MOOLARBEN COAL PROJECT

Stage 2

APPENDIX 3A

Air Quality Assessment

AIR QUALITY ASSESSMENT:
PROPOSED STAGE 2 OF THE MOOLARBEN COAL PROJECT, NEAR ULAN, NSW

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Prepared for
Moolarben Coal Mines Pty Ltd

by

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1 INTRODUCTION

This report has been prepared by Holmes Air Sciences on behalf of Wells Environmental Services who are preparing an Environmental Assessment for MCM. Its purpose is to assess the issues associated with air quality associated with a proposal by Moolarben Coal Mines Pty Limited (MCM) to develop Stage 2 of the Moolarben Coal Project (MCP) near the village of Ulan and the existing Ulan Coal Mine and Wilpinjong Coal Mines (see **Figure 1**).

Stage 1 of the MCP was approved by the NSW Minister for Planning on 6 September 2007. Stage 1 comprised three open cut mines (Pits 1, 2, and 3), an underground mine (Underground No. 4) with supporting infrastructure including a coal preparation plant.

Stage 2 of the MCP comprises one open cut mine (Pit 4), two underground coal mines (Underground No. 1 and Underground No. 2) with supporting infrastructure that will integrate with the approved Stage 1 infrastructure and coal preparation plant.

Stage 1 and Stage 2 will operate as an integrated mining complex and potentially recover up to 374 million tonnes (Mt) of Run of Mine (ROM) over a 30-year life at a production rate of up to 13 million tonnes per annum (Mtpa) ROM coal from the open cuts and up to 4 Mtpa from the underground mines.

The operation of open cut Pits 1, 2, 3 and Underground No. 4 have been previously assessed (**Holmes Air Sciences, 2006**) and granted project approval. This report considers the impacts associated with the development of Pit 4 and additional underground mining. Since the approved operations will operate concurrently with proposed Pit 4 and additional underground operations, the assessment treats all operations under the control of MCM as a single operation. This means that all air quality effects of both the approved and the proposed MCM operations are considered together. In addition, the assessment examines the effect of the cumulative emissions from the MCM operations and the nearby Ulan and Wilpinjong mines.

The report provides the following:

- a description of the project focussing on aspects relevant for air quality;
- a review of air quality monitoring data undertaken with a view to describing existing air quality conditions and establishing background air quality;
- an analysis of the project and dust emissions inventories for representative stages in the life of the mine;
- a description of the modelling approach used to predict the concentrations of particulate matter (PM) and dust deposition for comparison with ambient air quality assessment criteria;
- a discussion of methods that will be used to control dust and mitigate its impacts; and
- information to satisfy the Director Generals Requirements in relation to “Air Quality”.

Those parts of the assessment dealing with air quality follow the New South Wales Department of Environment and Climate Change (NSW DECC) “*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*” (**DECC, 2005**).

Finally it should be noted that this report is a revision of an earlier report prepared in 2008 In this assessment the level of air quality controls has been upgraded in an attempt to reduce the impacts of the project. Significantly the proponent has committed to chemical treatment of trafficked areas to reduce the quantity of dust generated by traffic. The original assessment assumed 50% control

and the current assessment assumes that the level of control will reduce emissions by 85% compared with an untreated trafficked surface.

2 LOCAL SETTING AND PROJECT DESCRIPTION

Figure 1 shows the lease area and locally significant features. **Figure 2** shows land ownership and the locations of air quality monitoring stations that will be referred to later. The local land use consists of forests (uncleared land), small farms, grazing and some cropping, small mining operations (mining clay, slate and sandstone) and mining at the Ulan open cut and underground mines and at the Wilpingjong open cut mine. Apart from the village of Ulan which supports residences, a school, a hotel and other community facilities, there are a number of isolated rural residences most of which are associated with agricultural enterprises.

The topography is characterised by undulating terrain, which is steep in parts. Cliff-lines and steep sided valleys are prevalent throughout the area. These are mainly associated with small water courses. **Figure 3** shows a pseudo three dimensional plot of the terrain constructed using the data used in the dispersion modelling.

The Ulan mine currently has approval to extract up to 10 Mtpa by a combination of underground and open cut mining. The recently approved Wilpinjong open cut mine, located approximately 15 km to the east, is scheduled to produce approximately 13 Mtpa ROM coal.

3 AIR QUALITY ASSESSMENT CRITERIA

The project will result in the liberation of particulate matter (PM) described as total suspended particulate matter (TSP)[1], particulate matter with equivalent aerodynamic diameters 10 μm or less (PM_{10})[2] and particles with equivalent aerodynamic diameters of 2.5 μm and less ($PM_{2.5}$). These emissions would occur primarily as components of the fugitive dust from mining activities. In addition, there will be emissions from vehicles including carbon monoxide (CO) and minor quantities of sulphur dioxide (SO_2) and nitrogen dioxide (NO_2). These will occur from vehicle exhausts.

In practice emissions of CO, SO_2 and NO_2 from diesel-powered mining equipment are too small and too widely dispersed to give rise to significant off-site concentrations. For this reason these pollutants are not considered further in this report.

3.1 Particulate matter

For the reasons discussed above, the focus of this study is on the potential effects of particulate matter. Particulate matter has the capacity to affect health and to cause nuisance effects.

This section provides information on the air quality criteria used to assess the impact of emissions. The assessment criteria provide benchmarks, which if met, are intended to protect the community against the adverse effects of these pollutants. The criteria are generally considered to reflect current Australian community standards for the protection of health and protection against nuisance effects. To assist in interpreting the significance of predicted concentration and deposition levels some background discussion on the potential harmful effects is provided below.

[1] TSP is particulate matter suspended in the air and is measured using a high volume sampler operated according to AS2724.3-1984. The size range of particles is indeterminate and depends on the measurement conditions. TSP is usually taken to comprise particles in the size range up to 0 to 50 μm. Particles larger than 50 μm are generally too large to remain suspended in the air for long enough to be considered as air pollutants.

[2] A particle is said to have an equivalent aerodynamic diameter of x μm if its dynamical behavior in the atmosphere is the same as a sphere of diameter x and with density 1 g/cm^3.

Particulate matter can be categorised by size and/or by chemical composition. The potential harmful effects depend on both.

The human respiratory system has in-built defensive systems that prevent particles larger than approximately 10 µm from reaching the more sensitive parts of the respiratory system. Particles with equivalent aerodynamic diameters less than 10 µm are referred to as PM_{10}. Particles larger than 10 µm, while not able to affect health, can soil materials and generally degrade aesthetic elements of the environment. For this reason air quality goals make reference to measures of the total mass of all particles suspended in the air. This is referred to as Total Suspended Particulate matter (TSP). In practice particles larger than 30 to 50 µm settle out of the atmosphere too quickly to be regarded as air pollutants. The upper size range for TSP is usually taken to be 30 µm. PM_{10} particles are a sub-component of TSP.

The health-based assessment criteria used by DECC have, to a large extent, been developed by reference to epidemiological studies undertaken in urban areas with large populations where the primary pollutants are the products of combustion. This means that, in contrast to dust of crustal[3] origin, the particulate matter would be composed of smaller particles and would generally contain acidic and carcinogenic substances that are associated with combustion.

Table 1 summarises the air quality goals that are relevant to this study. The air quality goals relate to the total dust burden in the air and not just the dust from the project. In other words, consideration of background dust levels needs to be made when using these goals to assess impacts. This is discussed further in **Section 4**.

Table 1. Air quality standards/goals for particulate matter concentrations

POLLUTANT	STANDARD / GOAL	AVERAGING PERIOD	AGENCY
Total suspended particulate matter (TSP)	90 µg/m^3	Annual mean	NHMRC
Particulate matter < 10 µm (PM_{10})	50 µg/m^3	24-hour maximum	NSW DECC (assessment criteria)
	30 µg/m^3	Annual mean	NSW DECC (long-term reporting goal)
	50 µg/m^3	(24-hour average, 5 exceedances permitted per year)	NEPM

µg/m^3 – micrograms per cubic metre
µm - micrometre

3.2 Dust deposition

In addition to health impacts, airborne dust also has the potential to cause nuisance effects by depositing on surfaces including vegetation/crops. **Table 2** shows the maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective. These criteria for dust fallout levels are set to protect against nuisance impacts (**DECC, 2005**).

[3] The term crustal dust is used to refer to dust generated from materials that constitute the earth's crust.

Table 2. DECC criteria for dust (insoluble solids) fallout

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

4 EXISTING AIR QUALITY

Air quality in and around the proposed mine has been monitored since January 2005 using a network of eight dust deposition monitors operated in accordance with Australian Standard 3580.10.1 and a PM_{10} monitor operated in accordance with Australian Standard 3580.9.6. The locations of the monitoring sites are shown in **Figure 2**.

These monitors measure the existing dust deposition and PM_{10} concentration levels in the air due to emissions from all sources that contribute to dust in the air. These sources would include emissions from existing mining at the Wilpinjong open cut, Ulan open cut and underground mines, and emissions from agricultural and natural emission sources in the area.

The results of the monitoring are discussed below.

4.1 Dust deposition

Table 3 summarises the insoluble solids deposition levels monitored since monitoring commenced in January 2005. Field notes that accompany the monitoring data indicate that many of the samples were contaminated with material such as bird droppings, insects and/or seeds. This is not unusual in rural environments. Those samples affected by bird droppings, insects and seeds have been excluded from the averages of the reported dust deposition. These measurements include all background sources and so samples that are reported to be only affected by dust from farming, grazing, mining or roadway emissions are included in the dust deposition averages.

Table 3. Monitored dust (insoluble solids) deposition levels from the Moolarben monitoring network - g/m^2/month

Date	D1 Bobadeen	D2 Hillview	D3 Oakey Park	D4 Ulan Hotel	D5 Glenmoor	D6 Barcoo	D7 Hillside	D8 Croydon
14-Jan-05	1.5	11.4[a,b,e]	1.8	3.1	1.3	1	4.1	1
12-Feb-05	3.0[a,b,d,e]	20.0[a,b,c]	2.1	21.0[a,b,c,d,e]	2.2	1.8	25.0[a,b,d,e]	2.2
14-Mar-05	4.0[a,b,d]	13.7	3.5[a,e]	2.2	1.6	2	2.0[a,b,e]	6.8[a,e]
15-Apr-05	1.5	1.9	3.0[a,e]	5.1[a,e]	0.7	0.4	1.2	37.0[a,b,e]
16-May-05	0.8	0.8	1.5[a,e]	2.5[a,b,d,e]	0.5	0.6	2.4[b.e]	1
15-Jun-05	1.3	1	1.4	1.6	0.7	0.6	0.7	3.5[b,e]
13-Jul-05	0.4	0.8	3.7	2.1	1.3	1.1	1.1	6.1[a,b,e]
12-Aug-05	2.4	2.8	6.5[a,b]	1.8	2.7	0.5	1.8	3.6[a,b]
15-Sep-05	2.5[a,b,e]	1.1	1.9	2	3.6[a,b]	0.7	0.7	0.5
14-Oct-05	4.1[a,b,e]	2.9	13.6[a,b,e]	1.8	2.9	1	1.9	0.8
Nov-05	-	-	-	-	-	-	-	-
Dec-05	-	-	-	-	-	-	-	--
Year 2005	1.3	3.1	2.2	2.1	1.5	1	1.6	1.1
17-Jan-06	0.8	6.1[a,b]	8.6[a,b]	1	0.7	0.8	3.5	1.3
15-Feb-06	0.2	3.2[a,b,e]	10.1[a,b,e]	1.7	2.9	0.4	1.1	0.4
15-Mar-06	1	4.4[a,b,e]	5.8[a,b,e]	1.5	1.3	1.3	6.6[a,b,e]	1.1
13-Apr-06	1.5[a,b,e]	4.0[b,e]	1.7[b,e]	4.0[b,e]	1.1[a,b,e]	0.7[a,b,e]	0.6[a,b,e]	0.6[a,b,e]
12-May-06	1.2	8.3[a,b,e]	14.4[a,b]	6.1[a,b,c,e]	0.6	1	0.7	4.4[a,b,c,e]
14-Jun-06	1.4	2.4	7.4[a,b]	3.3[a,b,c]	9.7[a,b,c]	3.2[a,b]	2.2	1.5
13-Jul-06	0.4	0.6	2.5	3.7[a,b,e]	2	6.3[a,b]	0.6	0.3
15-Aug-06	0.5	0.7	4.5[a,b,e]	1.1	1.4	0.8	0.6	0.8
15-Sep-06	0.3	0.7	13.3[a,b]	1.2	6.6[a,b]	0.8	1.8	1.1
17-Oct-06	0.3	0.2	5.3[a,b]	0.3	0.5	0.2	0.2	0.3
15-Nov-06	1.9	1.9	3.4[a,b,c,e]	1.2	3.1[a,b]	1	9.2[a,b,c,e]	1.4
14-Dec-06	1.5	0.6	1.2	1.1	[1,2] 4.0[a,b]	0.8	1.1	0.5
Year 2006	0.9	1	1.9	1.1	1.3	0.8	1.3	0.9

