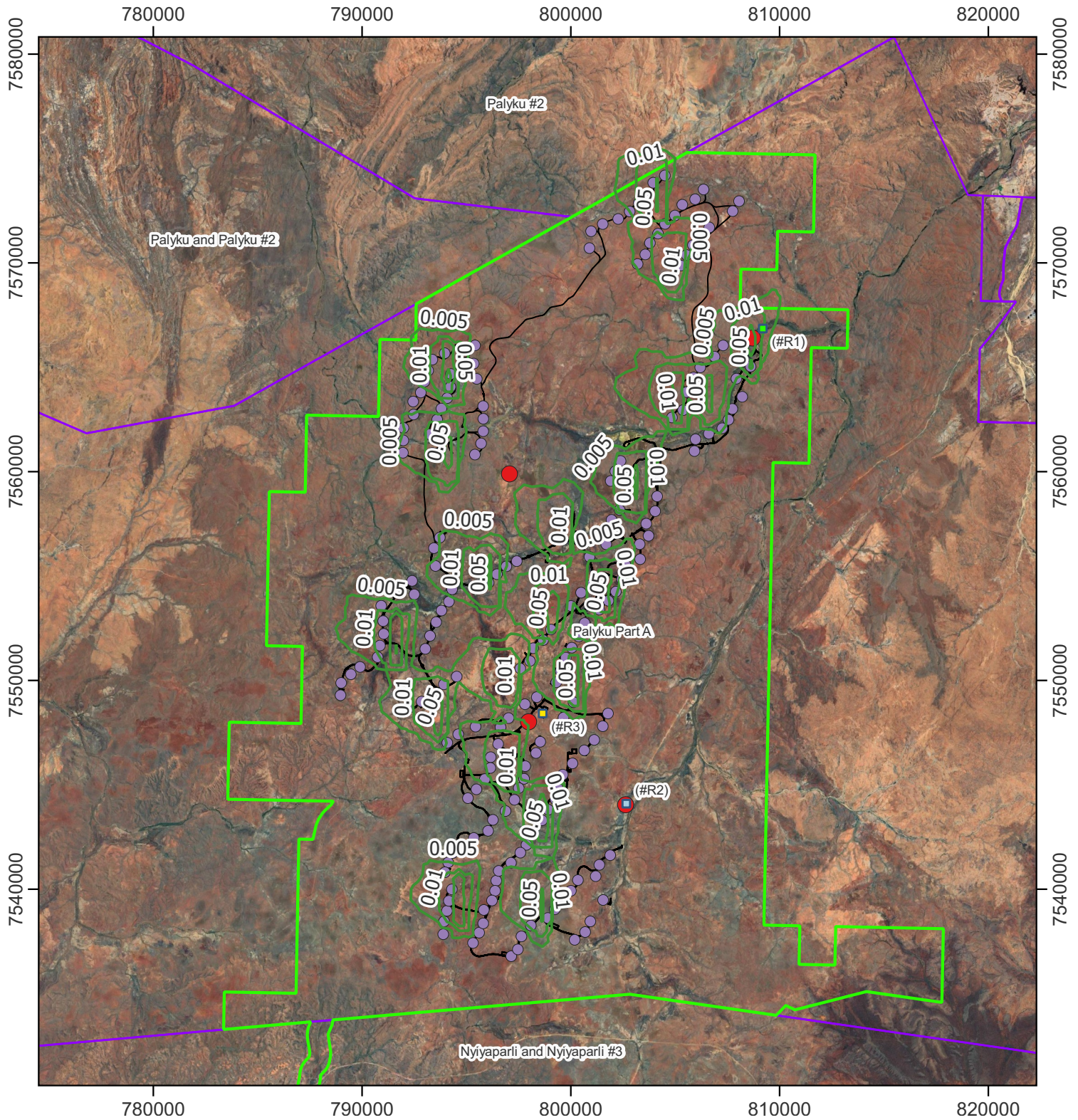
Paper Size ISO A4  
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 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



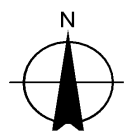
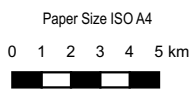
Fortescue - Bonney Downs - Wind Farm  
**SC8: Predicted annual average  
 PM<sub>2.5</sub> concentration in the north region - 5  
 turbines construction scenario with controls**

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**FIGURE 8.36**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

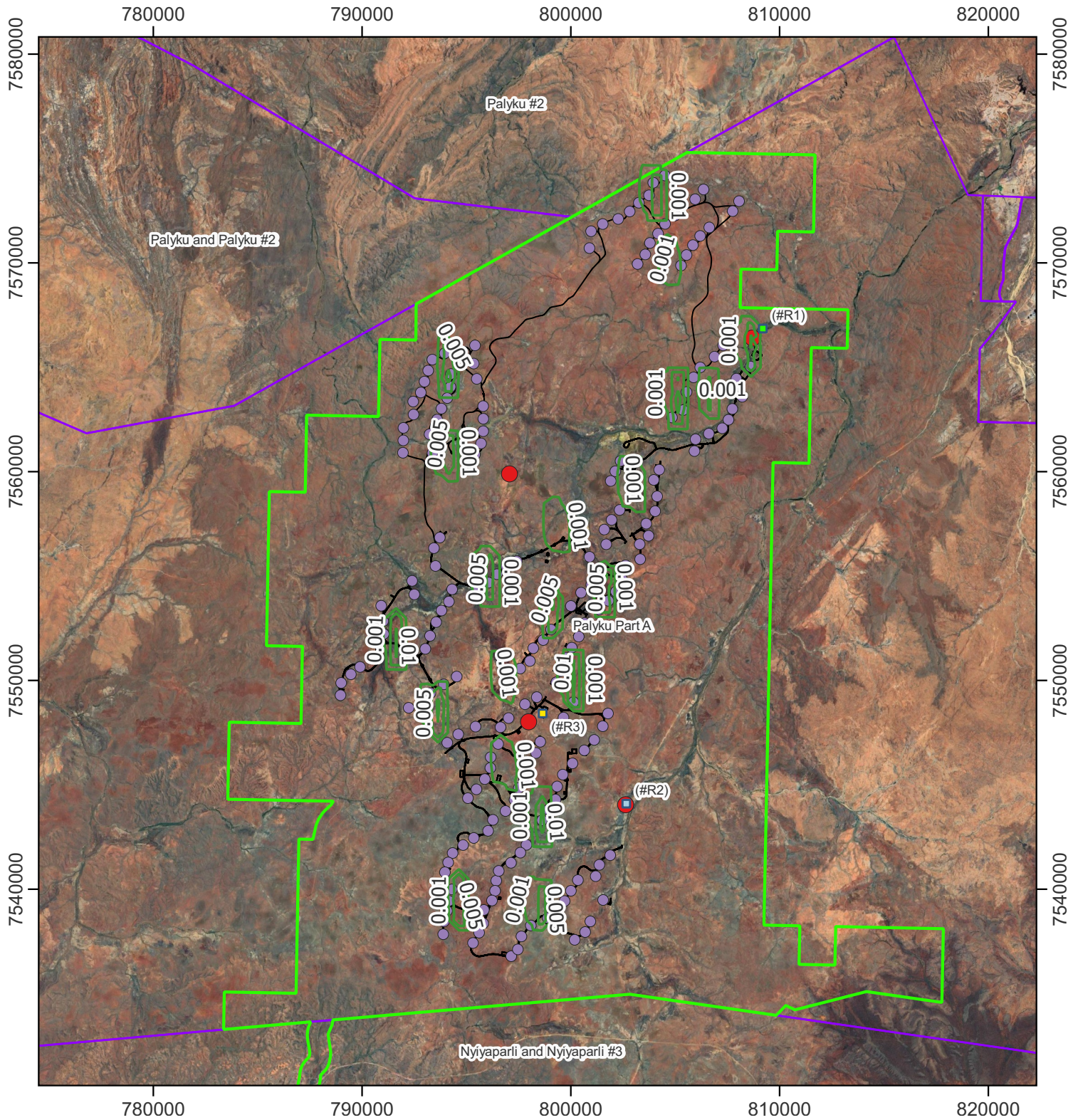


Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

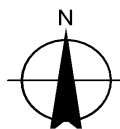
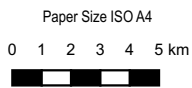
**Fortescue - Bonney Downs - Wind Farm**  
**SC9: Predicted maximum 24-hour average PM<sub>2.5</sub> concentration - Operations scenario without controls**

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**FIGURE 8.37**



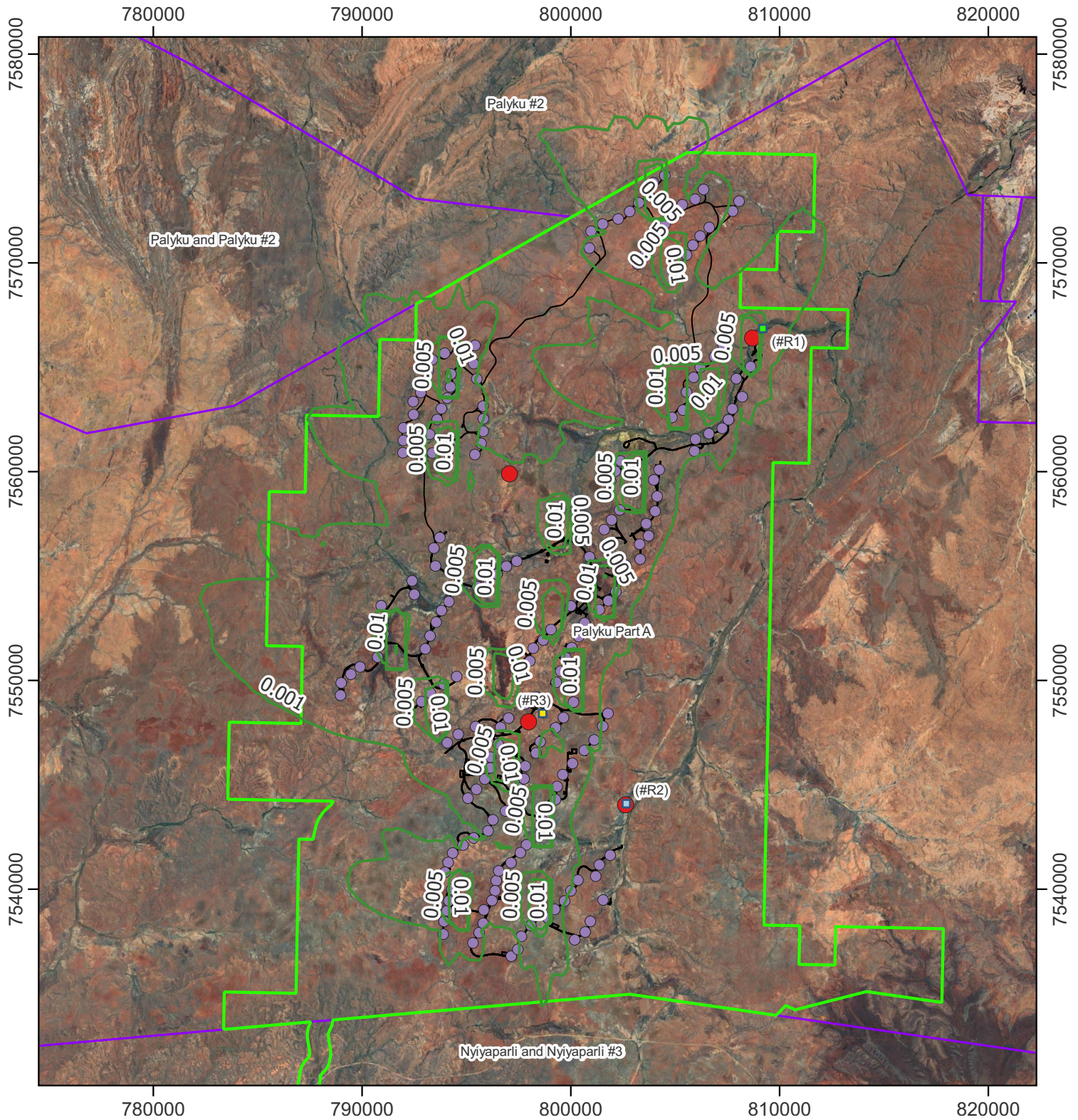
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



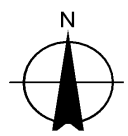
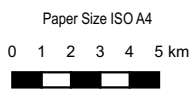
Fortescue - Bonney Downs - Wind Farm  
**SC9: Predicted annual average  
 PM<sub>2.5</sub> concentration - Operations scenario  
 without controls**

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**FIGURE 8.38**



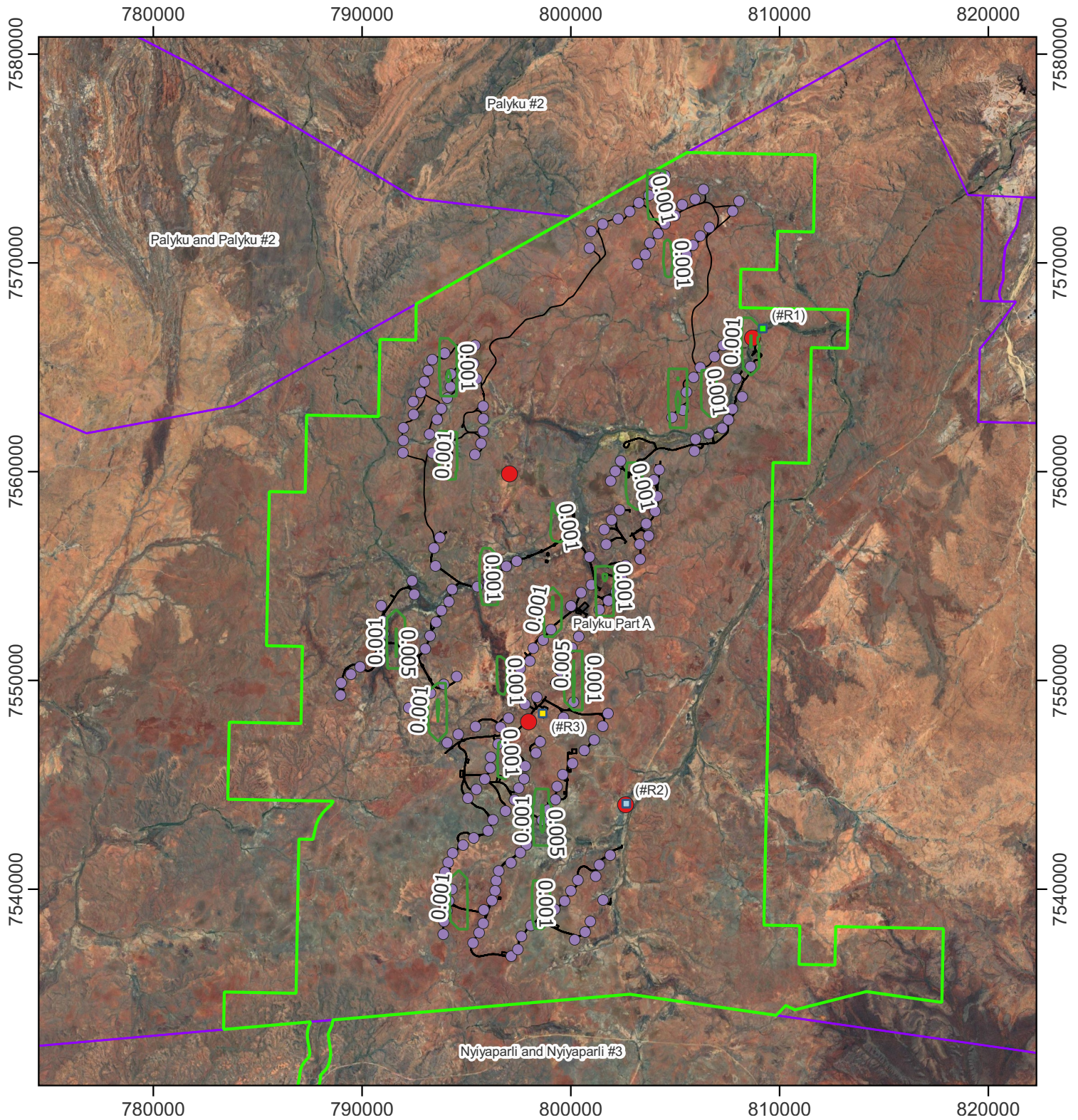
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $25 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



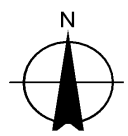
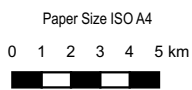
**Fortescue - Bonney Downs - Wind Farm**  
**SC10: Predicted maximum 24-hour average**  
**PM<sub>2.5</sub> concentration - Operations scenario with**  
**controls**

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 Revision No. **0**  
 Date. **06/06/2025**

**FIGURE 8.39**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $8 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC10: Predicted annual average**  
**PM<sub>2.5</sub> concentration - Operations scenario with**  
**controls**

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 Date: **06/06/2025**

**FIGURE 8.40**

## 8.3 Total suspended particulates

TSP has been assessed with respect to the amenity criteria for the maximum allowable 24-hour criteria

The predicted maximum incremental TSP GLCs for the south region construction scenarios are presented in Table 8.14 for the 24-hour averaging period. Contour plots for each of the south region construction scenarios and respective averaging periods are presented in Figure 8.41 to Figure 8.44.

The predicted maximum incremental TSP GLCs for the north region construction scenarios are presented in Table 8.15 for the 24-hour averaging period. Contour plots for each of the north region construction scenarios and respective averaging periods are presented in Figure 8.45 to Figure 8.48.

The predicted maximum incremental TSP GLCs for the operations scenarios are presented in Table 8.15 for the 24-hour averaging period. Contour plots for each of the operations scenarios and respective averaging periods are presented in Figure 8.49 to Figure 8.50.

It is difficult to understand how TSP GLCs relate to visibility. Particulate measurements could be used as a surrogate for visibility. However, the relationship between particulate concentrations and visibility is unique to each location and hence cannot be extrapolated to a different location (Ministry for the Environment, 2001). The composition and size of particles may also change with time, which means that relationship between visibility and particulate concentrations previously derived for a location may also change and hence not be applicable (Ministry for the Environment, 2001).

No exceedances of the amenity criteria were predicted for either the maximum 24-hour or annual average TSP criteria at any of the receptor locations for all modelled turbines in the south location.

Although exceedances of the amenity criteria are predicted for scenario 7, it is important to note the close proximity of these receptors to the construction operations, which are typically anticipated to have elevated concentrations of dust in close proximity, especially when no controls are applied to manage or mitigate the dust impacts. Comparing scenarios 7 and 8, it is evident that the implementation of control measures such as water sprays can greatly assist with compliance, with controls providing significant emission reduction between scenario 7 and 8.

Additional analysis was undertaken surrounding the frequency/number of exceedances predicted at each receptor by the model for each scenario (scenario 7 and scenario 8) where exceedances were prevalent, which can be seen in Table 8.17. The exceedance frequency analysis identified six exceedances of the 24-hour averaging criteria at receptor #1 (Bonnie Pool) for scenario 7.

**Table 8.14** TSP incremental ground level concentrations for south region construction scenarios, 24 hour averaging period

ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Criteria (µg/m³)
	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	
#R1	1.76	2%	0.57	<1%	9.49	11%	3.17	4%	90
#R2	3.98	4%	1.67	2%	13.3	15%	5.19	6%	
#R3	16.1	18%	7.27	8%	37.9	42%	16.9	19%	

**Table 8.15** TSP incremental ground level concentrations for north region construction scenarios, 24 hour averaging period

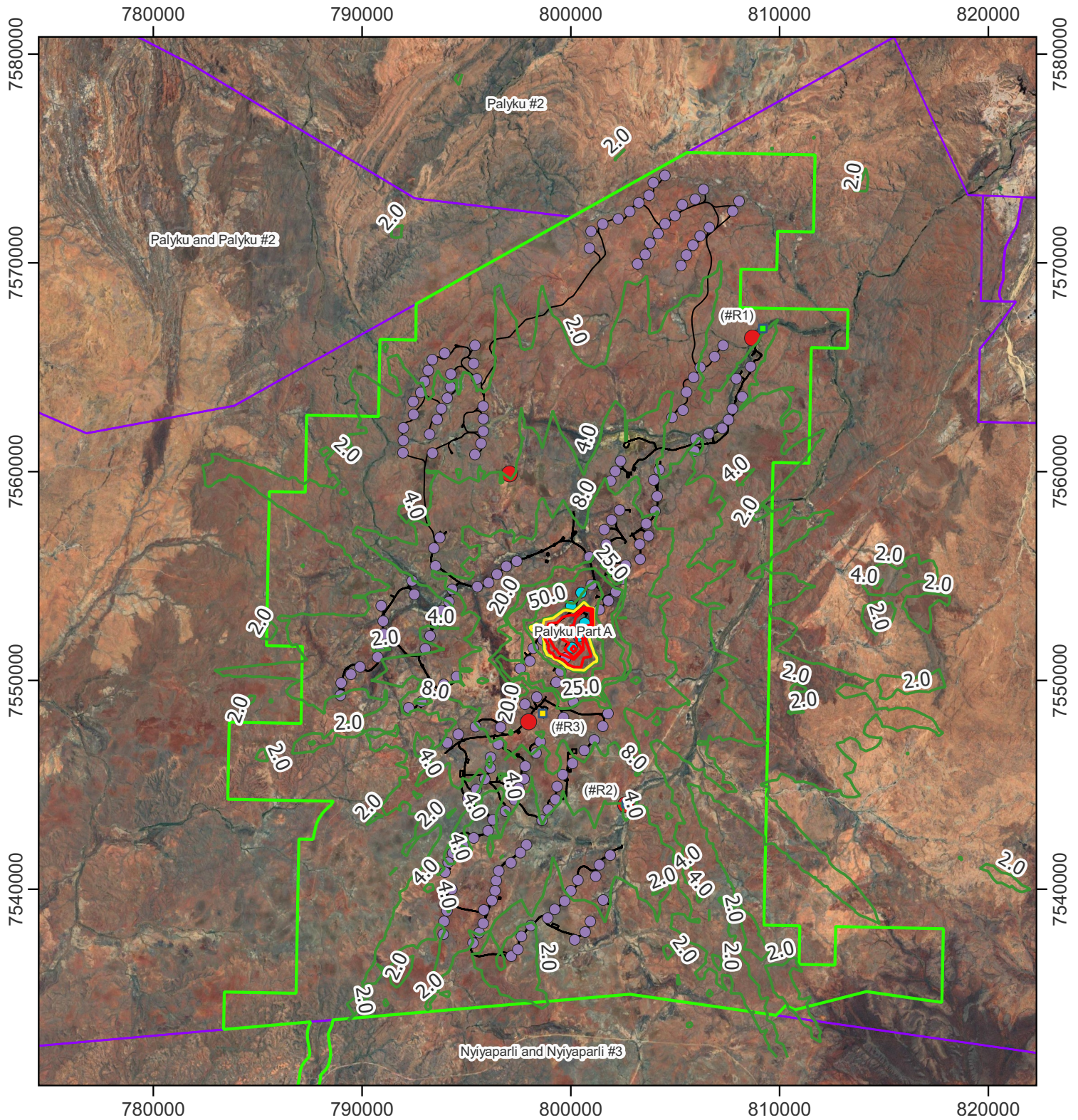
ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Criteria (µg/m³)
	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	
#R1	63.7	71%	29.6	33%	152	169%	64.7	72%	90
#R2	1.54	2%	0.69	<1%	6.67	7%	2.90	3%	
#R3	2.78	3%	1.23	1%	8.59	10%	3.50	4%	

**Table 8.16** TSP incremental ground level concentrations for operations scenarios, 24 hour averaging period

ID	Scenario 9		Scenario 10		Criteria (µg/m³)
	GLC (µg/m³)	% of criteria	GLC (µg/m³)	% of criteria	
#R1	0.09	<1%	0.05	<1%	90
#R2	0.01	<1%	0.004	<1%	
#R3	0.02	<1%	0.01	<1%	

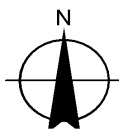
**Table 8.17** TSP frequency of exceedances for receptors with predicted exceedances of the 24-hour averaging period

ID	Description ID	Scenario 7 (5T in the north, no controls)
		# of Exceedances
#R1	Bonnie Pool	6



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

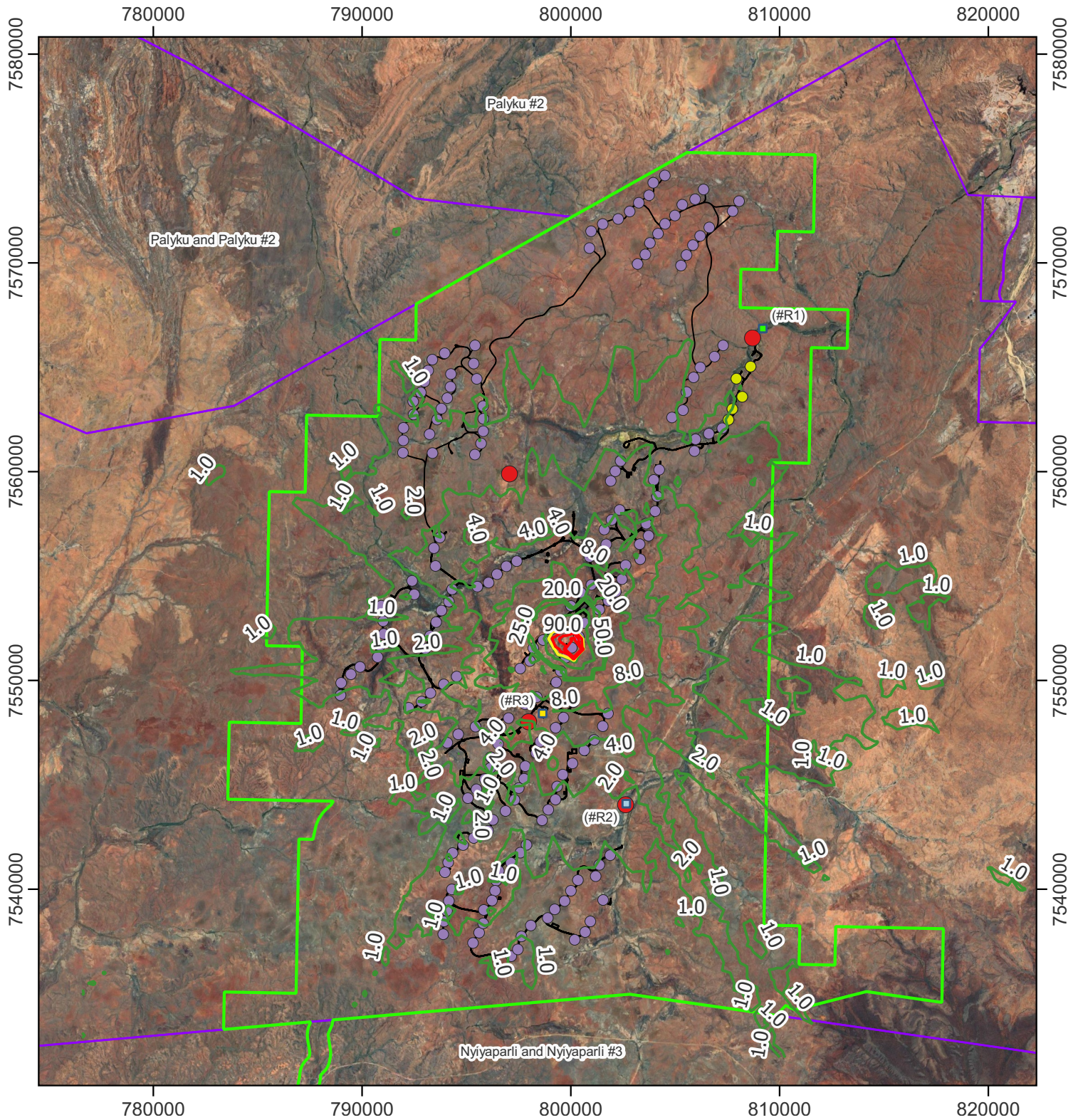
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC1: Predicted maximum 24-hour average  
 TSP concentration in the south region - 1 turbine  
 construction scenario without controls

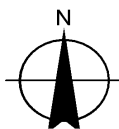
Project No. 12643037  
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**FIGURE 8.41**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - South region selected turbines
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

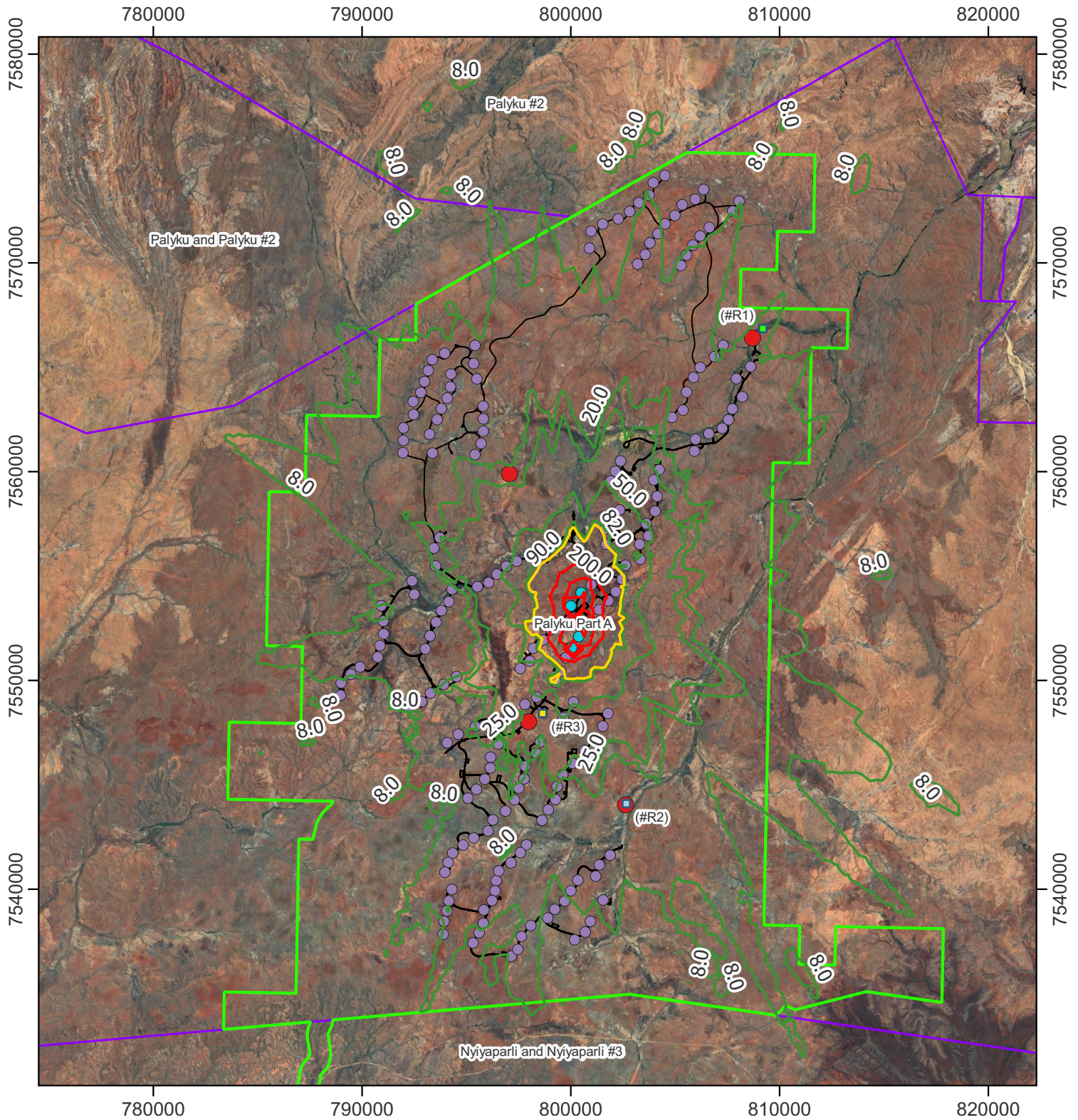
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