Table continues over page

Table 3. Monitored dust (insoluble solids) deposition levels from the Moolarben monitoring network - g/m2/month *continued*

Date	D1 Bobadeen	D2 Hillview	D3 Oakey Park	D4 Ulan Hotel	D5 Glenmoor	D6 Barcoo	D7 Hillside	D8 Croydon
16-Jan-07	1.9	1.8	2.8[a,b,c,e]	10.7[a,b,c,e]	3.6[a,b,c,e]	6.2[a,b,c,e]	2.6	1.5
14-Feb-07	1.9	1.8	4.6[a,b,c]	3.8[a,b,e]	2.6	1.3	1.3	2.5
15-Mar-07	4.3[a,b,c,e]	1.9	8[a,b,c]	3[a,b,e]	1.3	1	3.4[a,b,c,e]	2.7
13-Apr-07	2.2	3.3[a,b]	5[a,b,c]	1.3	9[a,b,c]	0.9	9.9[a,b,c]	1.1
11-May-07	0.9	2.8	2.1	2.7	1	3.2[a,b,e]	1.2	1.6
13-Jun-07	0.3	2 8.6	2 4	0.8	0.6	0.8	0.8	2.3
Jul-07	-	-	-	-	-	-	-	-
Aug-07	-	-	-	-	-	-	-	--
13-Sep-07	1	2	16.5[a,b,e]	0.9	1.5	0.8	1.7	0.8
19-Oct-07	0.2	2.1	6.2[a,b]	1.6	2.1	0.2	0.3	0.5
12-Nov-07	0.7	1.1	51.6[a,b,c]	4.1[a,b]	3.5[a,b,c]	1.4	9.8[a,b,e]	0.9
13-Dec-07	0.9	18.1[a,b,e]	[1,2] 23.5	2.9	1.9	1.7	3.4[a,b,e]	6.7[a,b,e]
Year 2007	1.1	1.9	2.1	1.7	1.6	1	1.3	1.5
16-Jan-08	0.4	13.1[a,b]	28.8[a,b]	5.6[a,b]	2.3	8.1[a,b,e]	8.1[a,b]	1
14-Feb-08	4.4[a,b,c,e]	10.4[a,b,c,e]	29[a,b,c,e]	3.3[a,b,c]	1.1	1.1	33.6[a,b,c,e]	1.5
14-Mar-08	0.5	15.2[b,d,e]	3.8[b,e]	0.7	6.8[b,c]	0.6	8.1[b,c,e]	0.5
11-Apr-08	0.5	24.4[a,c,e]	6.7[a,c,e]	2.3	1.3	0.6	1.4	1.1
16-May-08	1.6	16.9[a,b,c,e]	9.9[a,b,c,e]	2.9	2.1	1.1	1.9	1
Year 2008 up to and including May, excludes contamination by [a,b or c]	0.8	-	-	2	1.7	0.9	1.7	1

Notes:
[a] Insects, [b] Bird dropping, [c] Vegetation seeds [d] Farming, [e] Grazing

The data show that the level of dust deposition in the existing environment is low and in all areas the acceptable increase in annual average dust deposition would be 2 g/m^2/month.

4.2 Particulate matter concentrations (PM_{10})

PM_{10} concentrations for the Moolarben area have been monitored using a High Volume Air Sampler (HVAS), commencing on 28 October 2005. Measurements are made over a 24-hour period, every sixth day. The monitor is located close to Ulan Village (see **Figure 2)**.

The results are presented in **Table 4** and in **Figure 4**. To date 156 observations of 24-hour PM_{10} concentrations are available. Dates when data were missing are shown in the table. The average concentration over all data collected to date has been 16.8 µg/m^3 (up from the 15.6 µg/m^3 that applied in the previous review that considered data up to 8 August 2006) and the maximum 24-hour concentration has been 44.5 µg/m^3 in February, 2008 (up from the 34.3 µg/m^3 recorded up to 8 August 2006). Over the past 12 months (26 October 2007 to 26 October 2008) the annual average PM_{10} concentration has been 14.3 µg/m^3 and the maximum 44.5 µg/m^3. It can be seen from **Figure 4** and from **Table 4** that there are no occasions where the DECC's 24-hour goal of 50 µg/m^3 or annual average goal of 30 µg/m^3 have been exceeded. The recent trend in concentrations has been downward, possibly reflecting better seasonal conditions than in the earlier period.

The monitor obviously records all PM_{10} in the air. The current contributors to PM_{10} are likely to be mining operations at Ulan and to a lesser extent those at Wilpingjong and natural and agricultural activities in the area. The data indicate that current mining operations are not having a significant effect on air quality in Ulan Village.

Table 4. Monitored 24-hour average PM_{10} concentrations

Date	Concentration - µg/m³	Date Continued	Concentration - µg/m³
28-Oct-05	10.1	12-Mar-07	25.7
05-Nov-05	3.8	18-Mar-07	7.3
11-Nov-05	10.0	24-Mar-07	17.5
17-Nov-05	13.2	30-Mar-07	15.8
25-Nov-05	8.6	05-Apr-07	16.5
29-Nov-05	8.6	11-Apr-07	31.0
05-Dec-05	6.4	17-Apr-07	30.5
11-Dec-05	8.8	23-Apr-07	20.4
17-Dec-05	13.5	29-Apr-07	9.0
23-Dec-05	21.5	05-May-07	32.1
29-Dec-05	22.1	11-May-07	18.8
03-Jan-06	16.7	17-May-07	11.4
04-Jan-06	30.5	23-May-07	10.1
10-Jan-06	16.2	29-May-07	19.7
16-Jan-06	9.2	04-Jun-07	11.1
23-Jan-06	14.4	10-Jun-07	8.0
28-Jan-06	9.9	16-Jun-07	4.9
03-Feb-06	16.7	22-Jun-07	5.6
09-Feb-06	No data	28-Jun-07	2.5
15-Feb-06	No data	04-Jul-07	7.0
21-Feb-06	No data	09-Aug-07	14.3
27-Feb-06	No data	15-Aug-07	18.1
05-Mar-06	No data	21-Aug-07	7.2
11-Mar-06	No data	27-Aug-07	10.8
17-Mar-06	No data	02-Sep-07	18.9
23-Mar-06	No data	08-Sep-07	8.3
01-Apr-06	20.4	14-Sep-07	43.8
04-Apr-06	21.8	20-Sep-07	26.8
10-Apr-06	31.1	26-Sep-07	34.9
16-Apr-06	9.8	02-Oct-07	Did not run
22-Apr-06	13.7	05-Oct-07	23.2
28-Apr-06	22.4	08-Oct-07	21.7
04-May-06	16.3	14-Oct-07	13.1
10-May-06	18.7	26-Oct-07	8.1
16-May-06	34.3	01-Nov-07	Invalid sample
22-May-06	20.1	07-Nov-07	6.9
28-May-06	15.9	13-Nov-07	18.2
03-Jun-06	11.2	19-Nov-07	23.0
09-Jun-06	24.9	25-Nov-07	13.3
15-Jun-06	13.5	01-Dec-07	Run time outside units
21-Jun-06	12.7	05-Dec-07	21.1
27-Jun-06	20.1	07-Dec-07	15.8
03-Jul-06	7.6	13-Dec-07	20.9
09-Jul-06	19.7	19-Dec-07	22.4
15-Jul-06	4.6	25-Dec-07	18.1
21-Jul-06	10.3	12-Jan-08	26.9
27-Jul-06	13.7	18-Jan-08	6.8
02-Aug-06	14.3	25-Jan-08	15.3
08-Aug-06	20.9	30-Jan-08	26.2
14-Aug-06	25.3	05-Feb-08	10.3
14-Aug-06	25.3	11-Feb-08	14.7
20-Aug-06	19.6	17-Feb-08	14.8
26-Aug-06	8.0	23-Feb-08	44.5
01-Sep-06	15.9	29-Feb-08	9.5
07-Sep-06	7.6	24-Mar-08	14.3
13-Sep-06	13.2	30-Mar-08	Unit in for servicing
19-Sep-06	25.4	05-Apr-08	Unit in for servicing
25-Sep-06	22.8	11-Apr-08	Unit in for servicing
01-Oct-06	19.8	17-Apr-08	Unit in for servicing
07-Oct-06	32.9	23-Apr-08	Unit in for servicing
13-Oct-06	28.2	29-Apr-08	Unit in for servicing
19-Oct-06	26.0	11-May-08	
25-Oct-06	25.0	17-May-08	10.4
31-Oct-06	36.8	23-May-08	14.4
06-Nov-06	7.8	29-May-08	12.6
12-Nov-06	14.9	29-May-08	12.6
18-Nov-06	17.6	04-Jun-08	3.9
24-Nov-06	37.2	10-Jun-08	8.5

Date	Concentration - µg/m^3	Date Continued	Concentration - µg/m^3
30-Nov-06	33.0	16-Jun-08	12.3
06-Dec-06	24.5	22-Jun-08	7.0
12-Dec-06	23.2	28-Jun-08	Power failure
18-Dec-06	31.5	04-Jul-08	12.3
24-Dec-06	11.3	10-Jul-08	3.9
30-Dec-06	9.2	16-Jul-08	11.4
05-Jan-07	17.3	22-Jul-08	
11-Jan-07	31.1	30-Jul-08	8.6
17-Jan-07	27.5	03-Aug-08	5.6
23-Jan-07	20.3	09-Aug-08	
29-Jan-07	22.8	15-Aug-08	
01-Feb-07	15.4	21-Aug-08	15.3
04-Feb-07	32.4	27-Aug-08	14.1
10-Feb-07	14.0	02-Sep-08	8.0
18-Feb-07	15.4	08-Sep-08	8.3
22-Feb-07	25.5	14-Sep-08	1.0
28-Feb-07	16.6	20-Sep-08	21.0
28-Feb-07	16.6	26-Sep-08	10.6
01-Mar-07	16.6	02-Oct-08	22.6
06-Mar-07	12.7	08-Oct-08	6.7

5 CLIMATE AND METEOROLOGY

Meteorological data for the area are available from several sources. Relevant information is reviewed below. The most important data from the point of view of dust impact assessment is data on wind speed and wind direction and consequently most attention has been paid to this information.

5.1 Wind speed and direction

Wind data are currently being collected from two sites (WS 1 (Ulan Village) and WS 2 (Rayner) as shown on **Figure 2**). Data from WS 1 is available for the whole of 2005 and this year has the best data capture rate and so has been used for the assessment.

Annual and seasonal wind roses prepared from these data are shown in **Figure 5**. It can be seen that over the year, the most common winds for the area are generally from the east-southeast, east and southwest. This pattern is reflective of the summer and autumn conditions. During the spring, winds from the northeast clockwise to the east-southeast are the most common. These winds are also present during the winter however; winds from the south western quadrant are more frequent.

The percentage of calms (winds less than 0.5 m/s) over the year is 8.8%.

It is interesting to review the wind rose patterns for the two weather station sites over the same period to see how they compare. The wind rose pattern for the Ulan (WS 1) 2006/2007 is presented in **Figure 6** and wind roses for the Rayner weather station (WS 2) for 2006/2007 are presented in **Figure 7**. It can be seen when comparing **Figure 6** and **Figure 7** that similar patterns are presented, with the majority of winds derived from the eastern and western quadrants. However, winds at the Ulan site experience a much greater percentage of calms (31.5%) compared to that of the Rayner site (14.6%) and the 8.8% measured at Ulan in 2005. Equipment problems at the Ulan station during 2006/2007 have been identified as the cause of the elevated calm periods measured during this period. The Rayner site presents a similar pattern to the Ulan data from 2005 (as shown in **Figure 5**).

To use the wind data to assess dispersion, it is necessary to also have data on atmospheric stability. **Table 5** shows the frequency of occurrence of the stability categories expected in the area. The most common stability occurrences were calculated to be the classes D (35.2%) and E (21.2%).

Joint wind speed, wind direction and stability class frequency tables for the two sites are presented in **Appendix A**.

Table 5. Frequency of occurrence of stability classes

Stability Class	Ulan (WS 1) - 2005	Ulan (WS 1) – 2006/2007	Rayner (WS 2) – 2006/2007
A	3.4	19.6	20.8
B	8.4	6.0	7.1
C	10.8	11.4	8.5
D	35.2	26.4	13.7
E	21.2	12.5	7.2
F	21.0	23.9	42.7
Total	100	100	100

5.2 Local Climatic Conditions

The Bureau of Meteorology also collects climatic information in the vicinity of the study area. A range of climatic information collected from Gulgong Post Office (located approximately 30 km to the southwest of the Project) is presented in **Table 6** (**Bureau of Meteorology, 2008**). Temperature and humidity data consist of monthly averages of 9 am and 3 pm readings. Also presented are monthly averages of maximum and minimum temperatures. Rainfall data consist of mean and median monthly rainfall and the average number of rain days per month.

5.3 Temperature, humidity and rainfall

The Bureau of Meteorology records climatic information at Gulgong located approximately 30 km to the south west of the study area. The data consists of temperature and humidity collected over 38 years, and rainfall over 127 years. Gulgong is at an elevation of 475 m and Ulan Village at 420 m above sea-level. The 55 m difference in elevation would be expected to have a minor effect on temperature, humidity and rainfall but the data are less likely to be affected by local factors than the wind data and have been used to describe conditions at the mine site. The data are presented in **Table 6**.

The temperature data show that January is on average the warmest month with a mean maximum of 30.9 ^{o}C and mean minimum of 16.6 ^{o}C. July is the coolest month with an average maximum of 14.6 ^{o}C and mean minimum of 2.6 ^{o}C.

The annual average relative humidity reading is made at 9 am and 3 pm at the Gulgong site. It can be seen that relative humidity is greatest in June and July when it is 84%, and lowest in October and December when it is 61%. The 3 pm relative humidity is greatest in June when it is 57%, and lowest in December when it is 36%.

Mean annual rainfall for the Gulgong site is 649 mm and the mean number of raindays (days when rainfall was at least 0.25 mm) is 73. January is the wettest month with a rainfall average of 70.7 mm.

Table 6. Temperature, Humidity and Rainfall Data Gulgong

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
9 am Mean Dry-bulb and Wet-bulb Temperatures (ºC) and Relative Humidity (%)													
Dry-bulb	21.6	20.6	19.0	15.9	11.3	7.6	6.7	8.5	12.6	16.5	18.2	20.8	14.9
Wet-bulb	17.2	17.1	15.5	12.9	9.7	6.5	5.5	6.8	9.8	12.5	14.2	16.2	12.0
Humidity	64	70	71	70	79	84	84	77	70	61	64	61	71
3 pm Mean Dry-bulb and Wet-bulb Temperatures (ºC) and Relative Humidity (%)													
Dry-bulb	29.4	28.4	26.2	22.3	18.0	14.3	13.5	15.3	18.4	22.0	25.0	28.2	21.8
Wet-bulb	19.5	19.6	17.8	15.0	12.7	10.1	9.2	10.1	12.1	14.3	16.3	18.1	14.6
Humidity	38	41	41	42	50	57	55	46	45	40	40	36	44
Daily Maximum Temperature (ºC)													
Mean	30.9	29.8	27.4	23.5	19.0	15.4	14.6	16.4	19.5	23.4	26.5	29.7	23.0
Daily Minimum Temperature (ºC)													
Mean	16.6	16.2	13.6	9.8	6.4	3.4	2.6	3.4	6.1	9.2	12.0	14.9	9.5
Rainfall (mm)													
Mean	70.7	61.9	54.3	44.4	45.4	51.2	49.1	46.4	46.1	56.3	59	64.8	649.4
Raindays (Number)													
Mean	5.9	5.2	5.1	4.5	5.6	7.2	7.4	6.8	6.6	6.6	6.2	6.1	73.2
Station number 062013; Commenced: 1881, Last record: 2008; Latitude (deg S): -32.3634; Longitude (deg E): 149.5329 Source: Bureau of Meteorology (2008)													

6 APPROACH TO ASSESSMENT

6.1 Overview

In August 2005, the DECC published new guidelines for the assessment of air pollution sources using dispersion models (**DECC, 2005**). The guidelines specify how assessments based on the use of air dispersion models should be undertaken. This includes guidelines for the preparation of meteorological data to be used in dispersion models, the way in which emissions should be estimated and the relevant air quality criteria for assessing the significance of predicted concentration and deposition rates from the proposal. The approach taken in this assessment follows as closely as possible the approaches suggested by the guidelines.

This section is provided so that technical reviewers can appreciate how the modelling of different particle size categories was carried out.

The model used was a modified version of the US EPA ISC model (see later). The ISC model is fully described in the user manual and the accompanying technical description (**US EPA, 1995**). The modelling has been based on the use of three particle-size categories (0 to 2.5 µm - referred to as $PM_{2.5}$ FP (fine particulate matter), 2.5 to 10 µm - referred to as CM (coarse matter) and 10 to 30 µm - referred to as the Rest). Emission rates of TSP have been calculated using emission factors derived from information provided by the **US EPA (1985)** and **NERDDC (1988)** (see **Appendix B**).

The distribution of particles has been derived from measurements in the **SPCC (1986)** study. The distribution of particles in each particle size range is as follows:

- $PM_{2.5}$ (FP) is 4.68% of the TSP;
- $PM_{2.5\text{-}10}$ (CM) is 34.4% of TSP; and
- $PM_{10\text{-}30}$ (Rest) is 60.9% of TSP.

Modelling was done using three ISC source groups. Each group corresponded to a particle size category. Each source in the group was assumed to emit at the full TSP emission rate and to deposit from the plume in accordance with the deposition rate appropriate for particles with an aerodynamic diameter equal to the geometric mean of the limits of the particle size range, except for the $PM_{2.5}$ group, which was assumed to have a particle size of 1 µm. The predicted concentration in the three plot output files for each group were then combined according to the weightings above to determine the concentration of PM_{10} and TSP.

The ISC model also has the capacity to take into account dust emissions that vary in time, or with meteorological conditions. This has proved particularly useful for simulating emissions on mining or quarry operations where wind speed is an important factor in determining the rate at which dust is generated.

For the current study, the operations were represented by a series of volume sources located according to the location of activities for the modelled scenario. The location of the modelled dust sources for each of the scenarios modelled are presented in **Figure 8** to **Figure 12**. Estimates of emissions for each source were developed on an hourly time step taking into account the activities that would take place at that location. Thus, for each source, for each hour, an emission rate was determined which is dependent upon the level of activity and the wind speed. It is important to do this in the ISC model to ensure that long-term average emission rates are not combined with worst-case dispersion conditions which are associated with light winds. Light winds at a mine site would correspond with periods of low dust generation (because wind erosion and other wind dependent

emissions rates will be low) Light winds also correspond with periods of poor dispersion. If these measures are not taken then the model has the potential to significantly overstate impacts.

Dust concentrations and deposition rates have been predicted over the area shown in **Figure 13**. While local terrain has been included in the modelling, the terrain on site is extremely complex. Pit 4 is isolated from residences to the north and west by a steep, heavily-wooded ridge. Dust modelling does not take into account the protection that this ridge and the dense woodland would provide to these locations. Therefore the modelling is considered to be conservative for receptors to the west of the mine at least as far as emissions from Pit 4 are concerned.

The modelling has been performed using the meteorological data discussed in **Section 5.1** and the dust emission estimates from **Section 7**. Dust emissions from wind erosion sources have been modelled for 24 hours per day in all modelling scenarios. Model predictions have been made at a number of discrete receptors positioned across the area shown in **Figure 13** including residential locations, located in the study area. The location of these receptors has been chosen to provide finer resolution closer to the dust sources and nearby receptors.

The ISC model input files will be provided in electronic form on request. An example file is provided in **Appendix C**.

6.2 Prediction of 24-hour PM_{10} concentrations

It has been apparent for a number of years that the ISC model has a tendency to overestimate 24-hour PM_{10} concentrations, while still predicting the longer term average concentrations reasonably accurately. In recent years the DECC have permitted the use of a calibration factor to correct for the tendency of ISC to over-predict 24-hour average PM_{10} concentrations. In most instances, the DECC has required site-specific calibration factor be developed from local modelling and monitoring results.

To overcome this difficultly, and avoid the need to undertake calibration studies, the ISC model has been modified to create a model that improves the performance of ISC with respect to the predicted 24-hour average PM_{10} concentrations. This model is known as ISCMOD. ISCMOD is identical to ISC except that the horizontal plume spreading dispersion curves have been modified to adopt the recommendations of the American Meteorological Society's (AMS) expert panel on dispersion curves (**Hanna, 1977**) and the suggestions made by **Arya (1999)**. The suggested changes were recommended because, as the AMS panel notes, the original horizontal dispersion curves relate to an averaging time of three minutes and they recommend that these be adjusted to the one hour curves required by ISC. The change involves increasing the horizontal plume widths by a factor of 1.82 (60 minutes / 3 minute)$^{0.2}$.

A similar adjustment has been applied to account for the local surface roughness being different at Moolarben compared with the site where the original curves were developed. Moolarben has been taken to have a surface roughness of 0.3 m compared with 0.03 m for the original curves. The adjustment leads to an increase in the horizontal and vertical curves by a factor of (0.3 m/ 0.03 m)$^{0.2}$ namely 1.6.

7 ESTIMATED DUST EMISSIONS

Total dust emissions due to the proposed mine have been estimated by analysing the activities taking place at the site during selected years of operation.

The operations which apply in each case have been combined with emission factors developed, both locally and by the US EPA, to estimate the amount of dust produced by each activity. There have been significant revisions to the US EPA emission factors for mining operations in 2003. The emission factors applied are considered to be the most up to date methods for determining dust generation rates. The fraction of TSP in each of three size ranges for each activity has been estimated and used in the dispersion modelling.