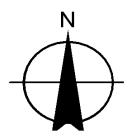
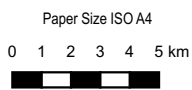
Fortescue - Bonney Downs - Wind Farm  
 SC2: Predicted maximum 24-hour average  
 TSP concentration in the south region - 1 turbine  
 construction scenario with controls

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.42**



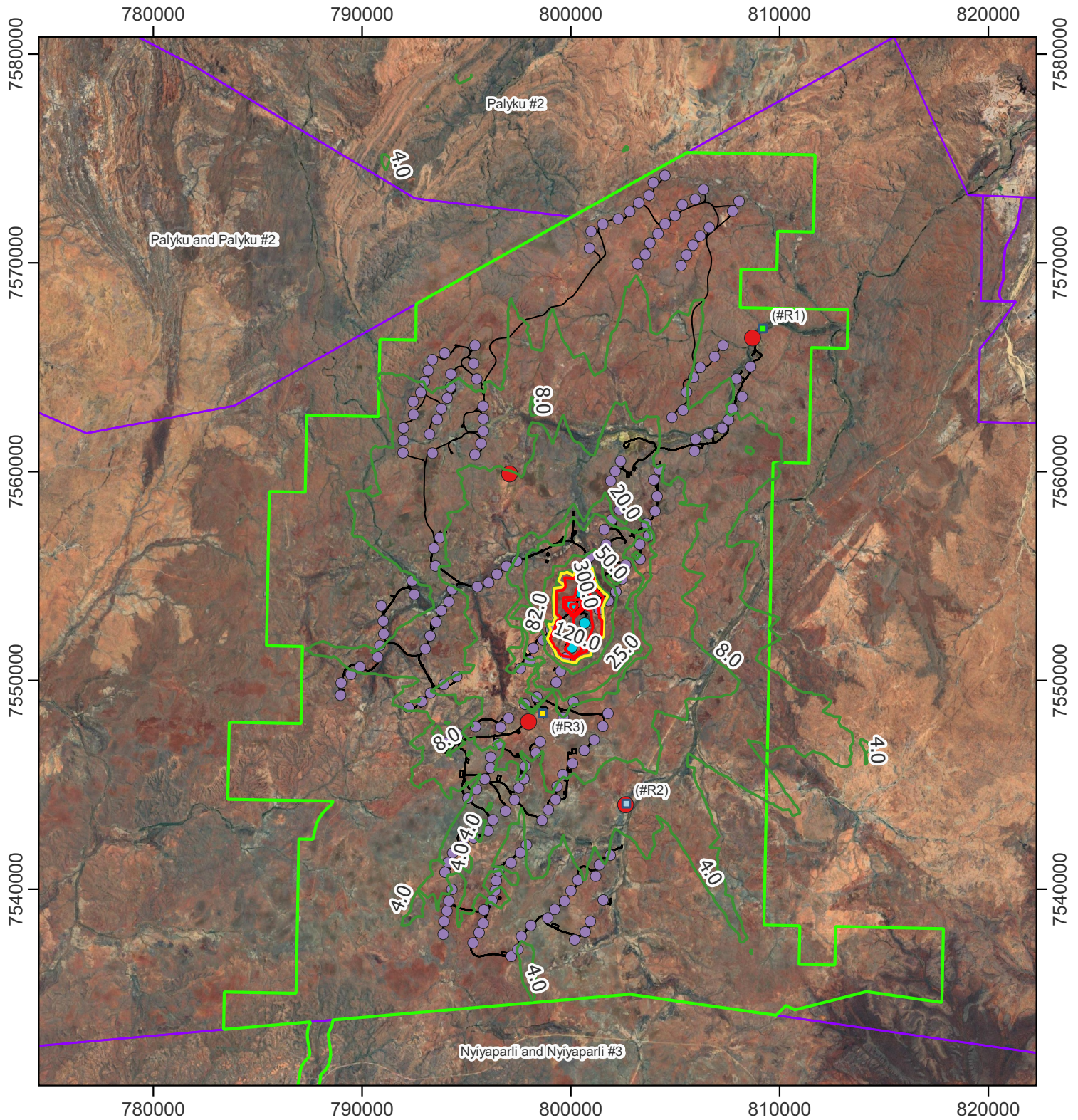
- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - South region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )



**Fortescue - Bonney Downs - Wind Farm**  
**SC3: Predicted maximum 24-hour average TSP concentration in the south region - 5 turbines construction scenario without controls**

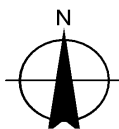
Project No. **12643037**  
 Revision No. **0**  
 Date. **06/06/2025**

**FIGURE 8.43**



- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - All turbines
  - South region selected turbines
  - Proposed Bonney Downs Camp
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )

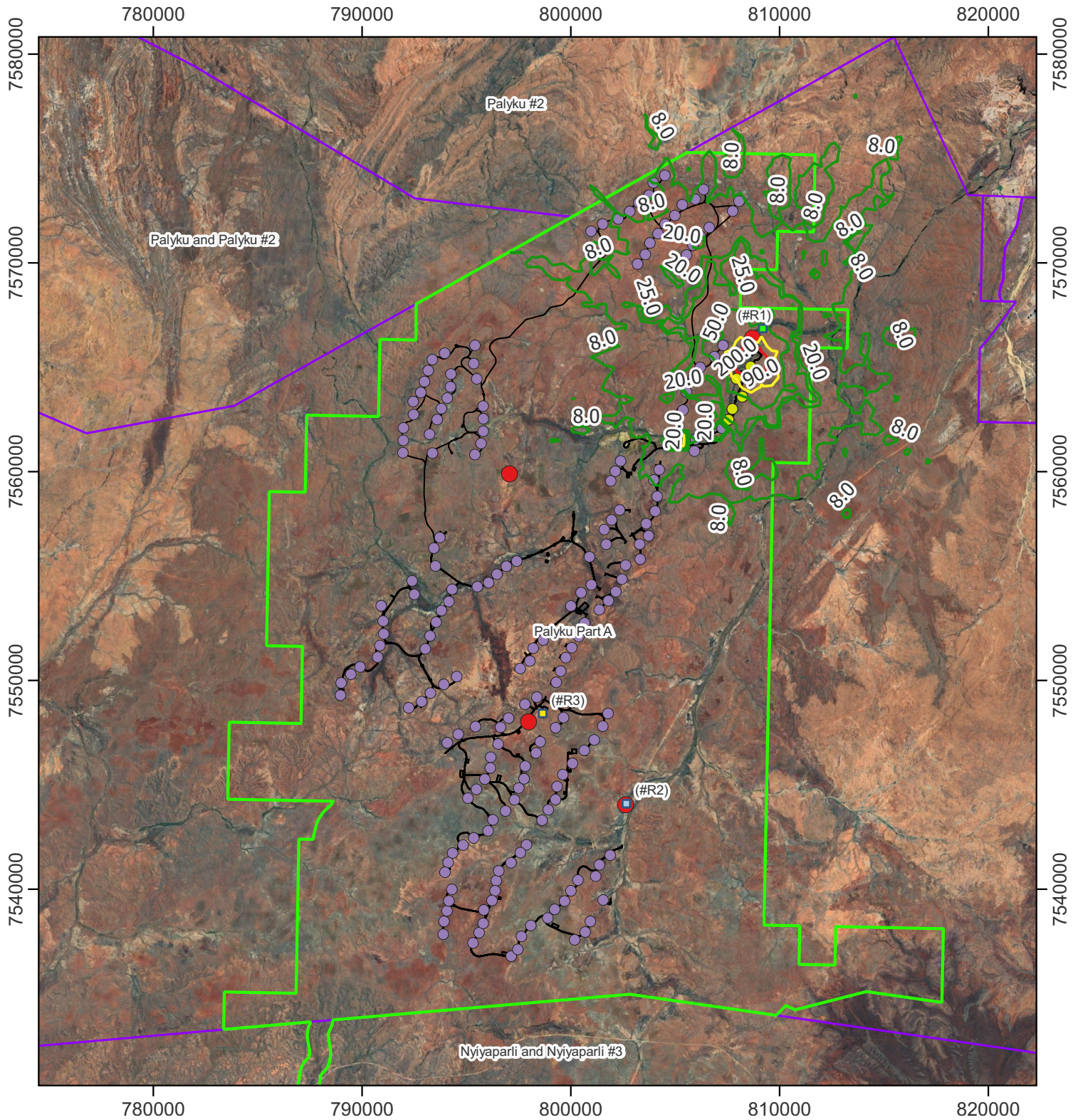
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



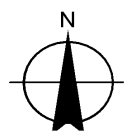
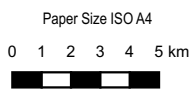
Fortescue - Bonney Downs - Wind Farm  
 SC4: Predicted maximum 24-hour average  
 TSP concentration in the south region - 5 turbines  
 construction scenario with controls

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.44**



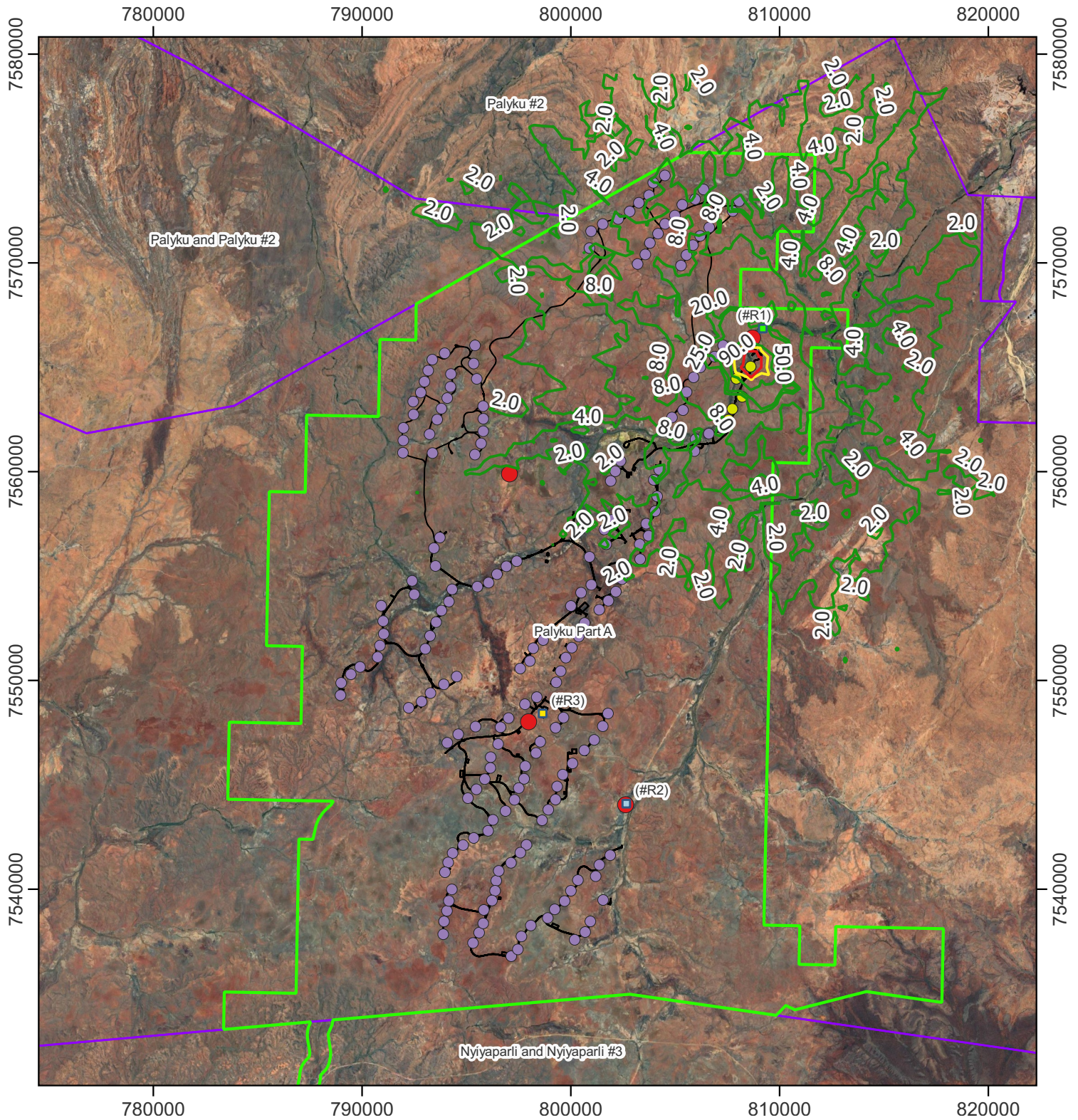
- Legend**
- Native title determination area
  - Bonney Downs development envelope
  - Tracks
  - Dust monitors
  - All turbines
  - North region selected turbines
  - Proposed Bonney Downs Camp
  - Bonnie Pool
  - Bonney Downs Homestead
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )



**Fortescue - Bonney Downs - Wind Farm**  
**SC5: Predicted maximum 24-hour average TSP concentration in the north region - 1 turbine construction scenario without controls**

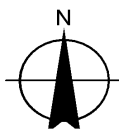
Project No. **12643037**  
 Revision No. **0**  
 Date: **06/06/2025**