The assessment has considered six selected years during the proposed mining (Year 2, 7, 12, 16, 19 and 24). These cover impacts arising for a range of production levels (including overburden production). The operational description for the project has been used to determine haul road distances and routes, stockpile and pit areas, activity operating hours, truck sizes and other details that are necessary to estimate dust emissions for each year of assessment. These differ from the quantities that applied in the Stage 1 environmental assessment although the overall differences are small.

The most significant dust generating activities from the proposed operations have been identified and the dust emission estimates during the six years are summarised in **Table 7**.

Details of the calculations of the dust emissions are presented in **Appendix B**. The estimated emissions take account of proposed air pollution controls including passive controls such as those inbuilt into the mine plan, e.g. stockpile size and alignment, length of haul roads and active controls, which would include the intensity of watering and chemical treatment of trafficked area and extent of rehabilitation.

It should be noted that emissions derived from the open cut mining operations at Pit 3 for Years 12, 16, 19 and 24 have been estimated as the amount of TSP generated per tonne of ROM coal mined for each respective year.

Table 7. Estimated dust emissions due to proposed mining operations

ACTIVITY	Year 2	Year 7	Year 12	Year 16	Year 19	Year 24
OB - Stripping topsoil - Pit 1	80	-	-	-	-	-
OB - Stripping topsoil - Pit 2	-	80	-	-	-	-
OB - Stripping topsoil - Pit 3	-	-	-	-	-	-
OB - Stripping topsoil - Pit 4	80	80	560	560	560	560
OB - Drilling - Pit 1	1,628	-	-	-	-	-
OB - Drilling - Pit 2	-	3,328	-	-	-	-
OB - Drilling - Pit 3	-	-	-	-	-	-
OB - Drilling - Pit 4	1,628	3,328	6,584	8,284	8,284	14,302
OB - Blasting - Pit 1	8,811	-	-	-	-	-
OB - Blasting - Pit 2	-	25,189	-	-	-	-
OB - Blasting - Pit 3	-	-	-	-	-	-
OB - Blasting - Pit 4	8,811	25,189	70,862	99,351	99,351	171,458
OB - Sh/Ex/FELs loading - Pit 1	55,997	-	-	-	-	-
OB - Sh/Ex/FELs loading - Pit 2						
OB - Sh/Ex/FELs loading - Pit 3						
OB - Sh/Ex/FELs loading - Pit 4	55,997	111,993	223,986	335,979	279,983	233,646
OB - Hauling to emplacement - Pit 1	100,200	-	-	-	-	-
OB - Hauling to emplacement - Pit 2	-	200,400	-	-	-	-
OB - Hauling to emplacement - Pit 3	-	-	-	-	-	-
OB - Hauling to emplacement - Pit 4	100,200	200,400	400,800	601,200	501,000	1,045,215
OB - Emplacing at dumps - Pit 1	55,997	-	-	-	-	-

ACTIVITY	Year 2	Year 7	Year 12	Year 16	Year 19	Year 24
OB - Emplacing at dumps - Pit 2	-	111,993	-	-	-	-
OB - Emplacing at dumps - Pit 3	-	-	-	-	-	-
OB - Emplacing at dumps - Pit 4	55,997	111,993	223,986	335,979	279,983	233,646
OB - Dozers on O/B - Pit 1	167,353	-	-	-	-	-
OB - Dozers on O/B - Pit 2	-	334,707	-	-	-	-
OB - Dozers on O/B - Pit 3	-	-	-	-	-	-
OB - Dozers on O/B - Pit 4	167,353	334,707	836,767	836,767	836,767	836,767
OB - Dozers on Rehabilitation - Pit 1	41,838	-	-	-	-	-
OB - Dozers on Rehabilitation - Pit 2	-	83,677	-	-	-	-
OB - Dozers on Rehabilitation - Pit 3	-	-	-	-	-	-
OB - Dozers on Rehabilitation - Pit 4	41,838	83,677	167,353	167,353	167,353	167,353
CL - Drilling - Pit 1	-	-	-	-	-	-
CL - Drilling - Pit 2	-	1,876	-	-	-	-
CL - Drilling - Pit 3	-	-	-	-	-	-
CL - Drilling - Pit 4	-	1,876	7,009	7,009	7,009	7,009
CL - Blasting - Pit 1	-	-	-	-	-	-
CL - Blasting - Pit 2	-	10,411	-	-	-	-
CL - Blasting - Pit 3	-	-	-	-	-	-
CL - Blasting - Pit 4	-	10,411	26,268	26,268	26,268	9,268
CL - Dozers ripping - Pit 1	49,974	-	-	-	-	-
CL - Dozers ripping - Pit 2	-	99,948	-	-	-	-
CL - Dozers ripping - Pit 3	-	-	-	-	-	-
CL - Dozers ripping - Pit 4	49,974	99,948	99,948	199,895	199,895	199,895
CL - Loading ROM to trucks -Pit 1	472,873	1,882	-	-	-	-
CL - Loading ROM to trucks -Pit 2	-	53,512	-	-	-	-
CL - Loading ROM to trucks -Pit 3	-	-	-	-	-	-
CL - Loading ROM to trucks -Pit 4	270,213	270,213	810,639	810,639	810,639	633,918
CL - Loading ROM to trucks -UG1	-	212,593	204,939	-	-	-
CL - Loading ROM to trucks -UG2	-	-	-	149,482	-	-
CL - Loading ROM to trucks -UG3	-	-	-	-	236,435	270,213
CL - Hauling ROM coal to dump hopper - Pit 1	133,000	529	-	-	-	-
CL - Hauling ROM coal to dump hopper - Pit 2	-	28,121	-	-	-	-
CL - Hauling ROM coal to dump hopper - Pit 3	-	-	58,000	58,000	58,000	58,000
CL - Hauling ROM coal to dump hopper - Pit 4	178,000	142,000	474,000	222,000	396,000	234,599
CL - Hauling ROM coal to dump hopper - UG 1	-	-	48,540	-	-	-
CL - Hauling ROM coal to dump hopper - UG 2	-	-	-	35,405	-	-
CL - Hauling ROM coal to dump hopper - UG 3	-	-	-	-	-	-
CL - unloading ROM coal at stockpile/hopper Pit 1	472,873	1,882	-	-	-	-
CL - unloading ROM coal at stockpile/hopper Pit 2	-	53,512	-	-	-	-
CL - unloading ROM coal at stockpile/hopper Pit 3	-	-	67,553	67,553	67,553	-
CL - unloading ROM coal at stockpile/hopper Pit 4	270,213	270,213	810,639	810,639	810,639	633,918
CL - unloading ROM coal at stockpile/hopper UG 1	-	212,593	204,939	-	-	-
CL - unloading ROM coal at stockpile/hopper UG 2	-	-	-	149,482	-	-
CL - unloading ROM coal at stockpile/hopper UG 3	-	-	-	-	236,435	270,213
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)	-	-	206,164	235,674	226,341	-
CL - Rehandle ROM coal at stockpilepile/hopper	148,617	107,640	230,137	219,046	236,436	194,337
CL - Handling coal at CHPP	39,613	28,691	61,342	58,385	63,021	51,799
CL - Dozers at CHPP	305,872	382,340	499,738	499,738	499,738	499,738
CL - Loading rejects (too wet)	-	-	-	-	-	-
CL - Transporting rejects (nominal) back to Pit 1	25,200	100	-	-	-	-
CL - Transporting rejects (nominal) back to Pit 2	-	5,624	-	-	-	-
CL - Transporting rejects (nominal) back to Pit 3	-	-	58,000	58,000	58,000	-
CL - Transporting rejects (nominal) back to Pit 4	35,600	28,400	94,800	44,400	79,200	46,920
CL - Transporting rejects (nominal) back to UG1	-	-	9,708	-	-	-
CL - Transporting rejects (nominal) back to UG2	-	-	-	7,081	-	-
CL - Transporting rejects (nominal) back to UG3	-	-	-	-	-	-
CL - Unloading rejects (too wet)	-	-	-	-	-	-
CL - Loading product coal stockpile	3,229	2,339	4,707	4,466	4,844	4,223
CL - Loading coal to trains	3,229	2,339	4,707	4,466	4,844	4,223
WE - OB spoil area - All pits	632,957	646,836	1,112,093	1,283,179	1,655,761	1,939,345
WE - Open pit - All pits	327,142	111,643	287,874	174,403	201,371	201,371
WE - ROM stockpiles	7,786	7,786	7,786	7,786	7,781	7,781
WE - Product stockpiles	12,457	12,457	12,457	12,457	12,450	12,450
Grading roads	73,856	98,475	123,093	123,093	123,093	123,093
TOTAL for Mololarben Mine	**4,376,887**	**4,537,328**	**7,455,979**	**7,654,020**	**8,195,034**	**8,105,262**
Wilpinjong Yr 9 - Wi	3,479,119	3,642,525	3,223,557	3,323,556	3,323,556	-
Wilpinjong Yr 9 - Ws	641,641	671,777	594,508	612,951	612,951	-
Wilpinjong Yr 9 - We	632,135	661,825	585,701	603,870	603,870	-
Ulan UG - Wi	147,228	147,228	147,228	147,228	147,228	-
Ulan UG - Ws	27,153	27,153	27,153	27,153	27,153	-
Ulan UG - We	26,750	26,750	26,750	26,750	26,750	-
Ulan OC - Wi	2,859,308	2,859,308	2,859,308	2,859,308	2,859,308	-

ACTIVITY	Year 2	Year 7	Year 12	Year 16	Year 19	Year 24
Ulan OC - Ws	527,331	527,331	527,331	527,331	527,331	-
Ulan OC - We	519,519	519,519	519,519	519,519	519,519	-
ROM coal production	11,000,000	12,000,000	13,000,000	13000000	13000000	14,383,976
ROM Ratio – kg of TSP to tonnes of ROM coal for Moolarben	0.40	0.38	0.57	0.59	0.63	0.56

Key: OB= Operations on overburden, CL = Operations on coal, WI = Dust not sensitive to wind, WS = Dust sensitive to wind, WE = Dust due to wind erosion, UG = Underground mining operations, OC = Open cut mining operations

8 ASSESSMENT OF IMPACTS

8.1 Introduction

Dispersion model simulations have been undertaken for Year 2, Year 7, Year 12, Year 16, Year 19 and Year 24 operations. This section provides an interpretation of the predicted contours of dust concentration (PM_{10}, and TSP) and dust deposition produced by these simulations.

Contours have been provided showing the predicted effects of Moolarben considered in isolation and the predicted effects of Moolarben considered with other neighbouring mines (including an allowance for non-mining sources of dust). Isopleth diagrams showing the following have been produced for each of the six scenarios:

- The predicted maximum 24-hour average PM_{10} concentration for Moolarben alone;
- The predicted annual average PM_{10} concentration for Moolarben;
- The predicted annual average PM_{10} concentration for Moolarben with other sources of PM;
- The predicted annual average TSP concentration for Moolarben;
- The predicted annual average TSP concentration for Moolarben with other sources of PM;
- The predicted annual average dust deposition for Moolarben; and
- The predicted annual average dust deposition for Moolarben with other sources of PM.

The following sections provide details on the affected residences and at what stage the effects are predicted to occur.

8.2 Assessment Locations

Rather than provide a detailed discussion of each isopleth figure, the results have been summarised in tabular form for each scenario. Those that are predicted to experience particulate matter deposition or concentration levels above the NSW DECC's assessment criteria are shown with highlighted text.

The contour plots of dust concentrations and deposition levels show the areas of land that are affected by dust at different levels. However, concentration and deposition levels at residences are of particular interest. The locations of neighbouring residences are shown in **Figure 2**.

8.3 Assessment Criteria

The air quality criteria used for deciding which properties are likely to experience air quality impacts are those specified in the NSW DECC's modelling guidelines (see **Section 3**).

The criteria are:

- 50 $\mu g/m^3$ for 24-hour average PM_{10} for Moolarben considered alone;
- 30 $\mu g/m^3$ for annual average PM_{10} due to Moolarben and other sources;

- 90 µg/m^3 for annual average TSP concentrations due to Moolarben alone and the Project and other sources;
- 2 g/m^2/month for annual average deposition (insoluble solids) due to Moolarben considered alone; and
- 4 g/m^2/month for annual average predicted cumulative deposition (insoluble solids) due to Moolarben and other sources.

8.4 Year 2

In Year 2 mining will be occurring in the approved Pit 1 and Pit 4 of the project area. Pit 4 will be advancing to the north and waste emplacement will be occurring in the southern out-of-pit emplacement area and in-pit.

Figure 13 to **Figure 19** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 2 operations, showing the effects of Moolarben by itself and the Project in combination with other sources.

While the figures are a useful way of showing the effects of the project, tabular summaries are a more useful way of determining whether a particular residence is predicted to experience a concentration or deposition above the relevant assessment criterion.

Table 8 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 2, the following exceedances are identified.

- 24-hour average PM_{10} above 50 µg/m^3 due to the Project considered in isolation – six receptors (one private receptor and five owned by mining companies);
- Annual average PM_{10} above 30 µg/m^3 due to the Project and other mines and other sources – one receptor (no private receptors and one owned by mining companies);
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – no receptors;
- Annual average TSP above 90µg/m^3 due to the Project and other mines and other sources – no receptors affected; and
- Annual average dust deposition above 4g/m^2/month/ due to the Project and other mines and other sources – no receptors affected.

Table 8. Summary of predicted air quality impacts for Year 2

			Year 2 - Project alone				Year 2 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	20	4	6	0.3	**NA**	19	48	1.9
765265	6431931	11	17	2	2	0.1	**NA**	16	42	1.6
758370	6421350	20	30	3	5	0.2	**NA**	18	46	1.8
757342	6421298	22	31	3	4	0.2	**NA**	18	45	1.8
757110	6421102	23	28	3	4	0.2	**NA**	18	45	1.8
758484	6423794	25	**60**	7	13	0.7	**NA**	23	55	2.3
757430	6423741	26	41	5	9	0.4	**NA**	21	50	2.1
763756	6415963	29A	12	1	1	0.0	**NA**	15	42	1.7
762840	6415591	29B	8	1	1	0.0	**NA**	15	41	1.6
761168	6415971	29	9	1	1	0.0	**NA**	15	41	1.6
758435	6416631	30	9	1	1	0.0	**NA**	14	40	1.6
760008	6416123	31	9	1	1	0.0	**NA**	14	40	1.6
763590	6413194	32	6	0	1	0.0	**NA**	14	40	1.6
759021	6414840	35	6	1	1	0.0	**NA**	14	39	1.6
760388	6416975	36	12	1	2	0.1	**NA**	15	41	1.7
756179	6417106	37	9	1	1	0.0	**NA**	14	40	1.6
756389	6416414	40	8	1	1	0.0	**NA**	14	40	1.6
756863	6421212	41A	30	3	4	0.2	**NA**	18	44	1.8
756194	6415791	41B	7	1	1	0.0	**NA**	14	39	1.6
760283	6413728	47	6	0	1	0.0	**NA**	14	39	1.6
765574	6412269	48	7	0	0	0.0	**NA**	14	40	1.6
765368	6411935	48	7	0	0	0.0	**NA**	14	40	1.6
756926	6419919	58	18	2	3	0.1	**NA**	16	43	1.7
756886	6419210	59	14	1	2	0.1	**NA**	16	42	1.7
756500	6418546	60	12	1	2	0.1	**NA**	15	41	1.6
756375	6418755	61	13	1	2	0.1	**NA**	15	41	1.6
756497	6420922	63	27	2	4	0.1	**NA**	17	44	1.7
756262	6420946	64	28	2	3	0.1	**NA**	17	44	1.7
767049	6414413	68	12	1	1	0.0	**NA**	17	43	1.7
756132	6420692	70	26	2	3	0.1	**NA**	17	43	1.7
756021	6420067	74	21	2	3	0.1	**NA**	16	43	1.7
756012	6419777	75	19	2	2	0.1	**NA**	16	42	1.7
755920	6419546	76	18	2	2	0.1	**NA**	16	42	1.7
756357	6419434	77	16	2	2	0.1	**NA**	16	42	1.7
755750	6419149	78	15	1	2	0.1	**NA**	15	41	1.7
756034	6419159	79	15	1	2	0.1	**NA**	15	42	1.7
755649	6418908	80	14	1	2	0.1	**NA**	15	41	1.6
756219	6418906	81	14	1	2	0.1	**NA**	15	41	1.6
756223	6418659	82	12	1	2	0.1	**NA**	15	41	1.6
755832	6418444	83	12	1	1	0.1	**NA**	15	41	1.6
756047	6418248	84	11	1	1	0.0	**NA**	15	41	1.6
755506	6417818	86	10	1	1	0.0	**NA**	14	40	1.6
755841	6418051	87	10	1	1	0.0	**NA**	15	40	1.6
756043	6417723	88	10	1	1	0.0	**NA**	14	40	1.6
755431	6417645	89	9	1	1	0.0	**NA**	14	40	1.6
755337	6417501	90	9	1	1	0.0	**NA**	14	40	1.6
755969	6417348	91	9	1	1	0.0	**NA**	14	40	1.6
754900	6416785	94	8	1	1	0.0	**NA**	14	40	1.6
755085	6416834	95	8	1	1	0.0	**NA**	14	40	1.6
755183	6416867	96	8	1	1	0.0	**NA**	14	40	1.6
755364	6416985	97	8	1	1	0.0	**NA**	14	40	1.6
755440	6416783	98	8	1	1	0.0	**NA**	14	40	1.6
755603	6416770	99	8	1	1	0.0	**NA**	14	40	1.6
755992	6416832	100	8	1	1	0.0	**NA**	14	40	1.6
755850	6416237	101	7	1	1	0.0	**NA**	14	39	1.6
755969	6416452	101	8	1	1	0.0	**NA**	14	40	1.6
755530	6416189	102	7	1	1	0.0	**NA**	14	39	1.6
755072	6416398	103	7	1	1	0.0	**NA**	14	39	1.6
755112	6416116	104	7	1	1	0.0	**NA**	14	39	1.6
755061	6416033	105	7	1	1	0.0	**NA**	14	39	1.6
755558	6415823	106	7	1	1	0.0	**NA**	14	39	1.6
755752	6415919	107	7	1	1	0.0	**NA**	14	39	1.6
755410	6415494	109	7	1	1	0.0	**NA**	14	39	1.6
755361	6415339	110	7	1	1	0.0	**NA**	14	39	1.6

			Year 2 - Project alone				Year 2 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
Averaging period			**24-hr**	**Annual**	**Annual**	**Annual**	**24-hr**	**Annual**	**Annual**	**Annual**
MGA coordinates (Zone 55)			***Impact assessment criteria***							
Easting (m)	**Northing (m)**	**ID**	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755052	6415789	111	7	1	1	0.0	**NA**	14	39	1.6
755138	6415655	112	7	1	1	0.0	**NA**	14	39	1.6
755269	6415660	113	7	1	1	0.0	**NA**	14	39	1.6
767545	6414629	136	12	1	1	0.0	**NA**	18	44	1.7
771960	6415964	137	8	0	1	0.0	**NA**	23	53	2.1
769659	6414795	138	12	1	1	0.0	**NA**	20	47	1.8
769645	6414405	143	11	0	1	0.0	**NA**	18	45	1.7
770276	6413737	146	11	0	1	0.0	**NA**	16	42	1.6
757984	6425038	151	35	8	15	0.8	**NA**	25	58	2.5
758351	6425038	160A	36	8	16	0.8	**NA**	25	59	2.5
758339	6425214	162	35	8	15	0.8	**NA**	25	58	2.5
758371	6425110	168	35	8	16	0.8	**NA**	25	59	2.5
756662	6423986	169	27	4	7	0.3	**NA**	20	49	2.0
755557	6421185	170	30	2	3	0.1	**NA**	17	44	1.7
753898	6414840	171	6	0	1	0.0	**NA**	13	39	1.5
756058	6420779	172	27	2	3	0.1	**NA**	17	43	1.7
755624	6420844	175	28	2	3	0.1	**NA**	17	43	1.7
755585	6420625	176	26	2	3	0.1	**NA**	17	43	1.7
755530	6420496	177	24	2	3	0.1	**NA**	16	43	1.7
755292	6420111	180	22	2	2	0.1	**NA**	16	42	1.7
755178	6420092	181	21	2	2	0.1	**NA**	16	42	1.7
755049	6420016	182	21	2	2	0.1	**NA**	16	42	1.7
754822	6419969	183	20	2	2	0.1	**NA**	16	42	1.7
755093	6419504	184	18	1	2	0.1	**NA**	16	42	1.7
754967	6419464	185	17	1	2	0.1	**NA**	15	42	1.7
754674	6419437	186	17	1	2	0.1	**NA**	15	41	1.6
754816	6419137	187	15	1	2	0.1	**NA**	15	41	1.6
754577	6419073	188	15	1	2	0.1	**NA**	15	41	1.6
754772	6418881	189	14	1	2	0.1	**NA**	15	41	1.6
754488	6418711	190	13	1	1	0.1	**NA**	15	41	1.6
754592	6418520	191	12	1	1	0.0	**NA**	15	41	1.6
754649	6418328	192	11	1	1	0.0	**NA**	15	40	1.6
754160	6418080	194	10	1	1	0.0	**NA**	14	40	1.6
754583	6417973	195	10	1	1	0.0	**NA**	14	40	1.6
754072	6417840	196	10	1	1	0.0	**NA**	14	40	1.6
754141	6417241	200	8	1	1	0.0	**NA**	14	40	1.6
754138	6417158	201	8	1	1	0.0	**NA**	14	40	1.6
754311	6416962	201	8	1	1	0.0	**NA**	14	40	1.6
754258	6416804	202	8	1	1	0.0	NA	14	40	1.6
754462	6416639	203	8	1	1	0.0	NA	14	39	1.6
754537	6416557	204	8	1	1	0.0	NA	14	39	1.6
754394	6416192	206	7	1	1	0.0	NA	14	39	1.6
754057	6415768	207	7	1	1	0.0	NA	14	39	1.6
753938	6415612	208	6	1	1	0.0	NA	14	39	1.6
753883	6415407	209	6	1	1	0.0	NA	14	39	1.5
753873	6415226	210	6	1	1	0.0	NA	14	39	1.5
754659	6415319	217	6	1	1	0.0	NA	14	39	1.6
754550	6415117	218	6	1	1	0.0	NA	14	39	1.5
754468	6415586	219	7	1	1	0.0	NA	14	39	1.6
754258	6415351	220	6	1	1	0.0	NA	14	39	1.6
754813	6415761	222	7	1	1	0.0	NA	14	39	1.6
754921	6415935	223	7	1	1	0.0	NA	14	39	1.6
754895	6417021	224	8	1	1	0.0	NA	14	40	1.6
754812	6417270	226	9	1	1	0.0	NA	14	40	1.6
755000	6417482	227	9	1	1	0.0	NA	14	40	1.6
755021	6417572	228	9	1	1	0.0	NA	14	40	1.6
755115	6417791	229	10	1	1	0.0	NA	14	40	1.6
755229	6417879	230	10	1	1	0.0	NA	14	40	1.6
755200	6418034	231	10	1	1	0.0	NA	15	40	1.6
755121	6418197	232	11	1	1	0.0	NA	15	40	1.6
755196	6418290	233	11	1	1	0.0	NA	15	41	1.6
755157	6418405	234	12	1	1	0.0	NA	15	41	1.6
755107	6418631	235	13	1	1	0.1	NA	15	41	1.6
755165	6418738	236	13	1	2	0.1	NA	15	41	1.6
755468	6418862	237	14	1	2	0.1	NA	15	41	1.6
755497	6418969	238	15	1	2	0.1	NA	15	41	1.6
755558	6419118	239	15	1	2	0.1	NA	15	41	1.6
755694	6419408	240	17	1	2	0.1	NA	16	42	1.7
755631	6419645	241	19	2	2	0.1	NA	16	42	1.7