**FIGURE 8.45**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

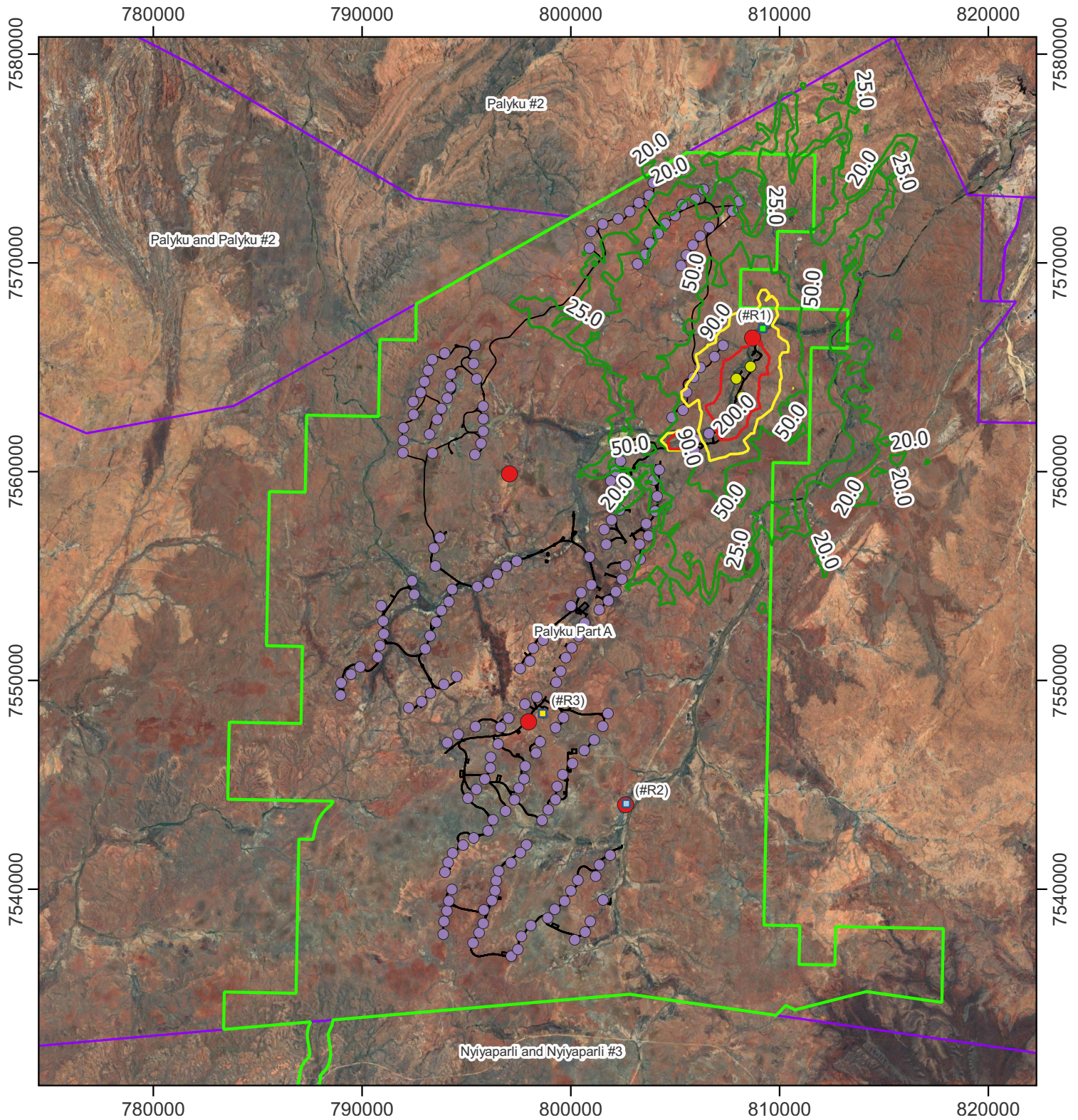
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC6: Predicted maximum 24-hour average  
 TSP concentration in the north region - 1 turbine  
 construction scenario with controls

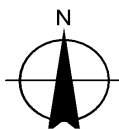
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.46**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

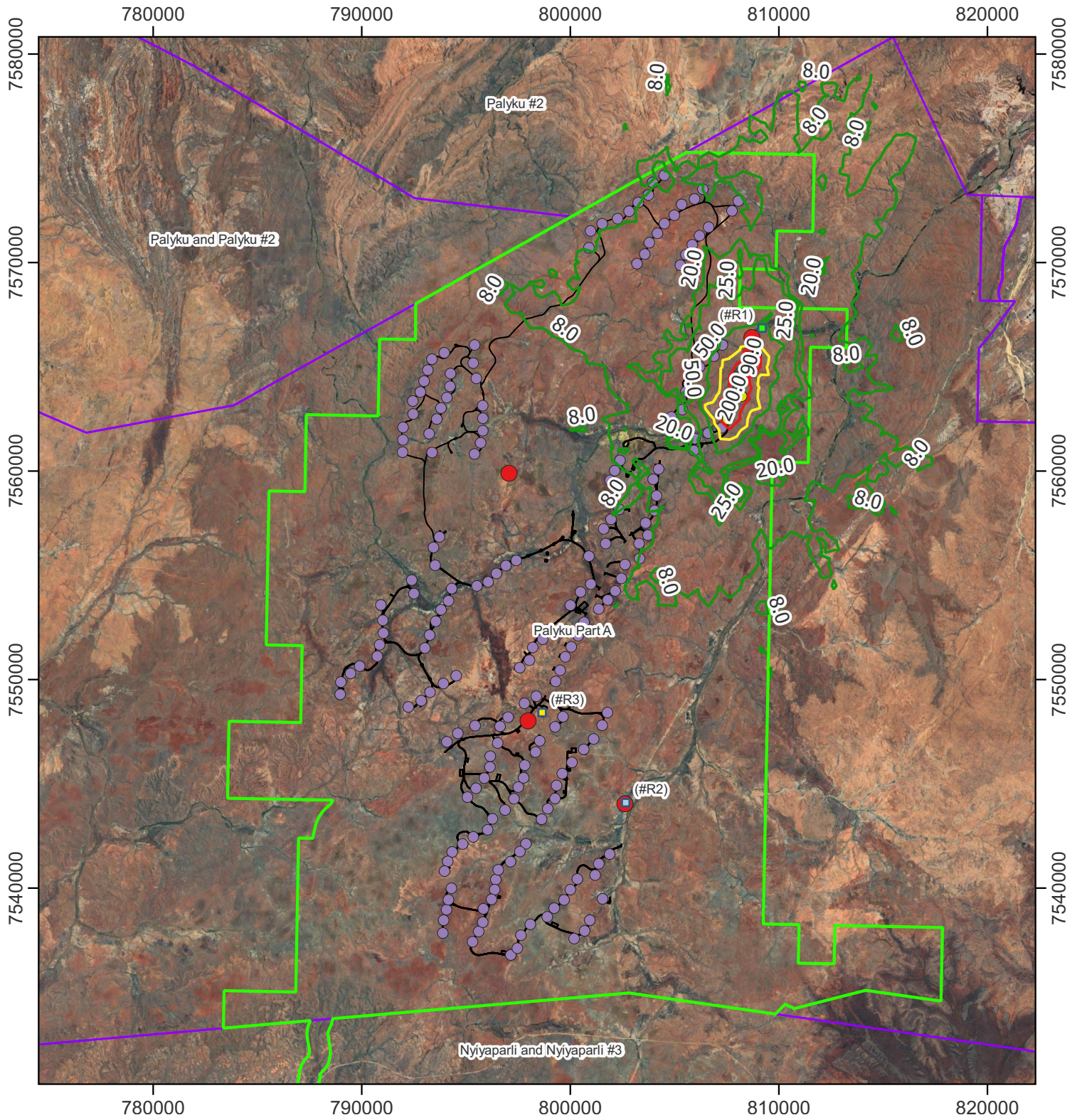
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC7: Predicted maximum 24-hour average  
 TSP concentration in the north region - 5 turbines  
 construction scenario without controls

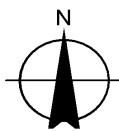
Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.47**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - North region selected turbines
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Proposed Bonney Downs Camp
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonnie Pool
  - Bonney Downs Homestead

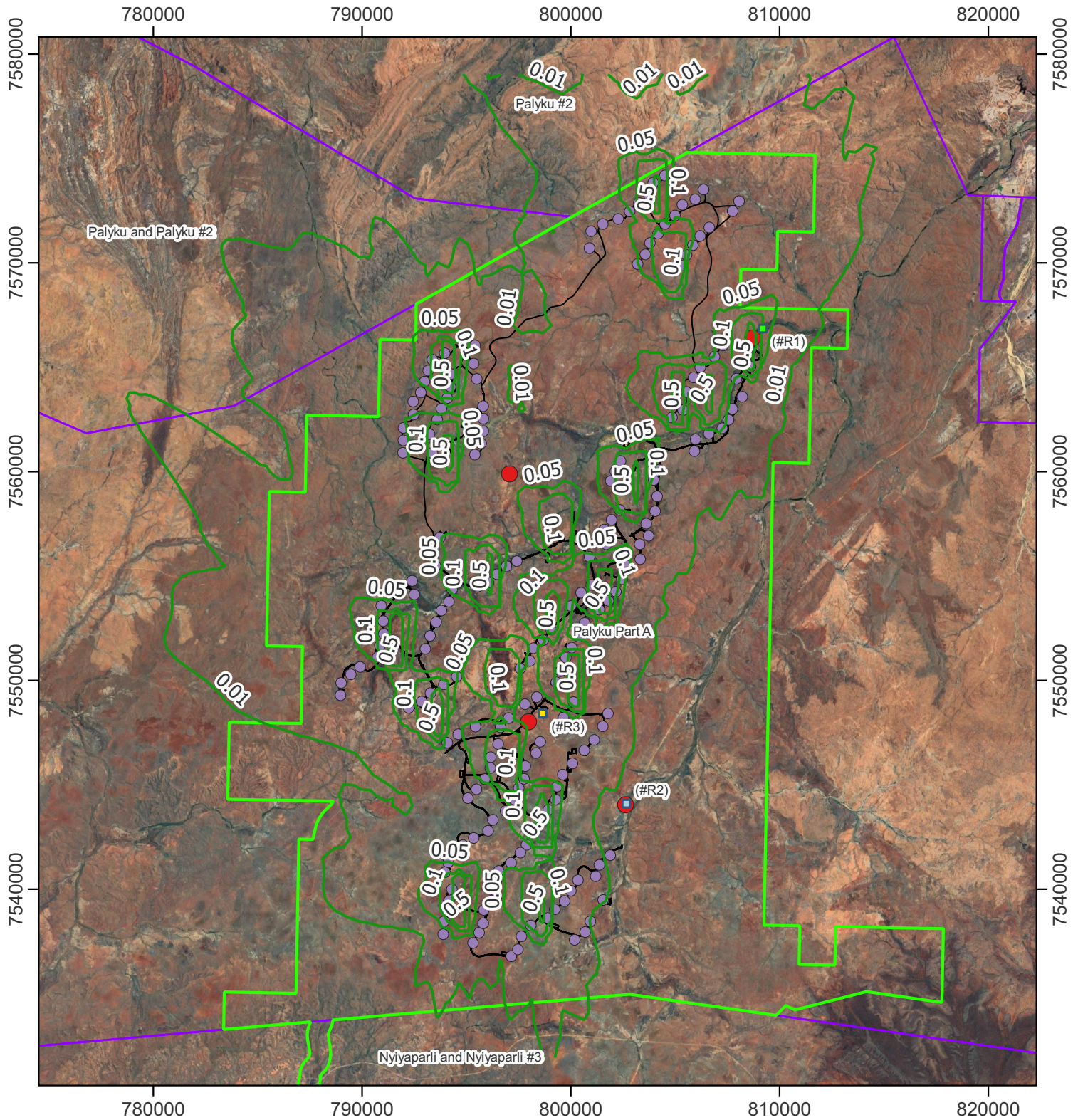
Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



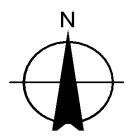
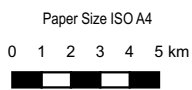
Fortescue - Bonney Downs - Wind Farm  
 SC8: Predicted maximum 24-hour average  
 TSP concentration in the north region - 5 turbines  
 construction scenario with controls

Project No. 12643037  
 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.48**



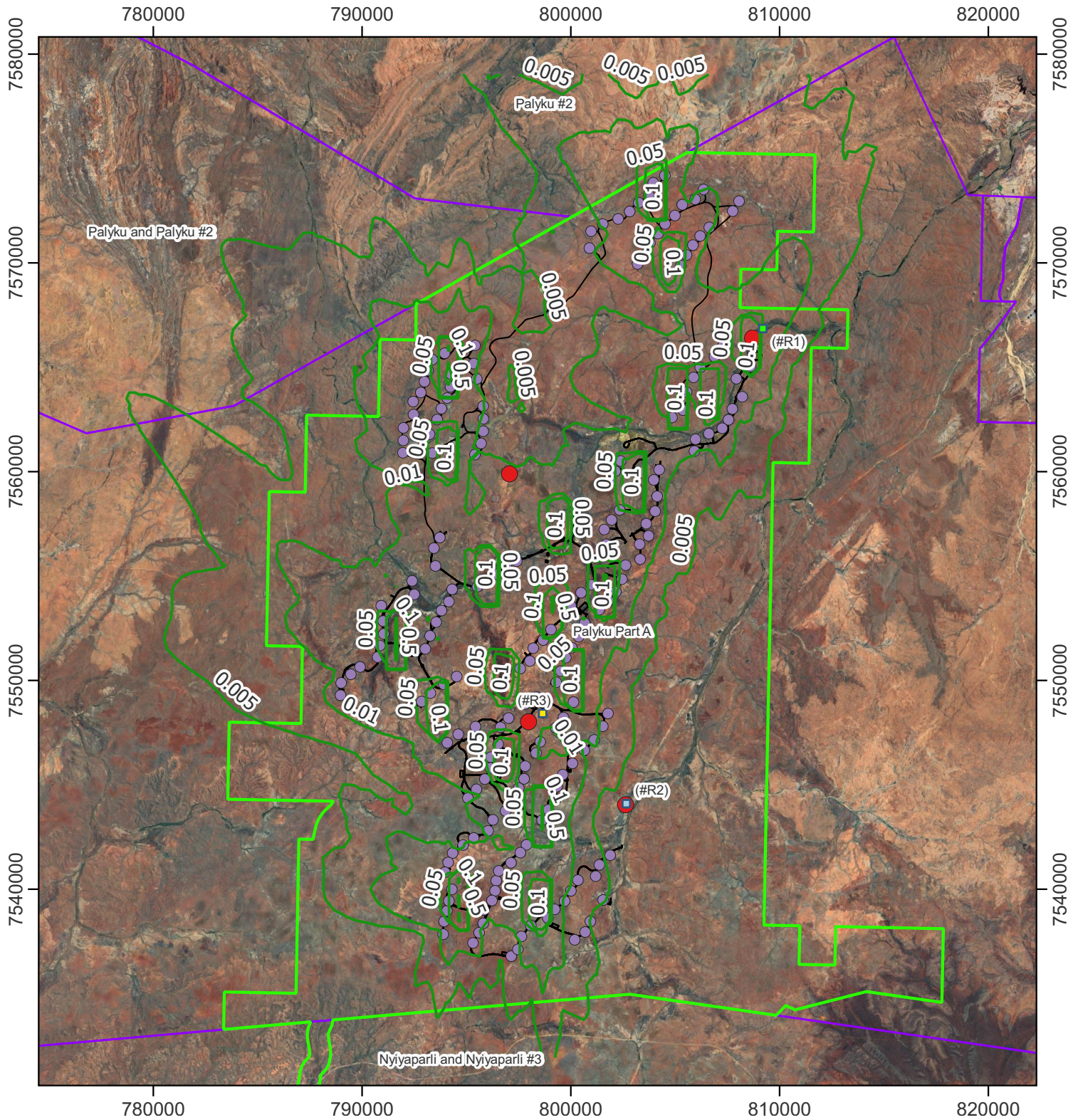
- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead



**Fortescue - Bonney Downs - Wind Farm**  
**SC9: Predicted maximum 24-hour average**  
**TSP concentration - Operations scenario without**  
**controls**

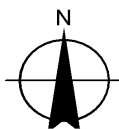
Project No. **12643037**  
 Revision No. **0**  
 Date. **06/06/2025**

**FIGURE 8.49**



- Legend**
- Native title determination area
  - All turbines
  - Contours below criteria ( $\mu\text{g}/\text{m}^3$ )
  - Bonney Downs development envelope
  - Proposed Bonney Downs Camp
  - Contours at criteria ( $90 \mu\text{g}/\text{m}^3$ )
  - Tracks
  - Bonnie Pool
  - Contours exceeding criteria ( $\mu\text{g}/\text{m}^3$ )
  - Dust monitors
  - Bonney Downs Homestead

Paper Size ISO A4  
 0 1 2 3 4 5 km  
 Map Projection: Transverse Mercator  
 Horizontal Datum: WGS 84  
 Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
 SC10: Predicted maximum 24-hour average  
 TSP concentration - Operations scenario with  
 controls

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 Revision No. 0  
 Date: 06/06/2025

**FIGURE 8.50**

## 8.4 Dust deposition

Dust deposition has been assessed with respect to the amenity impacts for the maximum allowable deposited dust per month.