			Year 2 - Project alone				Year 2 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Mine-owned receptors										
763424	6421248	2	37	7	12	0.5	NA	24	56	2.2
764312	6419748	3	**64**	15	30	1.6	NA	**32**	75	3.4
758110	6421399	6	32	3	5	0.2	NA	18	46	1.8
761331	6422274	7	36	5	8	0.3	NA	21	50	2.0
763212	6422933	8	33	7	11	0.5	NA	23	54	2.1
757478	6422930	9	**55**	4	6	0.3	NA	20	48	1.9
762910	6431699	10	25	2	3	0.1	NA	18	44	1.7
762881	6431819	10	24	2	3	0.1	NA	18	44	1.7
763608	6426397	12	**117**	13	22	1.0	NA	28	62	2.6
763860	6426113	13	**100**	11	18	0.8	NA	26	58	2.4
764864	6425885	14	49	5	8	0.3	NA	20	49	1.9
764438	6425349	15	**57**	7	12	0.5	NA	22	53	2.1
764166	6424816	16	**64**	10	19	0.8	NA	25	60	2.4
765852	6421087	27	19	4	6	0.3	NA	23	52	2.0
759316	6416451	28	10	1	1	0.0	NA	15	40	1.6
758233	6425134	41C	34	8	16	0.8	NA	25	59	2.5
765785	6419473	44	48	6	10	0.6	NA	25	58	2.4
758431	6425114	46	36	8	15	0.8	NA	25	59	2.5
757462	6425554	46	33	7	11	0.5	NA	25	56	2.2
758171	6424610	46A	47	9	17	1.0	NA	25	59	2.6
759087	6422154	46B	39	4	6	0.2	NA	19	47	1.8
763857	6423567	46C	39	7	11	0.5	NA	23	53	2.1
758663	6425526	46E	34	7	13	0.6	NA	24	57	2.4
766156	6423783	46G	23	2	4	0.2	NA	18	45	1.7
757370	6423594	49	43	5	8	0.4	NA	21	50	2.0
761026	6413318	51	5	0	1	0.0	NA	14	39	1.6
768518	6421667	65	11	1	2	0.1	NA	20	47	1.8
768932	6421422	65	10	1	2	0.1	NA	20	48	1.8
768051	6420974	65	12	1	2	0.1	NA	22	50	1.9
772907	6417059	65	7	0	1	0.0	NA	29	62	2.3
767777	6417444	65	16	1	2	0.1	NA	25	56	2.3
766968	6418411	65	21	2	3	0.2	NA	23	54	2.2
769709	6420922	65	9	1	1	0.1	NA	22	50	1.9
772112	6420135	65	7	1	1	0.0	NA	30	63	2.3
768893	6419042	65	14	1	2	0.1	NA	29	62	2.4
769599	6417274	65	11	1	1	0.0	NA	**36**	74	2.9
768684	6421859	141	11	1	2	0.1	NA	19	46	1.7
757938	6425052	150	34	8	15	0.8	NA	25	58	2.5
757999	6425110	153	34	8	15	0.8	NA	25	58	2.5
758111	6425214	154	33	8	15	0.8	NA	25	58	2.5
758087	6425077	155	33	8	16	0.8	NA	25	59	2.5
758081	6425050	155	34	8	16	0.8	NA	25	59	2.5
758191	6425191	157	34	8	15	0.8	NA	25	58	2.5
757910	6424897	158	37	8	15	0.8	NA	25	58	2.5
758229	6425118	159	34	8	16	0.8	NA	25	59	2.5
758311	6425114	161	35	8	16	0.8	NA	25	59	2.5
758295	6425058	160B	35	8	16	0.8	NA	25	59	2.5
758274	6425257	165	34	8	15	0.7	NA	25	58	2.5
758391	6425134	167	36	8	15	0.8	NA	25	59	2.5
756321	6423522	173	28	4	5	0.2	NA	19	47	1.8

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

8.5 Year 7

In Year 7, mining will be occurring in the approved Pit 2 and Pit 4 as well as Underground 1. Pit 2 will be advancing to the south, while Pit 4 will still be advancing to the north. Waste emplacement will be occurring in the pit and on the area to the south.

Figure 20 to **Figure 26** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 7 operations, showing the effects of Moolarben by itself and the Project in combination with other sources.

Table 9 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 7, the following exceedances are identified.

- 24-hour average PM_{10} above 50 $\mu g/m^3$ due to the Project considered in isolation – eight receptors (one private receptor and seven owned by mining companies);
- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Project and other mines and other sources – nine receptors (no private receptors and nine owned by mining companies);
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – two mine-owned receptors;
- Annual average TSP above 90 $\mu g/m^3$ due to the Project and other mines and other sources – four receptors; no private receptors and four mine-owned receptors; and
- Annual average dust deposition above 4 g/m^2/month/ due to the Project and other mines and other sources – four receptors (no private receptors, four owned by mining companies).

Table 9. Summary of predicted air quality impacts for Year 7

			Year 7 - Project alone				Year 7 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	**66**	14	28	1.5	NA	30	69	3.1
765265	6431931	11	20	2	2	0.0	NA	16	42	1.6
758370	6421350	20	43	9	16	0.8	NA	24	57	2.4
757342	6421298	22	33	6	10	0.5	NA	21	50	2.1
757110	6421102	23	31	5	8	0.4	NA	20	49	2.0
758484	6423794	25	35	6	9	0.4	NA	22	52	2.0
757430	6423741	26	32	6	9	0.3	NA	22	51	2.0
763756	6415963	29A	16	1	1	0.1	NA	15	41	1.6
762840	6415591	29B	13	1	1	0.0	NA	15	41	1.6
761168	6415971	29	17	1	1	0.0	NA	15	41	1.6
758435	6416631	30	23	1	2	0.0	NA	15	40	1.6
760008	6416123	31	15	1	1	0.0	NA	15	40	1.6
763590	6413194	32	9	1	1	0.0	NA	14	40	1.6
759021	6414840	35	12	1	1	0.0	NA	14	40	1.6
760388	6416975	36	19	2	2	0.0	NA	15	41	1.6
756179	6417106	37	26	1	2	0.0	NA	15	40	1.6
756389	6416414	40	22	1	1	0.0	NA	14	40	1.6
756863	6421212	41A	29	5	8	0.4	NA	20	48	2.0
756194	6415791	41B	18	1	1	0.0	NA	14	40	1.6
760283	6413728	47	9	1	1	0.0	NA	14	39	1.5
765574	6412269	48	9	0	1	0.0	NA	14	39	1.5
765368	6411935	48	8	0	1	0.0	NA	14	39	1.5
756926	6419919	58	31	3	5	0.2	NA	17	44	1.8
756886	6419210	59	31	2	3	0.1	NA	16	43	1.7
756500	6418546	60	29	2	3	0.1	NA	15	42	1.6
756375	6418755	61	28	2	3	0.1	NA	16	42	1.7
756497	6420922	63	26	4	6	0.3	NA	19	47	1.9
756262	6420946	64	25	4	6	0.3	NA	18	46	1.9
767049	6414413	68	13	1	1	0.0	NA	15	41	1.6
756132	6420692	70	24	3	5	0.3	NA	18	45	1.9
756021	6420067	74	23	3	4	0.2	NA	17	44	1.8
756012	6419777	75	23	2	4	0.2	NA	17	43	1.7
755920	6419546	76	23	2	3	0.1	NA	16	43	1.7
756357	6419434	77	27	2	3	0.1	NA	16	43	1.7
755750	6419149	78	23	2	3	0.1	NA	16	42	1.7
756034	6419159	79	25	2	3	0.1	NA	16	42	1.7
755649	6418908	80	24	2	3	0.1	NA	16	42	1.7
756219	6418906	81	27	2	3	0.1	NA	16	42	1.7
756223	6418659	82	28	2	3	0.1	NA	15	42	1.6
755832	6418444	83	26	2	2	0.1	NA	15	41	1.6
756047	6418248	84	27	2	2	0.1	NA	15	41	1.6
755506	6417818	86	24	1	2	0.1	NA	15	41	1.6
755841	6418051	87	26	2	2	0.1	NA	15	41	1.6
756043	6417723	88	27	2	2	0.1	NA	15	41	1.6
755431	6417645	89	24	1	2	0.1	NA	15	41	1.6
755337	6417501	90	23	1	2	0.1	NA	15	40	1.6
755969	6417348	91	26	1	2	0.1	NA	15	40	1.6
754900	6416785	94	20	1	1	0.0	NA	14	40	1.6
755085	6416834	95	21	1	1	0.0	NA	14	40	1.6
755183	6416867	96	21	1	1	0.0	NA	14	40	1.6
755364	6416985	97	22	1	1	0.0	NA	14	40	1.6
755440	6416783	98	22	1	1	0.0	NA	14	40	1.6
755603	6416770	99	23	1	1	0.0	NA	14	40	1.6
755992	6416832	100	24	1	2	0.0	NA	14	40	1.6
755850	6416237	101	21	1	1	0.0	NA	14	40	1.6
755969	6416452	101	22	1	1	0.0	NA	14	40	1.6
755530	6416189	102	20	1	1	0.0	NA	14	40	1.6
755072	6416398	103	20	1	1	0.0	NA	14	40	1.6
755112	6416116	104	19	1	1	0.0	NA	14	40	1.6
755061	6416033	105	19	1	1	0.0	NA	14	40	1.6
755558	6415823	106	19	1	1	0.0	NA	14	40	1.6
755752	6415919	107	19	1	1	0.0	NA	14	40	1.6
755410	6415494	109	17	1	1	0.0	NA	14	39	1.6
755361	6415339	110	17	1	1	0.0	NA	14	39	1.6

			Year 7 - Project alone				Year 7 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
Averaging period			**24-hr**	**Annual**	**Annual**	**Annual**	**24-hr**	**Annual**	**Annual**	**Annual**
MGA coordinates (Zone 55)			***Impact assessment criteria***							
Easting (m)	**Northing (m)**	**ID**	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755052	6415789	111	18	1	1	0.0	NA	14	39	1.6
755138	6415655	112	18	1	1	0.0	NA	14	39	1.6
755269	6415660	113	18	1	1	0.0	NA	14	39	1.6
767545	6414629	136	13	1	1	0.0	NA	15	41	1.6
771960	6415964	137	9	0	1	0.0	NA	17	43	1.7
769659	6414795	138	16	1	1	0.0	NA	15	41	1.6
769645	6414405	143	15	1	1	0.0	NA	15	41	1.6
770276	6413737	146	14	0	1	0.0	NA	15	40	1.6
757984	6425038	151	28	4	5	0.2	NA	21	49	1.9
758351	6425038	160A	29	4	5	0.2	NA	21	49	1.9
758339	6425214	162	28	4	5	0.2	NA	21	49	1.9
758371	6425110	168	29	4	5	0.2	NA	21	49	1.9
756662	6423986	169	29	5	7	0.3	NA	21	49	1.9
755557	6421185	170	22	4	5	0.3	NA	18	46	1.9
753898	6414840	171	15	1	1	0.0	NA	14	39	1.5
756058	6420779	172	23	3	5	0.3	NA	18	45	1.9
755624	6420844	175	21	3	5	0.2	NA	18	45	1.8
755585	6420625	176	20	3	4	0.2	NA	17	44	1.8
755530	6420496	177	19	3	4	0.2	NA	17	44	1.8
755292	6420111	180	18	2	3	0.2	NA	17	43	1.7
755178	6420092	181	17	2	3	0.2	NA	17	43	1.7
755049	6420016	182	17	2	3	0.2	NA	16	43	1.7
754822	6419969	183	17	2	3	0.1	NA	16	43	1.7
755093	6419504	184	19	2	3	0.1	NA	16	43	1.7
754967	6419464	185	19	2	3	0.1	NA	16	42	1.7
754674	6419437	186	18	2	3	0.1	NA	16	42	1.7
754816	6419137	187	19	2	3	0.1	NA	15	42	1.7
754577	6419073	188	18	2	2	0.1	NA	15	41	1.6
754772	6418881	189	19	2	2	0.1	NA	15	41	1.6
754488	6418711	190	19	2	2	0.1	NA	15	41	1.6
754592	6418520	191	20	1	2	0.1	NA	15	41	1.6
754649	6418328	192	20	1	2	0.1	NA	15	41	1.6
754160	6418080	194	19	1	2	0.1	NA	15	40	1.6
754583	6417973	195	21	1	2	0.1	NA	15	40	1.6
754072	6417840	196	19	1	2	0.1	NA	15	40	1.6
754141	6417241	200	19	1	1	0.0	NA	14	40	1.6
754138	6417158	201	19	1	1	0.0	NA	14	40	1.6
754311	6416962	201	19	1	1	0.0	NA	14	40	1.6
754258	6416804	202	19	1	1	0.0	NA	14	40	1.6
754462	6416639	203	19	1	1	0.0	NA	14	40	1.6
754537	6416557	204	19	1	1	0.0	NA	14	40	1.6
754394	6416192	206	18	1	1	0.0	NA	14	40	1.6
754057	6415768	207	17	1	1	0.0	NA	14	39	1.6
753938	6415612	208	17	1	1	0.0	NA	14	39	1.6
753883	6415407	209	16	1	1	0.0	NA	14	39	1.5
753873	6415226	210	16	1	1	0.0	NA	14	39	1.5
754659	6415319	217	17	1	1	0.0	NA	14	39	1.6
754550	6415117	218	16	1	1	0.0	NA	14	39	1.5
754468	6415586	219	17	1	1	0.0	NA	14	39	1.6
754258	6415351	220	16	1	1	0.0	NA	14	39	1.5
754813	6415761	222	18	1	1	0.0	NA	14	39	1.6
754921	6415935	223	18	1	1	0.0	NA	14	40	1.6
754895	6417021	224	21	1	1	0.0	NA	15	40	1.6
754812	6417270	226	21	1	1	0.0	NA	15	40	1.6
755000	6417482	227	22	1	2	0.0	NA	15	40	1.6
755021	6417572	228	22	1	2	0.1	NA	15	40	1.6
755115	6417791	229	23	1	2	0.1	NA	15	41	1.6
755229	6417879	230	23	1	2	0.1	NA	15	41	1.6
755200	6418034	231	23	1	2	0.1	NA	15	41	1.6
755121	6418197	232	23	1	2	0.1	NA	15	41	1.6
755196	6418290	233	23	2	2	0.1	NA	15	41	1.6
755157	6418405	234	22	2	2	0.1	NA	15	41	1.6
755107	6418631	235	22	2	2	0.1	NA	15	41	1.6
755165	6418738	236	22	2	2	0.1	NA	15	41	1.6
755468	6418862	237	23	2	2	0.1	NA	15	42	1.7
755497	6418969	238	23	2	3	0.1	NA	16	42	1.7
755558	6419118	239	22	2	3	0.1	NA	16	42	1.7
755694	6419408	240	22	2	3	0.1	NA	16	42	1.7
755631	6419645	241	21	2	3	0.1	NA	16	43	1.7

			Year 7 - Project alone				Year 7 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
Averaging period			**24-hr**	**Annual**	**Annual**	**Annual**	**24-hr**	**Annual**	**Annual**	**Annual**
MGA coordinates (Zone 55)			***Impact assessment criteria***							
Easting (m)	**Northing (m)**	**ID**	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Mine-owned receptors										
763424	6421248	2	**120**	27	**54**	**2.7**	NA	**45**	**99**	**4.5**
764312	6419748	3	**93**	9	17	0.9	NA	26	61	2.7
758110	6421399	6	40	8	14	0.7	NA	23	55	2.3
761331	6422274	7	**112**	26	**51**	**2.4**	NA	**43**	**94**	**4.1**
763212	6422933	8	**51**	11	19	0.8	NA	29	64	2.5
757478	6422930	9	34	7	11	0.5	NA	23	53	2.1
762910	6431699	10	23	2	2	0.0	NA	18	44	1.7
762881	6431819	10	23	2	2	0.0	NA	18	44	1.7
763608	6426397	12	**122**	13	22	0.9	NA	29	63	2.5
763860	6426113	13	**101**	11	18	0.8	NA	27	59	2.4
764864	6425885	14	44	6	9	0.3	NA	22	50	1.9
764438	6425349	15	50	7	11	0.4	NA	23	53	2.0
764166	6424816	16	**52**	8	12	0.5	NA	25	55	2.1
765852	6421087	27	50	4	7	0.3	NA	26	58	2.4
759316	6416451	28	19	1	2	0.0	NA	15	41	1.6
758233	6425134	41C	29	4	5	0.2	NA	21	49	1.9
765785	6419473	44	42	3	4	0.2	NA	21	51	2.1
758431	6425114	46	29	4	5	0.2	NA	21	49	1.9
757462	6425554	46	26	4	5	0.1	NA	21	49	1.9
758171	6424610	46A	29	4	6	0.2	NA	21	49	1.9
759087	6422154	46B	45	12	22	1.1	NA	28	64	2.8
763857	6423567	46C	47	9	14	0.5	NA	27	58	2.2
758663	6425526	46E	26	4	5	0.2	NA	21	50	2.0
766156	6423783	46G	21	4	5	0.2	NA	22	50	1.9
757370	6423594	49	32	6	9	0.3	NA	22	51	2.0
761026	6413318	51	9	1	1	0.0	NA	14	39	1.5
768518	6421667	65	16	1	2	0.1	NA	**33**	67	2.5
768932	6421422	65	15	1	2	0.1	NA	**46**	**93**	3.6
768051	6420974	65	22	2	3	0.1	NA	**39**	81	3.5
772907	6417059	65	7	0	1	0.0	NA	18	45	1.8
767777	6417444	65	20	1	2	0.1	NA	19	47	1.9
766968	6418411	65	25	1	2	0.1	NA	22	50	2.0
769709	6420922	65	15	1	2	0.1	NA	**143**	**286**	**12.1**
772112	6420135	65	11	1	1	0.0	NA	**84**	**173**	**7.9**
768893	6419042	65	16	1	1	0.1	NA	**34**	69	2.5
769599	6417274	65	15	1	1	0.0	NA	24	55	2.2
768684	6421859	141	15	1	2	0.1	NA	**31**	65	2.4
757938	6425052	150	28	4	5	0.2	NA	21	49	1.9
757999	6425110	153	28	4	5	0.2	NA	21	49	1.9
758111	6425214	154	28	4	5	0.2	NA	21	49	1.9
758087	6425077	155	29	4	5	0.2	NA	21	49	1.9
758081	6425050	155	29	4	5	0.2	NA	21	49	1.9
758191	6425191	157	28	4	5	0.2	NA	21	49	1.9
757910	6424897	158	28	4	5	0.2	NA	21	49	1.9
758229	6425118	159	29	4	5	0.2	NA	21	49	1.9
758295	6425058	160B	29	4	5	0.2	NA	21	49	1.9
758311	6425114	161	29	4	5	0.2	NA	21	49	1.9
758274	6425257	165	28	4	5	0.2	NA	21	49	1.9
758391	6425134	167	29	4	5	0.2	NA	21	49	1.9
756321	6423522	173	28	6	8	0.3	NA	21	50	1.9

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

8.6 Year 12

In Year 12, mining will be occurring at the Approved Pit 3 to the south and Pit 4. Waste emplacement will be occurring in the pits.

Figure 27 to **Figure 33** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 12 operations. These show the effects of Moolarben by itself and the Project in combination with other sources.

Table 10 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 12, the following exceedances are identified.

- 24-hour average PM_{10} above 50 $\mu g/m^3$ due to the Project considered in isolation – 16 receptors (three private receptors and 13 mine-owned receptors);
- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Project and other mines and other sources – 17 receptors (one private receptor and 16 mined-owned receptors);
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – eight receptors (one private receptor and seven mine-owned receptors);
- Annual average TSP above 90 $\mu g/m^3$ due to the Project and other mines and other sources – 12 receptors (one private receptor and 11 mine-owned receptors); and
- Annual average dust deposition above 4 g/m^2/month/ due to the Project and other mines and other sources – 12 receptors (one private receptor and 11 mine-owned receptors).

Table 10. Summary of predicted air quality impacts for Year 12

			Year 12 - Project alone				Year 12 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	**98**	13	23	1.2	NA	28	64	3.2
765265	6431931	11	38	3	4	0.1	NA	18	44	1.7
758370	6421350	20	47	6	9	0.4	NA	21	50	2.2
757342	6421298	22	33	4	6	0.3	NA	19	47	2.0
757110	6421102	23	31	4	6	0.2	NA	18	46	1.9
758484	6423794	25	48	11	18	0.8	NA	28	61	2.8
757430	6423741	26	39	9	14	0.6	NA	25	56	2.5
763756	6415963	29A	**80**	6	13	0.9	NA	20	53	2.5
762840	6415591	29B	**398**	29	**69**	**4.7**	NA	**43**	**108**	**6.3**
761168	6415971	29	40	4	7	0.5	NA	18	47	2.0
758435	6416631	30	21	2	3	0.2	NA	16	42	1.7
760008	6416123	31	20	2	4	0.2	NA	16	43	1.8
763590	6413194	32	13	1	1	0.0	NA	14	40	1.6
759021	6414840	35	14	1	2	0.1	NA	14	40	1.6
760388	6416975	36	29	4	7	0.4	NA	18	46	2.0
756179	6417106	37	22	2	3	0.1	NA	15	41	1.7
756389	6416414	40	18	2	2	0.1	NA	15	41	1.6
756863	6421212	41A	28	4	5	0.2	NA	18	46	1.9
756194	6415791	41B	16	1	2	0.1	NA	14	40	1.6
760283	6413728	47	16	1	1	0.0	NA	14	40	1.6
765574	6412269	48	14	1	1	0.0	NA	14	40	1.6
765368	6411935	48	13	1	1	0.0	NA	14	39	1.6
756926	6419919	58	34	3	4	0.2	NA	17	44	1.8
756886	6419210	59	37	3	4	0.2	NA	17	43	1.8
756500	6418546	60	33	3	4	0.2	NA	16	43	1.8
756375	6418755	61	33	3	4	0.2	NA	16	43	1.8
756497	6420922	63	26	3	5	0.2	NA	18	45	1.9
756262	6420946	64	24	3	4	0.2	NA	17	44	1.8
767049	6414413	68	17	1	1	0.1	NA	15	41	1.6
756132	6420692	70	25	3	4	0.2	NA	17	44	1.8
756021	6420067	74	27	3	4	0.2	NA	17	43	1.8
756012	6419777	75	28	3	4	0.2	NA	17	43	1.8
755920	6419546	76	28	3	4	0.1	NA	16	43	1.8
756357	6419434	77	32	3	4	0.2	NA	17	43	1.8
755750	6419149	78	29	3	4	0.1	NA	16	43	1.7
756034	6419159	79	31	3	4	0.1	NA	16	43	1.8
755649	6418908	80	29	2	3	0.1	NA	16	43	1.7
756219	6418906	81	32	3	4	0.2	NA	16	43	1.8
756223	6418659	82	33	3	4	0.2	NA	16	43	1.8
755832	6418444	83	30	2	3	0.1	NA	16	42	1.7
756047	6418248	84	30	2	3	0.1	NA	16	42	1.7
755506	6417818	86	26	2	3	0.1	NA	15	42	1.7
755841	6418051	87	28	2	3	0.1	NA	16	42	1.7
756043	6417723	88	26	2	3	0.1	NA	16	42	1.7
755431	6417645	89	24	2	3	0.1	NA	15	41	1.7
755337	6417501	90	23	2	3	0.1	NA	15	41	1.7
755969	6417348	91	23	2	3	0.1	NA	15	41	1.7
754900	6416785	94	20	2	2	0.1	NA	15	41	1.6
755085	6416834	95	20	2	2	0.1	NA	15	41	1.6
755183	6416867	96	20	2	2	0.1	NA	15	41	1.6
755364	6416985	97	21	2	2	0.1	NA	15	41	1.7
755440	6416783	98	20	2	2	0.1	NA	15	41	1.6
755603	6416770	99	20	2	2	0.1	NA	15	41	1.7
755992	6416832	100	20	2	2	0.1	NA	15	41	1.7
755850	6416237	101	17	1	2	0.1	NA	15	40	1.6
755969	6416452	101	18	2	2	0.1	NA	15	41	1.6
755530	6416189	102	17	1	2	0.1	NA	15	40	1.6
755072	6416398	103	18	1	2	0.1	NA	15	40	1.6
755112	6416116	104	17	1	2	0.1	NA	14	40	1.6
755061	6416033	105	16	1	2	0.1	NA	14	40	1.6
755558	6415823	106	15	1	2	0.1	NA	14	40	1.6
755752	6415919	107	16	1	2	0.1	NA	14	40	1.6
755410	6415494	109	14	1	1	0.0	NA	14	40	1.6