The predicted maximum dust deposition at each receptor for the south region construction scenarios is presented in Table 8.18 for the monthly averaging period. Contour plots for dust deposition from each of the south region construction scenarios are presented in Figure 8.51 to Figure 8.54.

The predicted maximum dust deposition at each receptor for the north region construction scenarios is presented in Table 8.19 for the monthly averaging period. Contour plots for dust deposition from each of the north region construction scenarios are presented in Figure 8.55 to Figure 8.58.

The predicted maximum dust deposition at each receptor for the operations scenarios is presented in Table 8.20 for the monthly averaging period. Contour plots for dust deposition from each of operations scenarios are presented in Figure 8.59 to Figure 8.60.

As per the model predicted results, dust deposition is not a concern from either construction or operational activities and any dust accumulation on surfaces of receptor sites will likely be unnoticeable.

**Table 8.18 Incremental dust deposition for south region construction scenarios, monthly averaging period (g/m<sup>2</sup>/month)**

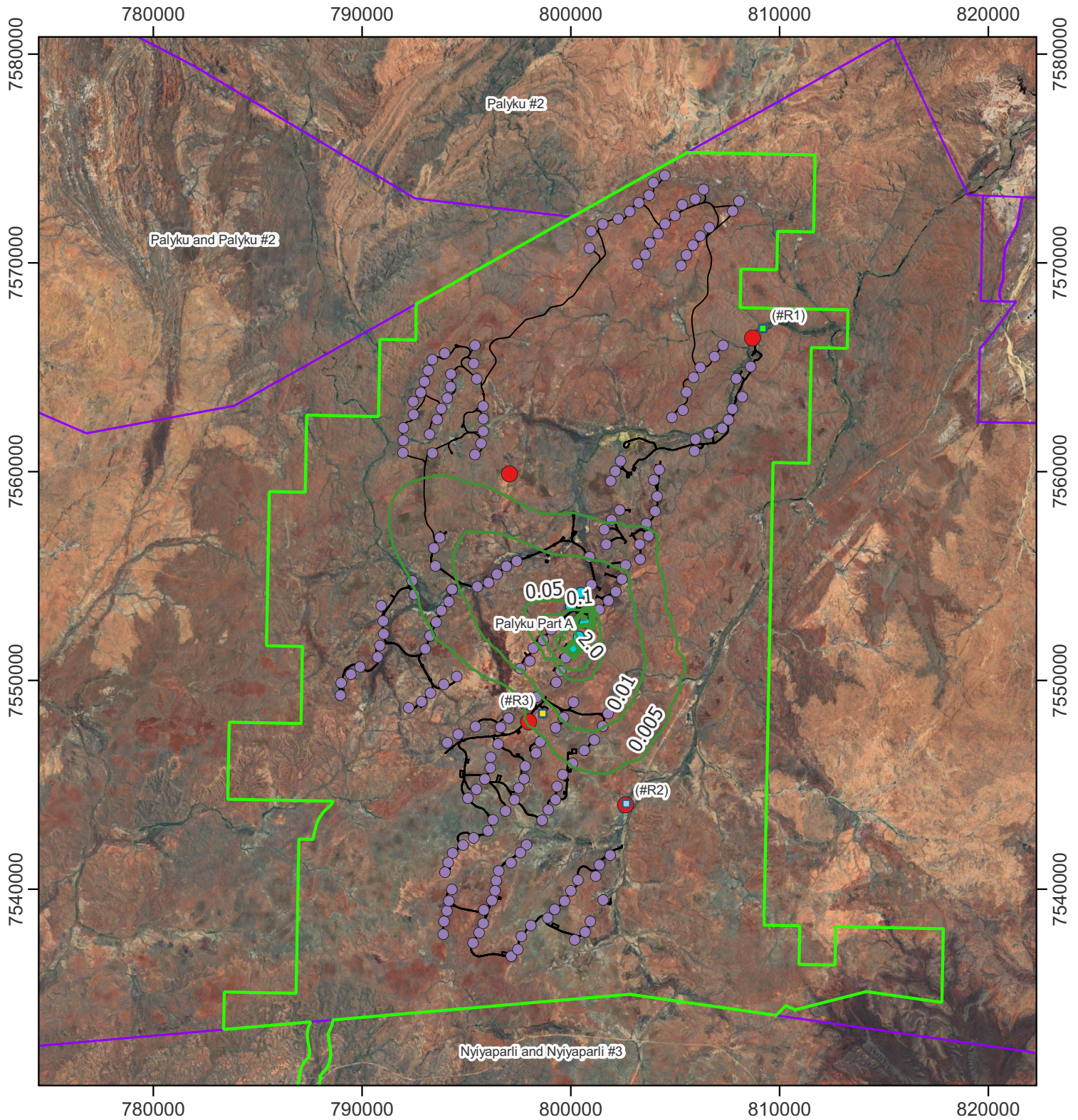
ID	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Amenity (g/m <sup>2</sup> /month)
	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	
#R1	0.001	<1%	0.0004	<1%	0.01	<1%	0.002	<1%	4
#R2	0.003	<1%	0.001	<1%	0.01	<1%	0.01	<1%	
#R3	0.006	<1%	0.003	<1%	0.02	<1%	0.01	<1%	

**Table 8.19 Incremental dust deposition for north region construction scenarios, monthly averaging period (g/m<sup>2</sup>/month)**

ID	Scenario 5		Scenario 6		Scenario 7		Scenario 8		Amenity (g/m <sup>2</sup> /month)
	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	
#R1	0.03	<1%	0.02	<1%	0.08	2%	0.04	<1%	4
#R2	0.0005	<1%	0.0002	<1%	0.002	<1%	0.001	<1%	
#R3	0.0005	<1%	0.0002	<1%	0.003	<1%	0.001	<1%	

**Table 8.20 Incremental dust deposition for operations scenarios, monthly averaging period (g/m<sup>2</sup>/month)**

ID	Scenario 9		Scenario 10		Amenity (g/m <sup>2</sup> /month)
	Deposition (g/m <sup>2</sup> /month)	% of amenity	Deposition (g/m <sup>2</sup> /month)	% of amenity	
#R1	0.0003	<1%	0.0002	<1%	4
#R2	0.0001	<1%	0.0000	<1%	
#R3	0.0002	<1%	0.0001	<1%	



**Legend**

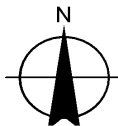
- ▭ Native title determination area
- ▭ Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g/m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g/m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g/m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



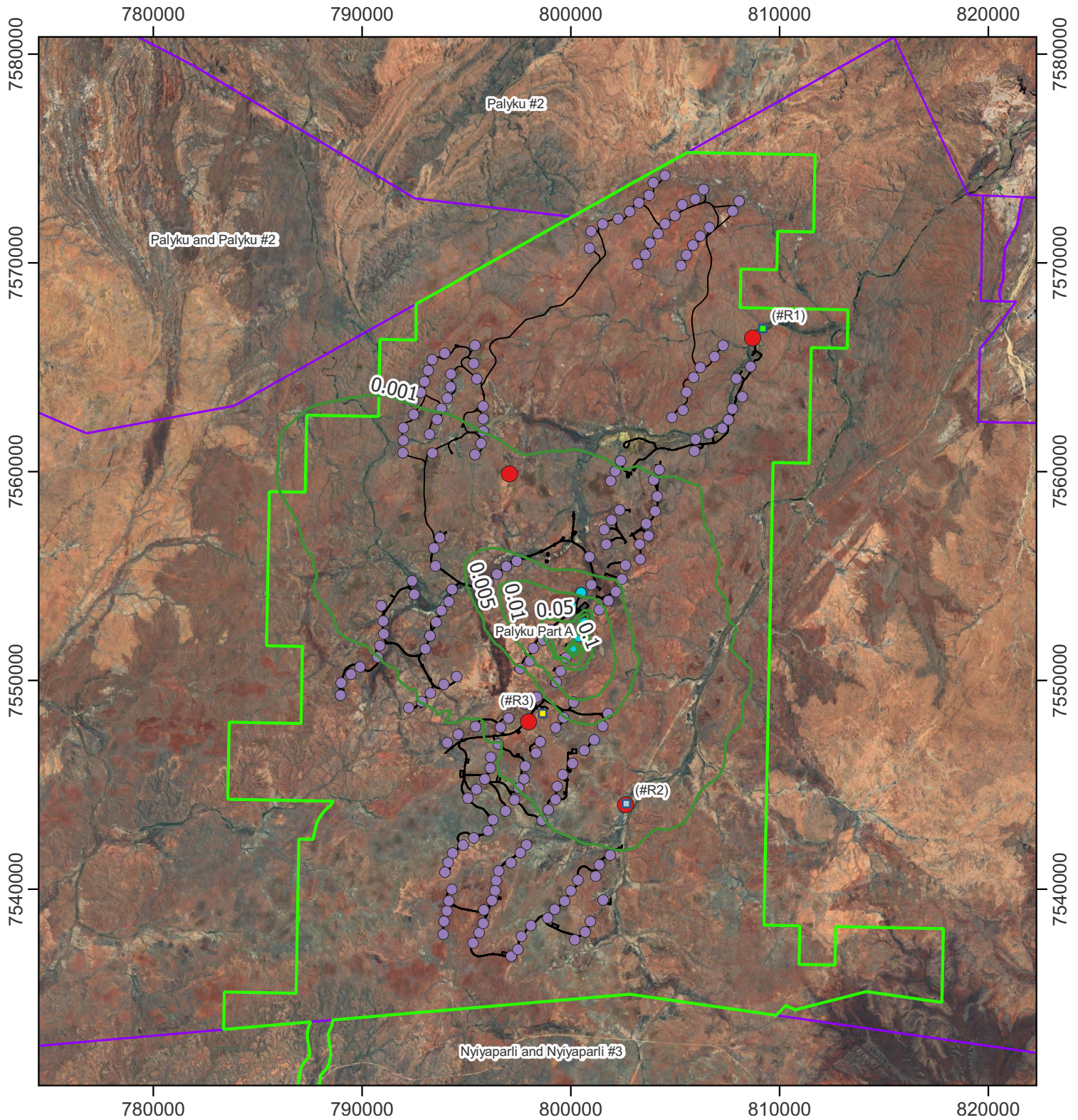
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC1: Predicted maximum monthly average dust deposition in the south region - 1 turbine construction scenario without controls

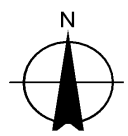
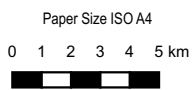
Project No. 12643037  
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**FIGURE 8.51**



**Legend**

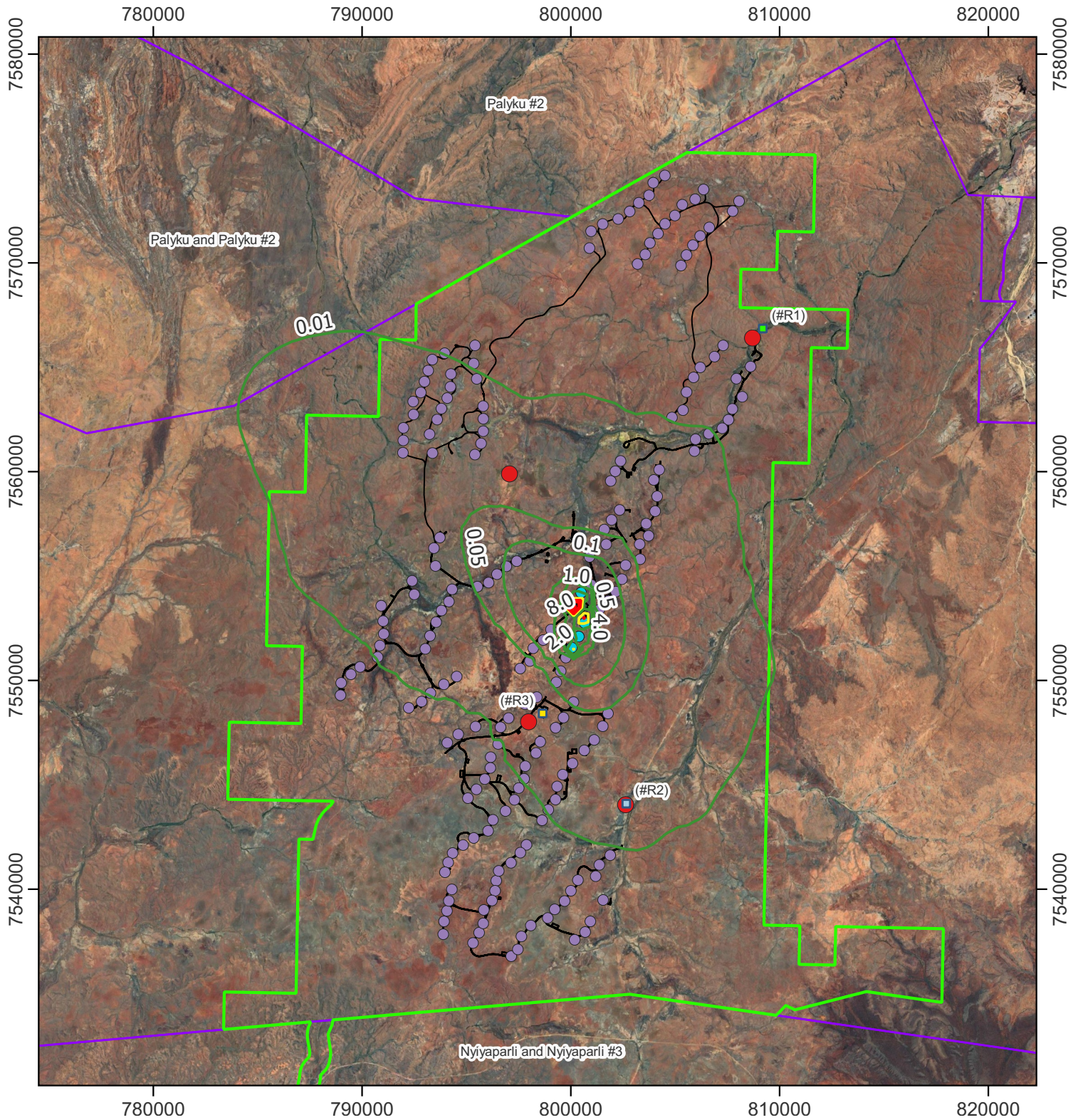
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )



**Fortescue - Bonney Downs - Wind Farm**  
**SC2: Predicted maximum monthly average dust deposition in the south region - 1 turbine construction scenario with controls**

Project No. **12643037**  
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 Date: **06/06/2025**

**FIGURE 8.52**



**Legend**

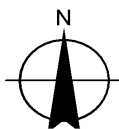
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



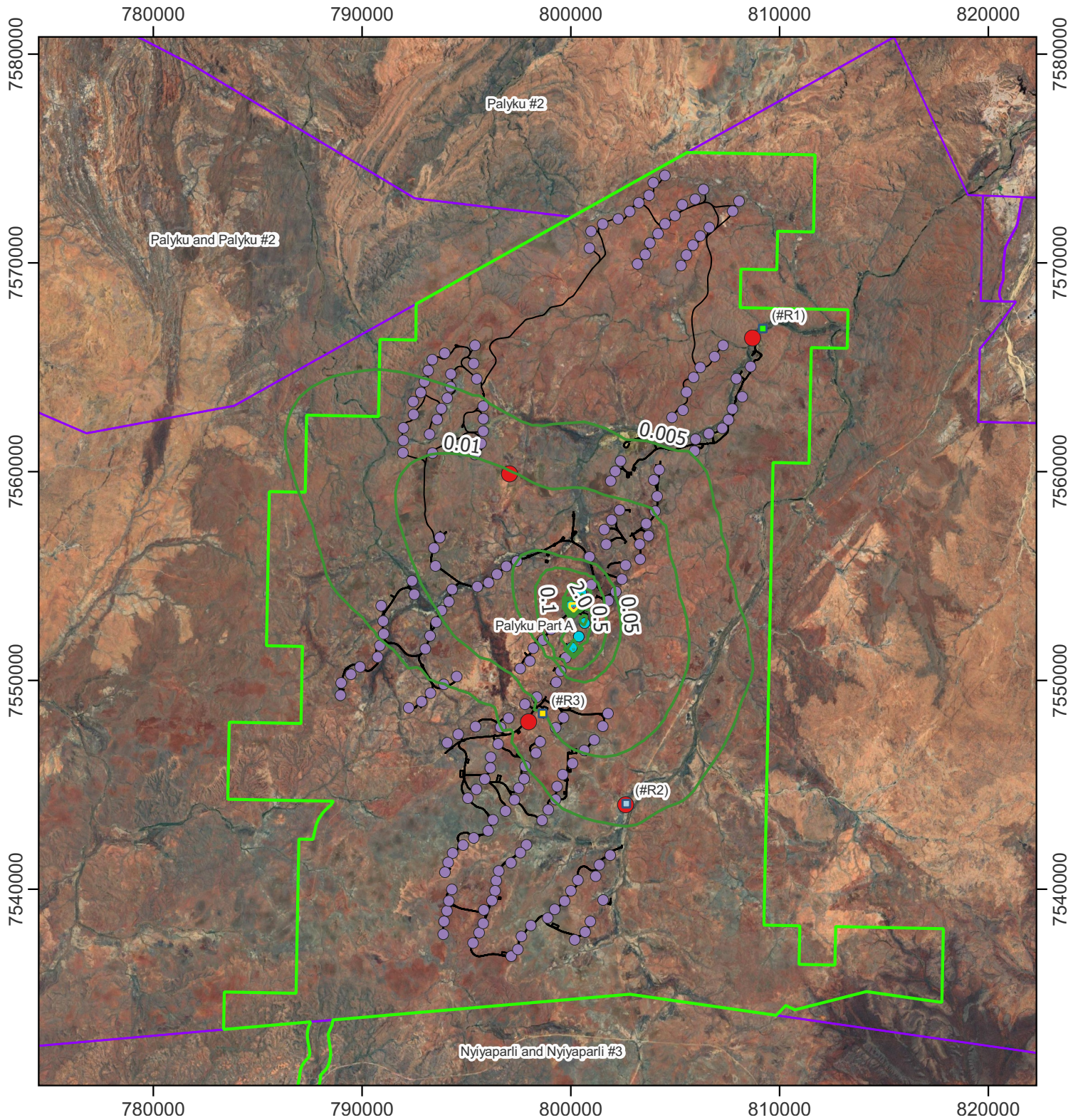
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC3: Predicted maximum monthly average dust deposition in the south region - 5 turbines construction scenario without controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.53**



**Legend**

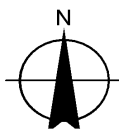
- ▭ Native title determination area
- ▭ Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- South region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



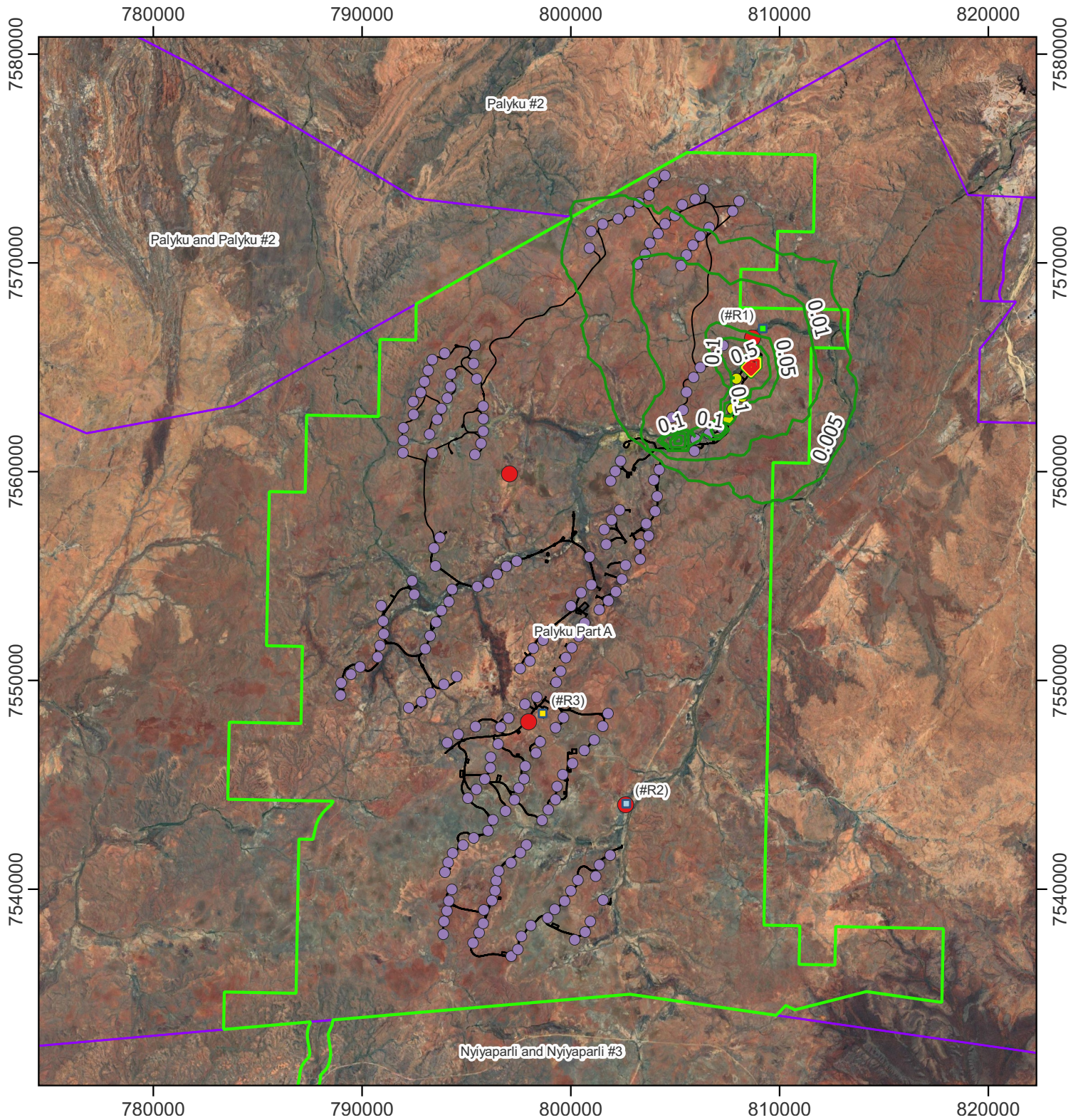
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC4: Predicted maximum monthly average dust deposition in the south region - 5 turbines construction scenario with controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.54**



**Legend**

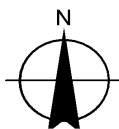
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- North region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



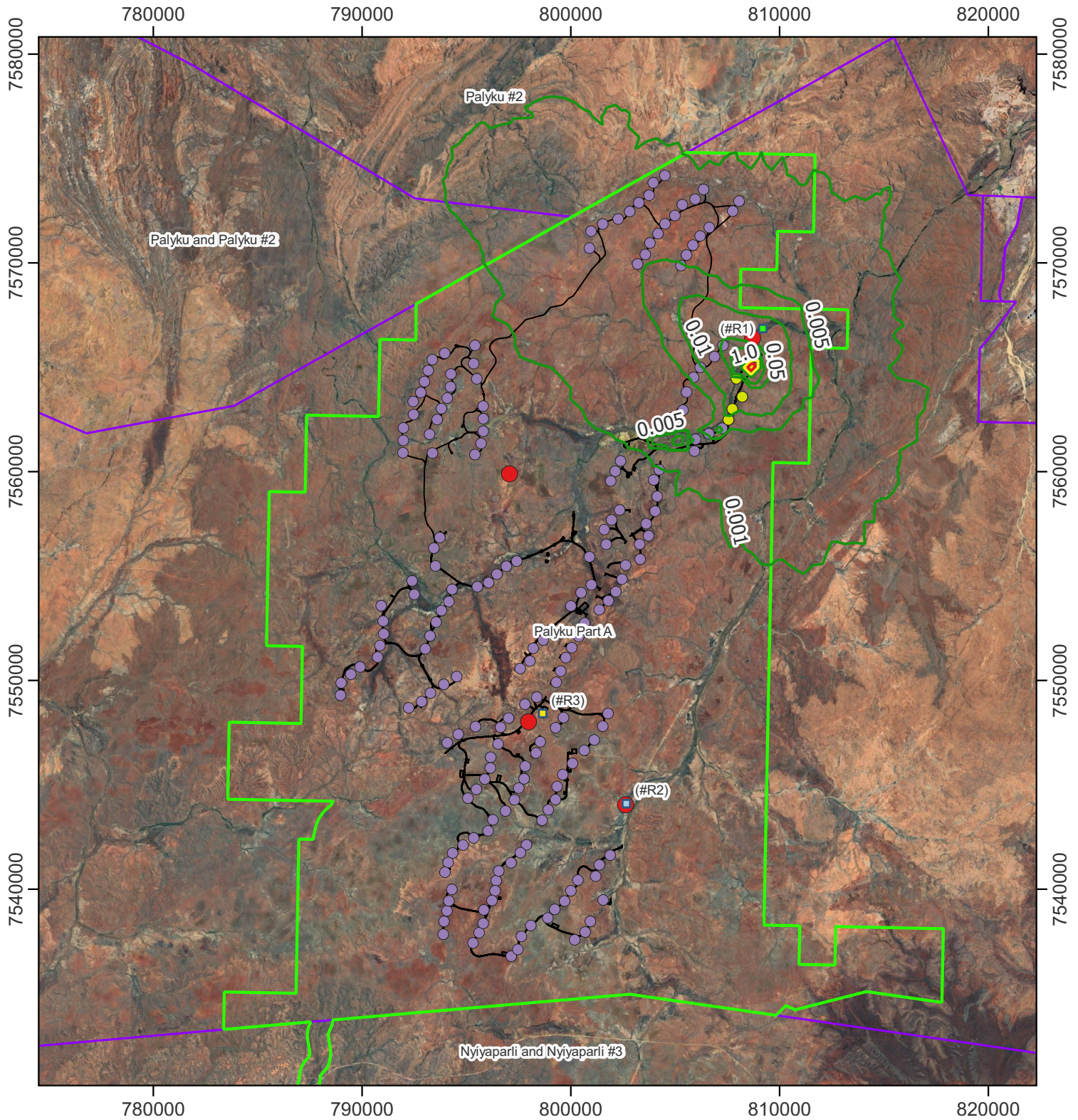
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC5: Predicted maximum monthly average dust deposition in the north region - 1 turbine construction scenario without controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.55**



**Legend**

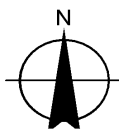
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- North region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



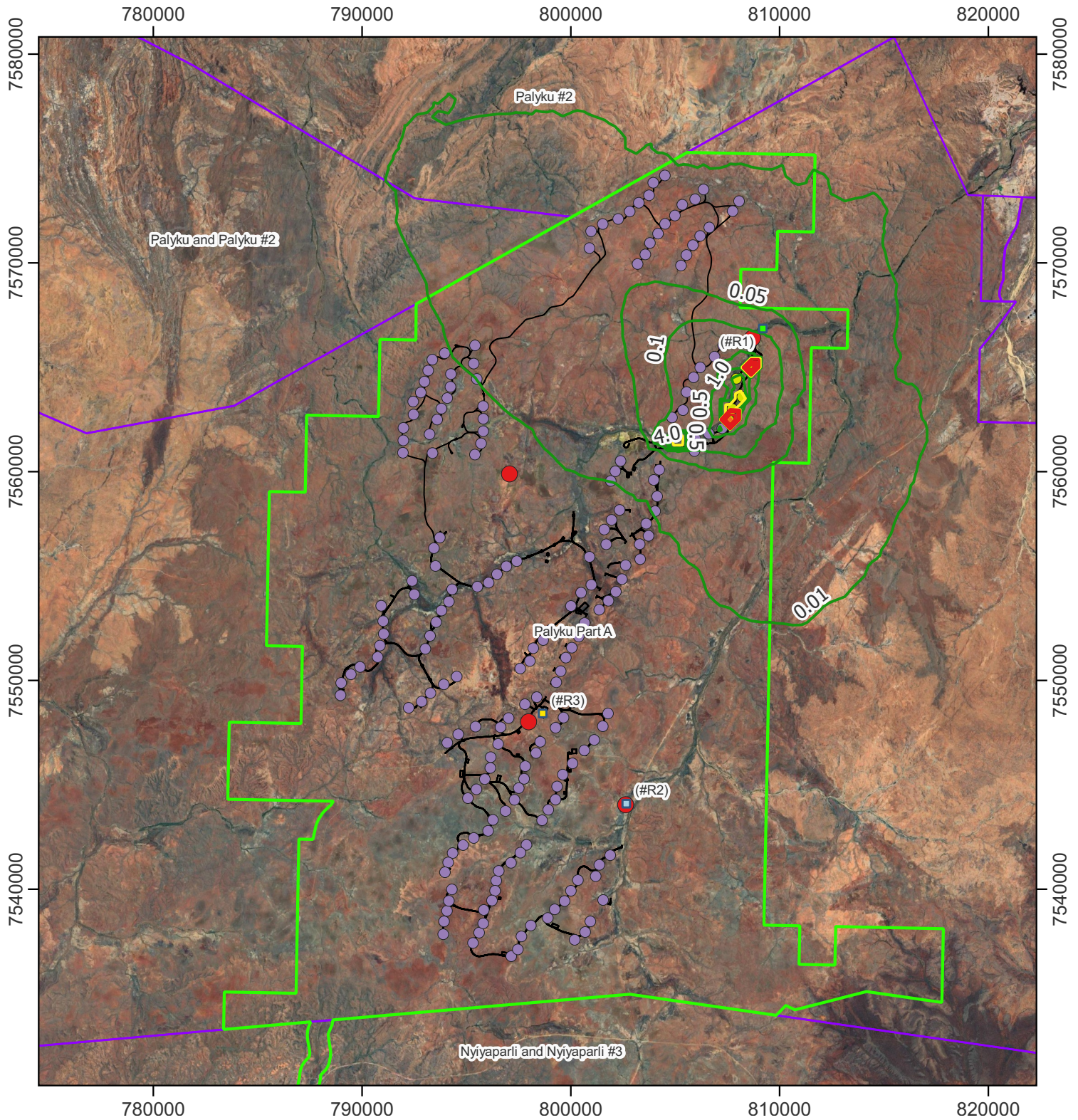
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC6: Predicted maximum monthly average dust deposition in the north region - 1 turbine construction scenario with controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.56**



### Legend

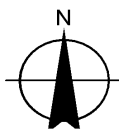
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- North region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $g/m^2/month$ )
- Contours at criteria (4  $g/m^2/month$ )
- Contours exceeding criteria ( $g/m^2/month$ )

Paper Size ISO A4

0 1 2 3 4 5 km



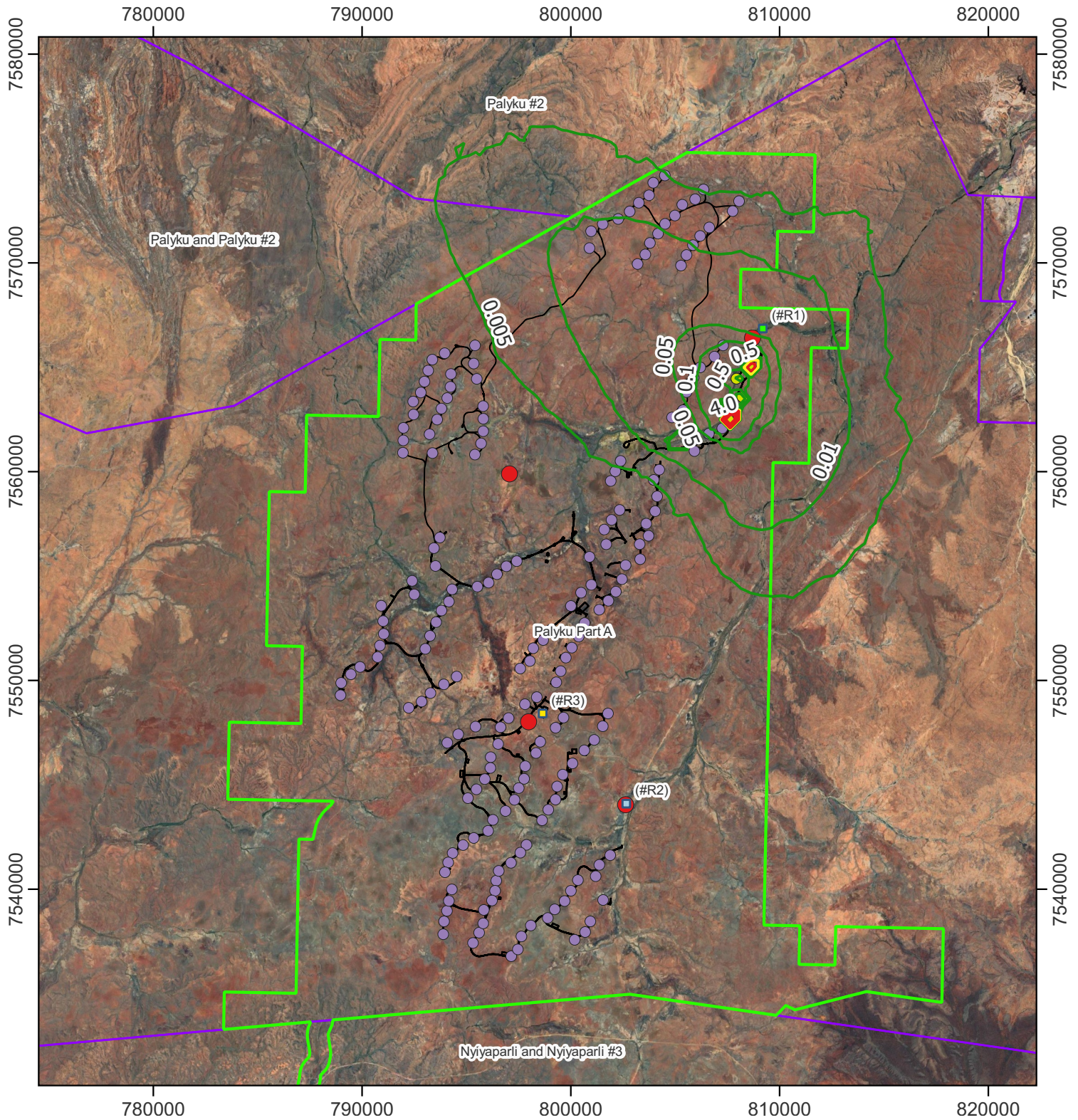
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC7: Predicted maximum monthly average dust deposition in the north region - 5 turbines construction scenario without controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.57**



**Legend**

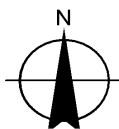
- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- North region selected turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria ( $\text{g}/\text{m}^2/\text{month}$ )
- Contours at criteria ( $4 \text{ g}/\text{m}^2/\text{month}$ )
- Contours exceeding criteria ( $\text{g}/\text{m}^2/\text{month}$ )

Paper Size ISO A4

0 1 2 3 4 5 km



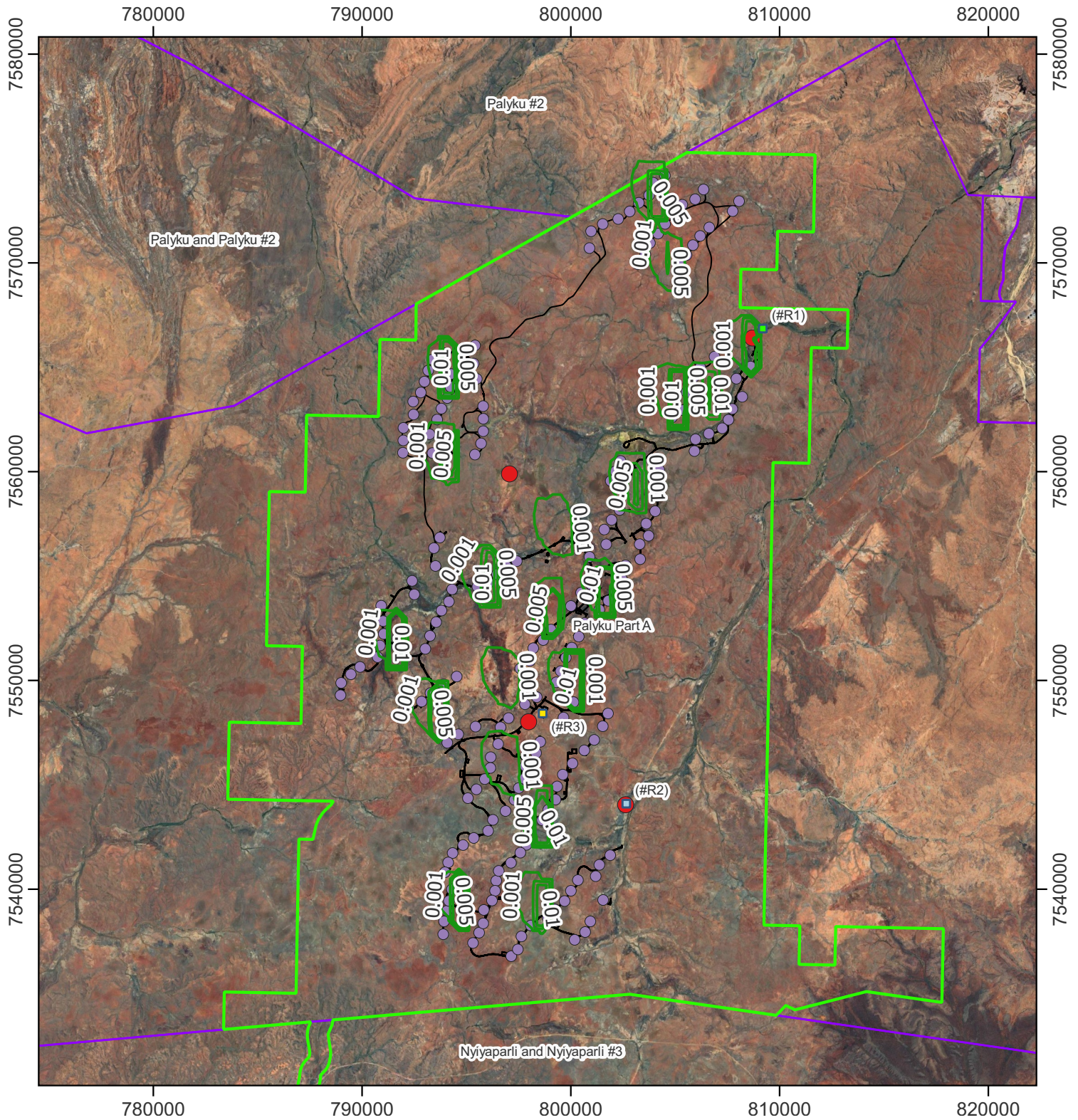
Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S



Fortescue - Bonney Downs - Wind Farm  
SC8: Predicted maximum monthly average dust deposition in the north region - 5 turbines construction scenario with controls

Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.58**

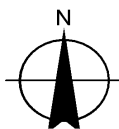


**Legend**

- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria (g/m<sup>2</sup>/month)
- Contours at criteria (4 g/m<sup>2</sup>/month)
- Contours exceeding criteria (g/m<sup>2</sup>/month)

Paper Size ISO A4

0 1 2 3 4 5 km



Map Projection: Transverse Mercator  
Horizontal Datum: WGS 84  
Grid: WGS 84 / UTM zone 50S

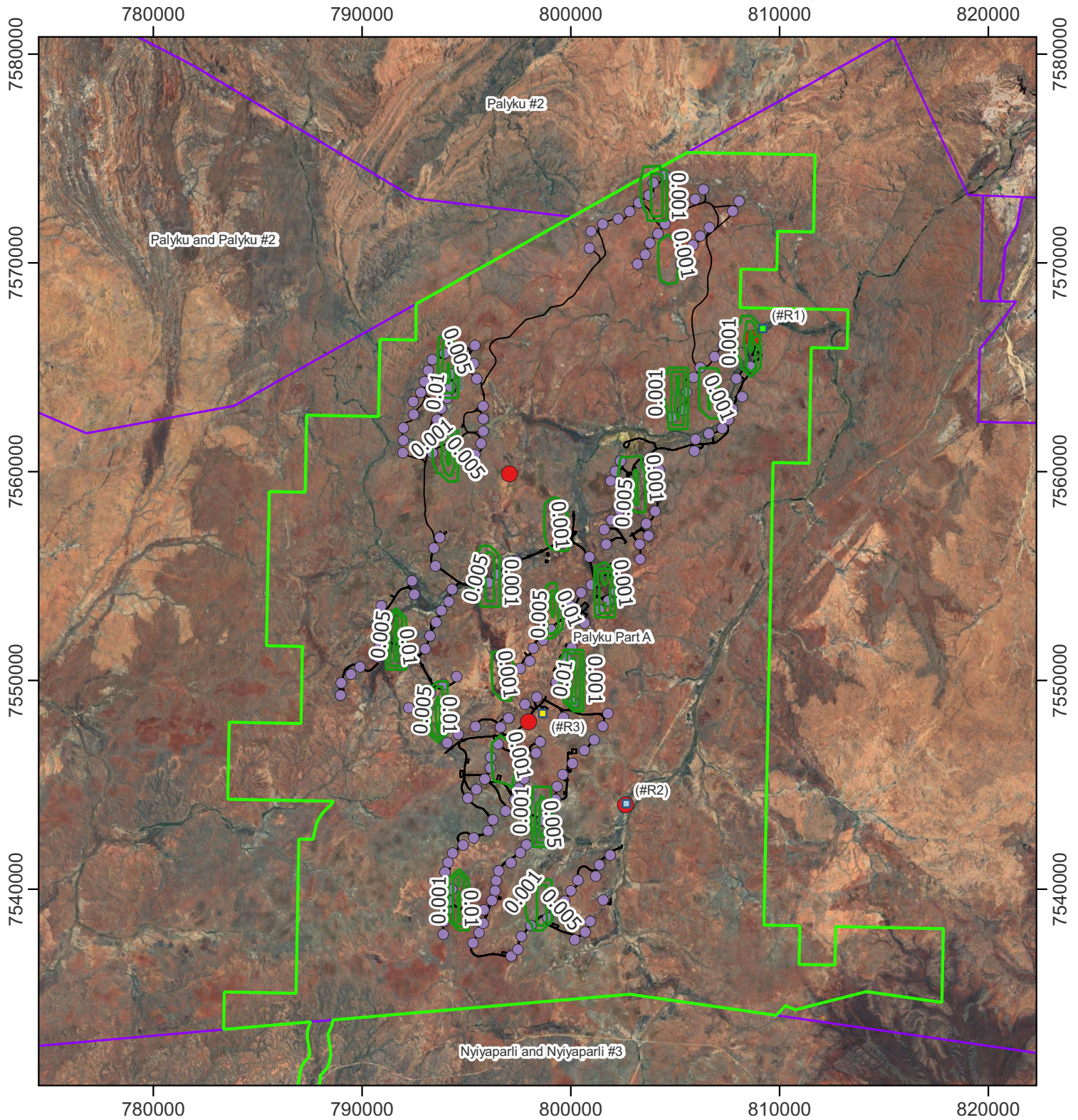


Fortescue - Bonney Downs - Wind Farm

SC9: Predicted maximum monthly average dust deposition - Operations scenario without controls

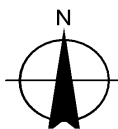
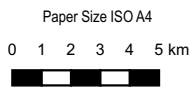
Project No. 12643037  
Revision No. 0  
Date: 06/06/2025

**FIGURE 8.59**



**Legend**

- Native title determination area
- Bonney Downs development envelope
- Tracks
- Dust monitors
- All turbines
- Proposed Bonney Downs Camp
- Bonnie Pool
- Bonney Downs Homestead
- Contours below criteria (g/m<sup>2</sup>/month)
- Contours at criteria (4 g/m<sup>2</sup>/month)
- Contours exceeding criteria (g/m<sup>2</sup>/month)



Fortescue - Bonney Downs - Wind Farm

SC10: Predicted maximum monthly average dust deposition - Operations scenario with controls

Project No. 12643037  
Revision No. 0  
Date. 06/06/2025

**FIGURE 8.60**

## 9. Conclusion

The Bonney Downs Wind Farm (the Project) includes development of a large-scale wind farm and transmission infrastructure within the Bonney Downs Pastoral Lease approximately 130 km north of Newman and approximately 40 km southwest of Nullagine. The Project consists of up to 200 wind turbines, battery energy storage systems (BESS) and supporting infrastructure and two substations and associated transmission infrastructure which will enable energy transfer from the wind farm to Fortescue’s mining operations. Fortescue plan to build this network of wind turbines progressively, with construction of up to five turbines running concurrently.

As part of the Environmental Impact Assessment (EIA) for the project, a social surroundings assessment is required. The social surroundings assessment is to consider amenity values and impacts of the Project including impact on air quality. The potential sources of dust during construction phase of the Project may include ground disturbing activities, blasting, earth moving, wind erosion of exposed areas, stockpiled materials and vehicular traffic. Potential sources of dust during operation phase of the Project may include wind erosion of exposed areas, use of operational equipment and vehicular traffic on unsealed roads.

Air dispersion modelling was conducted to assess the impacts of the construction and operational phases of the Project. Predicted incremental ground level concentrations (GLCs) were assessed against the relevant criteria, with the primary pollutants assessed being particulate matter less than 10 micrometres (PM<sub>10</sub>) and 2.5 micrometres (PM<sub>2.5</sub>) each for the human health criteria, and total suspended particulates (TSP) and dust deposition each for the amenity criteria.

A total of 10 scenarios were considered for this assessment, which can be seen in Table 9.1.

Table 9.1 Overview of scenarios

Scenario	Classification	Description	Region
SC1	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	South
SC2		Incremental emissions from construction of one wind turbine with management measures	
SC3		Incremental emissions from construction of five wind turbine without management measures	
SC4		Incremental emissions from construction of five wind turbine with management measures	
SC5	Turbine construction	Incremental emissions from construction of one wind turbine without management measures	North
SC6		Incremental emissions from construction of one wind turbine with management measures	
SC7		Incremental emissions from construction of five wind turbine without management measures	
SC8		Incremental emissions from construction of five wind turbine with management measures	
SC9	Turbine operations	Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) without management measures	North & south
SC10		Incremental emissions from operations of the Project (at completion of all 200 turbines in the region) with management measures	

The results of the air dispersion modelling indicate that the Project will **comply** with the relevant air quality criteria for each of the pollutants across all scenarios, with the exceptions presented in Table 9.2. Non-compliant model predictions occur exclusively in the five-turbine construction scenario within the northern region, and only when no mitigation measures are applied. Standard dust control strategies are expected to effectively reduce emissions to levels that comply with the relevant air quality criteria.

**Table 9.2**      *Summary of non-compliant model predictions*

ID	Description	Pollutant	Averaging Period	Scenario 7 (5T in the north, no controls)		
				GLC (µg/m³)	% of criteria	# of exceedances
#R1	Bonnie Pool	PM <sub>10</sub>	24-hour	57.5	115%	1
		TSP		152	169%	6

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# Appendices

# **Appendix A**

## **Emissions estimates**

Table A.1 Emissions estimates for one turbine construction scenario without controls in the south region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	793	No control	0%	No control	0%	kg/t/hour	0.0001	0.0001	0.01	0.006	0.0009
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	1488	No control	0%	No control	0%	kg/t/hour	0.0002	0.0001	0.02	0.01	0.002
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	99.2	No control	0%	No control	0%	kg/t/hour	0.0001	0.00003	0.002	0.0008	0.0001
Truck dumping	Trucks (dumping overburden)	tonnes/hour	218	No control	0%	No control	0%	kg/t/hour	0.012	0.004	0.73	0.26	0.04
Graders	Graders	km/hour	13.0	No control	0%	No control	0%	kg/km/hour	2.07	0.57	7.48	2.07	0.31
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hour	0.78	No control	0%	No control	0%	kg/km/hour	0.18	0.05	0.20	0.06	0.008
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hour	0.59	No control	0%	No control	0%	kg/km/hour	2.22	0.90	1.80	0.73	0.11
Dozers	Bulldozer on material other than coal	hour/hour (annual)	0.06	No control	0%	No control	0%	kg/hour/hour	7.80	2.30	0.04	0.01	0.002
Blasting	Blasting	blasts/hour	0.0001	No control	0%	No control	0%	kg/blast/hour	3.22	1.67	0.0001	0.00003	0.000004
Drilling	Drilling	holes/hour	0.01	No control	0%	No control	0%	kg/hole/hour	0.59	0.31	0.001	0.0008	0.0001
Wind erosion of cleared land	Wind erosion	hectares/hour	0.0004	No control	0%	No control	0%	kg/ha/hour	0.08	0.04	0.00004	0.00002	0.000003
Wind erosion of borrow pits	Wind erosion	hectares/hour	0.0001	No control	0%	No control	0%	kg/ha/hour	0.08	0.04	0.00001	0.000003	0.000001

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.2 Emissions estimates for one turbine construction scenario with controls in the south region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	793	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.0001	0.00003	0.01	0.003	0.0005
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	1488	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.0001	0.00004	0.01	0.01	0.001
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	99.2	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.00003	0.00001	0.001	0.0004	0.0001
Truck dumping	Trucks (dumping overburden)	tonnes/hour	218	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.006	0.002	0.36	0.13	0.02
Graders	Graders	km/hour	13.0	Water sprays (50%)	50%	No control	0%	kg/km/hour	1.04	0.29	3.74	1.04	0.16
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hour	0.78	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hour	0.01	0.003	0.01	0.003	0.0004
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hour	0.59	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hour	0.11	0.05	0.09	0.04	0.01
Dozers	Bulldozer on material other than coal	hour/hour (annual)	0.06	Water sprays (50%)	50%	No control	0%	kg/hour/hour	7.80	2.30	0.02	0.01	0.001
Blasting	Blasting	blasts/hour	0.0001	No control	0%	No control	0%	kg/blast/hour	3.22	1.67	0.0001	0.00003	0.000004
Drilling	Drilling	holes/hour	0.01	No control	0%	No control	0%	kg/hole/hour	0.59	0.31	0.001	0.0008	0.0001
Wind erosion of cleared land	Wind erosion	hectares/hour	0.0004	Water sprays (50%)	50%	No control	0%	kg/ha/hour	0.04	0.02	0.00002	0.00001	0.000001
Wind erosion of borrow pits	Wind erosion	hectares/hour	0.0001	Water sprays (50%)	50%	No control	0%	kg/ha/hour	0.04	0.02	0.000003	0.000002	0.0000003

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.3 Emissions estimates for five turbine construction scenario without controls in the south region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	3967	No control	0%	No control	0%	kg/t/hour	0.0006	0.0003	0.06	0.03	0.005
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	7439	No control	0%	No control	0%	kg/t/hour	0.0009	0.0004	0.12	0.06	0.008
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	496	No control	0%	No control	0%	kg/t/hour	0.0003	0.0001	0.008	0.004	0.0006
Truck dumping	Trucks (dumping overburden)	tonnes/hour	1091	No control	0%	No control	0%	kg/t/hour	0.06	0.02	3.64	1.30	0.20
Graders	Graders	km/hour	65.0	No control	0%	No control	0%	kg/km/hour	10.4	2.87	37.4	10.4	1.56
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hour	3.91	No control	0%	No control	0%	kg/km/hour	0.91	0.26	0.99	0.28	0.042
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hour	2.93	No control	0%	No control	0%	kg/km/hour	11.08	4.51	9.02	3.67	0.55
Dozers	Bulldozer on material other than coal	hour/hour (annual)	0.28	No control	0%	No control	0%	kg/hour/hour	39.0	11.5	0.20	0.06	0.009
Blasting	Blasting	blasts/hour	0.0003	No control	0%	No control	0%	kg/blast/hour	16.1	8.34	0.0003	0.0001	0.00002
Drilling	Drilling	holes/hour	0.05	No control	0%	No control	0%	kg/hole/hour	2.95	1.55	0.007	0.004	0.0006
Wind erosion of cleared land	Wind erosion	hectares/hour	0.002	No control	0%	No control	0%	kg/ha/hour	0.40	0.20	0.0002	0.0001	0.00001
Wind erosion of borrow pits	Wind erosion	hectares/hour	0.0003	No control	0%	No control	0%	kg/ha/hour	0.40	0.20	0.00003	0.00002	0.000003

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.4 Emissions estimates for five turbine construction scenario with controls in the south region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	3967	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.0003	0.0001	0.03	0.02	0.002
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	7439	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.0004	0.0002	0.06	0.03	0.004
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	tonnes/hour	496	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.0001	0.0001	0.004	0.002	0.0003
Truck dumping	Trucks (dumping overburden)	tonnes/hour	1091	Water sprays (50%)	50%	No control	0%	kg/t/hour	0.03	0.01	1.82	0.65	0.10
Graders	Graders	km/hour	65.0	Water sprays (50%)	50%	No control	0%	kg/km/hour	5.2	1.44	18.7	5.2	0.78
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hour	3.91	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hour	0.05	0.01	0.05	0.01	0.002
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hour	2.93	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hour	0.55	0.23	0.45	0.18	0.03
Dozers	Bulldozer on material other than coal	hour/hour (annual)	0.28	Water sprays (50%)	50%	No control	0%	kg/hour/hour	39.0	11.5	0.10	0.03	0.004
Blasting	Blasting	blasts/hour	0.0003	No control	0%	No control	0%	kg/blast/hour	16.1	8.34	0.0003	0.0001	0.00002
Drilling	Drilling	holes/hour	0.05	No control	0%	No control	0%	kg/hole/hour	2.95	1.55	0.007	0.004	0.0006
Wind erosion of cleared land	Wind erosion	hectares/hour	0.002	Water sprays (50%)	50%	No control	0%	kg/ha/hour	0.20	0.10	0.0001	0.00005	0.00001
Wind erosion of borrow pits	Wind erosion	hectares/hour	0.0003	Water sprays (50%)	50%	No control	0%	kg/ha/hour	0.20	0.10	0.00002	0.00001	0.000001

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.5 Emissions estimates for one turbine construction scenario without controls in the north region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	793	No control	0%	No control	0%	kg/t/hr	0.0001	0.00005	0.01	0.006	0.001
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	1488	No control	0%	No control	0%	kg/t/hr	0.0002	0.0001	0.02	0.01	0.002
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	99.2	No control	0%	No control	0%	kg/t/hr	0.0001	0.00003	0.002	0.001	0.0001
Truck dumping	Trucks (dumping overburden)	t/hr	218	No control	0%	No control	0%	kg/t/hr	0.01	0.004	0.73	0.26	0.04
Graders	Graders	km/hr	13.0	No control	0%	No control	0%	kg/km/hr	2.07	0.57	7.48	2.07	0.31
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hr	0.78	No control	0%	No control	0%	kg/km/hr	0.18	0.05	0.20	0.06	0.008
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hr	0.59	No control	0%	No control	0%	kg/km/hr	2.22	0.90	1.80	0.73	0.11
Dozers	Bulldozer on material other than coal	hr/hr (annual)	0.06	No control	0%	No control	0%	kg/hr/hr	7.80	2.30	0.04	0.012	0.002
Blasting	Blasting	blasts/hr	0.0001	No control	0%	No control	0%	kg/blast/hr	3.22	1.67	0.0001	0.00003	0.000004
Drilling	Drilling	holes/hr	0.01	No control	0%	No control	0%	kg/hole/hr	0.59	0.31	0.001	0.001	0.0001
Wind erosion of cleared land	Wind erosion	ha/hr	0.0004	No control	0%	No control	0%	kg/ha/hr	0.08	0.04	0.00004	0.00002	0.000003
Wind erosion of borrow pits	Wind erosion	ha/hr	0.0001	No control	0%	No control	0%	kg/ha/hr	0.08	0.04	0.00001	0.000003	0.000001

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.6 Emissions estimates for one turbine construction scenario with controls in the north region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	793	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.0001	0.00003	0.01	0.003	0.0005
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	1488	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.0001	0.00004	0.01	0.006	0.001
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	99.2	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.00003	0.00001	0.001	0.0004	0.0001
Truck dumping	Trucks (dumping overburden)	t/hr	218	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.01	0.002	0.36	0.13	0.02
Graders	Graders	km/hr	13.0	Water sprays (50%)	50%	No control	0%	kg/km/hr	1.04	0.29	3.74	1.04	0.16
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hr	0.78	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hr	0.01	0.003	0.01	0.003	0.0004
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hr	0.59	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hr	0.11	0.05	0.09	0.04	0.006
Dozers	Bulldozer on material other than coal	hr/hr (annual)	0.06	Water sprays (50%)	50%	No control	0%	kg/hr/hr	7.80	2.30	0.02	0.006	0.001
Blasting	Blasting	blasts/hr	0.0001	No control	0%	No control	0%	kg/blast/hr	3.22	1.67	0.0001	0.00003	0.000004
Drilling	Drilling	holes/hr	0.01	No control	0%	No control	0%	kg/hole/hr	0.59	0.31	0.001	0.001	0.0001
Wind erosion of cleared land	Wind erosion	ha/hr	0.0004	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.04	0.02	0.00002	0.00001	0.000001
Wind erosion of borrow pits	Wind erosion	ha/hr	0.0001	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.04	0.02	0.000003	0.000002	0.0000003

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.7 Emissions estimates for five turbine construction scenario without controls in the north region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	3967	No control	0%	No control	0%	kg/t/hr	0.001	0.0003	0.06	0.03	0.005
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	7439	No control	0%	No control	0%	kg/t/hr	0.001	0.0004	0.12	0.06	0.008
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	496	No control	0%	No control	0%	kg/t/hr	0.0003	0.0001	0.008	0.004	0.0006
Truck dumping	Trucks (dumping overburden)	t/hr	1091	No control	0%	No control	0%	kg/t/hr	0.06	0.02	3.64	1.30	0.20
Graders	Graders	km/hr	65	No control	0%	No control	0%	kg/km/hr	10.4	2.87	37.4	10.4	1.56
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hr	3.91	No control	0%	No control	0%	kg/km/hr	0.91	0.26	0.99	0.28	0.04
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hr	2.93	No control	0%	No control	0%	kg/km/hr	11.1	4.51	9.02	3.67	0.55
Dozers	Bulldozer on material other than coal	hr/hr (annual)	0.28	No control	0%	No control	0%	kg/hour/hr	39.0	11.5	0.20	0.06	0.009
Blasting	Blasting	blasts/hr	0.0003	No control	0%	No control	0%	kg/blast/hr	16.10	8.34	0.0003	0.0001	0.00002
Drilling	Drilling	holes/hr	0.05	No control	0%	No control	0%	kg/hole/hr	2.95	1.55	0.007	0.004	0.0006
Wind erosion of cleared land	Wind erosion	ha/hr	0.002	No control	0%	No control	0%	kg/ha/hr	0.40	0.2	0.0002	0.0001	0.00001
Wind erosion of borrow pits	Wind erosion	ha/hr	0.0003	No control	0%	No control	0%	kg/ha/hr	0.40	0.20	0.00003	0.00002	0.000003

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.8 Emissions estimates for five turbine construction scenario with controls in the north region (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Excavators	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	3967	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.0003	0.0001	0.03	0.02	0.002
Front end loaders	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	7439	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.000	0.0002	0.06	0.03	0.004
Compactors	Excavators/Shovels/Front-end loaders (on overburden)	t/hr	496	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.0001	0.0001	0.004	0.002	0.0003
Truck dumping	Trucks (dumping overburden)	t/hr	1091	Water sprays (50%)	50%	No control	0%	kg/t/hr	0.03	0.01	1.82	0.65	0.10
Graders	Graders	km/hr	65	Water sprays (50%)	50%	No control	0%	kg/km/hr	5.2	1.44	18.7	5.19	0.78
Haulage - Semi tipper	Wheel generated dust from unpaved roads (used by light duty vehicles)	km/hr	3.91	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hr	0.05	0.01	0.05	0.01	0.002
Haulage - 40T Articulated dump truck	Wheel generated dust from unpaved roads at industrial sites	km/hr	2.93	Water sprays (50%)	50%	Water sprays with chemicals	90%	kg/km/hr	0.6	0.23	0.45	0.18	0.03
Dozers	Bulldozer on material other than coal	hr/hr (annual)	0.28	Water sprays (50%)	50%	No control	0%	kg/hour/hr	39.0	11.5	0.10	0.03	0.004
Blasting	Blasting	blasts/hr	0.0003	No control	0%	No control	0%	kg/blast/hr	16.1	8.34	0.0003	0.0001	0.00002
Drilling	Drilling	holes/hr	0.05	No control	0%	No control	0%	kg/hole/hr	2.95	1.55	0.007	0.004	0.0006
Wind erosion of cleared land	Wind erosion	ha/hr	0.002	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.20	0.10	0.0001	0.00005	0.00001
Wind erosion of borrow pits	Wind erosion	ha/hr	0.0003	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.20	0.10	0.00002	0.00001	0.000001

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.9 Emissions estimates for operations scenario without controls (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Wind erosion of cleared land	Wind erosion	ha/hr	0.15	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.40	0.20	0.02	0.008	0.001

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>

Table A.10 Emissions estimates for operations scenario with controls (g/s)

Source	Source type	Units	Activity data	Controls				Emission factors			Emission rate (g/s)		
				Type #1	Control factor	Type #2	Control factor	Units	TSP	PM <sub>10</sub>	TSP	PM <sub>10</sub>	PM <sub>2.5</sub>
Wind erosion of cleared land	Wind erosion	ha/hr	0.15	Water sprays (50%)	50%	No control	0%	kg/ha/hr	0.20	0.10	0.01	0.004	0.0006

Note: Emission factors for PM<sub>2.5</sub> are not included in the table above, as PM<sub>2.5</sub> is taken as a fraction of PM<sub>10</sub>



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