			Year 12 - Project alone				Year 12 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755361	6415339	110	14	1	1	0.0	NA	14	40	1.6
755052	6415789	111	15	1	2	0.1	NA	14	40	1.6
755138	6415655	112	15	1	1	0.1	NA	14	40	1.6
755269	6415660	113	15	1	1	0.1	NA	14	40	1.6
767545	6414629	136	19	1	1	0.1	NA	15	41	1.6
771960	6415964	137	19	1	1	0.1	NA	17	44	1.8
769659	6414795	138	17	1	1	0.1	NA	16	42	1.6
769645	6414405	143	16	1	1	0.1	NA	15	41	1.6
770276	6413737	146	15	1	1	0.0	NA	14	40	1.6
757984	6425038	151	47	8	12	0.4	NA	26	56	2.4
758351	6425038	160A	49	9	12	0.5	NA	26	57	2.4
758339	6425214	162	49	8	12	0.4	NA	26	57	2.4
758371	6425110	168	49	9	12	0.4	NA	26	57	2.4
756662	6423986	169	34	8	11	0.5	NA	24	54	2.3
755557	6421185	170	21	3	4	0.2	NA	17	45	1.8
753898	6414840	171	13	1	1	0.0	NA	14	39	1.6
756058	6420779	172	24	3	4	0.2	NA	17	44	1.8
755624	6420844	175	22	3	4	0.2	NA	17	44	1.8
755585	6420625	176	22	3	4	0.2	NA	17	44	1.8
755530	6420496	177	23	3	4	0.2	NA	17	43	1.8
755292	6420111	180	23	3	3	0.1	NA	17	43	1.8
755178	6420092	181	22	2	3	0.1	NA	16	43	1.8
755049	6420016	182	22	2	3	0.1	NA	16	43	1.7
754822	6419969	183	21	2	3	0.1	NA	16	43	1.7
755093	6419504	184	24	2	3	0.1	NA	16	43	1.7
754967	6419464	185	23	2	3	0.1	NA	16	42	1.7
754674	6419437	186	22	2	3	0.1	NA	16	42	1.7
754816	6419137	187	24	2	3	0.1	NA	16	42	1.7
754577	6419073	188	23	2	3	0.1	NA	16	42	1.7
754772	6418881	189	24	2	3	0.1	NA	16	42	1.7
754488	6418711	190	23	2	3	0.1	NA	16	42	1.7
754592	6418520	191	24	2	3	0.1	NA	16	42	1.7
754649	6418328	192	25	2	3	0.1	NA	15	42	1.7
754160	6418080	194	23	2	3	0.1	NA	15	41	1.7
754583	6417973	195	25	2	3	0.1	NA	15	41	1.7
754072	6417840	196	23	2	2	0.1	NA	15	41	1.7
754141	6417241	200	21	2	2	0.1	NA	15	41	1.6
754138	6417158	201	21	2	2	0.1	NA	15	41	1.6
754311	6416962	201	20	2	2	0.1	NA	15	41	1.6
754258	6416804	202	20	1	2	0.1	NA	15	40	1.6
754462	6416639	203	19	1	2	0.1	NA	15	40	1.6
754537	6416557	204	19	1	2	0.1	NA	15	40	1.6
754394	6416192	206	17	1	2	0.1	NA	14	40	1.6
754057	6415768	207	16	1	1	0.1	NA	14	40	1.6
753938	6415612	208	15	1	1	0.0	NA	14	40	1.6
753883	6415407	209	14	1	1	0.0	NA	14	40	1.6
753873	6415226	210	14	1	1	0.0	NA	14	40	1.6
754659	6415319	217	14	1	1	0.0	NA	14	40	1.6
754550	6415117	218	13	1	1	0.0	NA	14	40	1.6
754468	6415586	219	15	1	1	0.0	NA	14	40	1.6
754258	6415351	220	14	1	1	0.0	NA	14	40	1.6
754813	6415761	222	15	1	2	0.1	NA	14	40	1.6
754921	6415935	223	16	1	2	0.1	NA	14	40	1.6
754895	6417021	224	21	2	2	0.1	NA	15	41	1.6
754812	6417270	226	22	2	2	0.1	NA	15	41	1.7
755000	6417482	227	23	2	2	0.1	NA	15	41	1.7
755021	6417572	228	23	2	3	0.1	NA	15	41	1.7
755115	6417791	229	25	2	3	0.1	NA	15	41	1.7
755229	6417879	230	25	2	3	0.1	NA	15	42	1.7
755200	6418034	231	26	2	3	0.1	NA	16	42	1.7
755121	6418197	232	26	2	3	0.1	NA	16	42	1.7
755196	6418290	233	27	2	3	0.1	NA	16	42	1.7
755157	6418405	234	26	2	3	0.1	NA	16	42	1.7
755107	6418631	235	26	2	3	0.1	NA	16	42	1.7
755165	6418738	236	26	2	3	0.1	NA	16	42	1.7
755468	6418862	237	28	2	3	0.1	NA	16	42	1.7
755497	6418969	238	28	2	3	0.1	NA	16	42	1.7
755558	6419118	239	28	2	3	0.1	NA	16	43	1.7
755694	6419408	240	28	3	4	0.1	NA	16	43	1.8

			Year 12 - Project alone				Year 12 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755631	6419645	241	26	3	4	0.1	NA	16	43	1.8
Mine-owned receptors										
763424	6421248	2	**539**	**67**	**146**	**9.5**	NA	**84**	**191**	**14.0**
764312	6419748	3	**83**	6	11	0.6	NA	25	56	2.5
758110	6421399	6	42	5	8	0.4	NA	20	49	2.1
761331	6422274	7	**551**	**138**	**297**	**17.7**	NA	**155**	**341**	**22.4**
763212	6422933	8	**330**	**66**	**134**	**7.0**	NA	**86**	**182**	**14.1**
757478	6422930	9	42	8	13	0.6	NA	24	54	2.5
762910	6431699	10	38	3	4	0.1	NA	19	46	1.7
762881	6431819	10	37	3	4	0.1	NA	19	45	1.7
763608	6426397	12	**287**	29	**53**	**2.5**	NA	**46**	**95**	**5.5**
763860	6426113	13	**242**	27	50	**2.4**	NA	**44**	**92**	**5.9**
764864	6425885	14	**86**	14	21	0.8	NA	**31**	64	3.1
764438	6425349	15	**159**	25	46	2.0	NA	**42**	89	**6.5**
764166	6424816	16	**293**	**43**	**91**	**4.2**	NA	**62**	**136**	**13.3**
765852	6421087	27	**59**	5	8	0.4	NA	30	65	2.8
759316	6416451	28	20	2	4	0.2	NA	16	43	1.8
758233	6425134	41C	49	8	12	0.4	NA	26	56	2.4
765785	6419473	44	**64**	3	5	0.3	NA	24	53	2.2
758431	6425114	46	49	9	12	0.5	NA	26	57	2.4
757462	6425554	46	47	8	10	0.4	NA	26	56	2.3
758171	6424610	46A	46	9	14	0.5	NA	26	57	2.5
759087	6422154	46B	**79**	15	29	1.6	NA	**31**	71	3.7
763857	6423567	46C	**234**	**39**	**73**	**3.4**	NA	**60**	**122**	**9.0**
758663	6425526	46E	49	8	12	0.4	NA	26	57	2.4
766156	6423783	46G	49	7	11	0.5	NA	**32**	66	2.8
757370	6423594	49	39	9	13	0.6	NA	25	56	2.5
761026	6413318	51	14	1	1	0.0	NA	14	39	1.6
768518	6421667	65	31	2	3	0.2	NA	**167**	**342**	**15.6**
768932	6421422	65	28	2	3	0.1	NA	**130**	**268**	**12.4**
768051	6420974	65	31	2	4	0.2	NA	**78**	**145**	**5.7**
772907	6417059	65	14	1	1	0.0	NA	17	45	1.8
767777	6417444	65	35	2	2	0.1	NA	20	48	2.0
766968	6418411	65	44	2	3	0.2	NA	22	51	2.1
769709	6420922	65	22	2	2	0.1	NA	**38**	83	3.7
772112	6420135	65	14	1	1	0.1	NA	21	49	1.9
768893	6419042	65	25	2	2	0.1	NA	26	57	2.2
769599	6417274	65	26	1	2	0.1	NA	26	59	2.4
768684	6421859	141	30	2	3	0.2	NA	**161**	**323**	**14.5**
757938	6425052	150	47	8	12	0.4	NA	26	56	2.4
757999	6425110	153	48	8	12	0.4	NA	26	56	2.4
758111	6425214	154	48	8	12	0.4	NA	26	56	2.4
758087	6425077	155	48	8	12	0.4	NA	26	56	2.4
758081	6425050	155	48	8	12	0.4	NA	26	56	2.4
758191	6425191	157	48	8	12	0.4	NA	26	56	2.4
757910	6424897	158	46	9	12	0.5	NA	26	56	2.4
758229	6425118	159	49	8	12	0.4	NA	26	56	2.4
758295	6425058	160B	49	9	12	0.4	NA	26	57	2.4
758311	6425114	161	49	8	12	0.4	NA	26	57	2.4
758274	6425257	165	49	8	12	0.4	NA	26	57	2.4
758391	6425134	167	49	9	12	0.4	NA	26	57	2.4
756321	6423522	173	33	7	10	0.5	NA	23	52	2.3

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

8.7 Year 16

In Year 16, mining will be occurring in the approved Pit 3 in the south of EL 6288 and the northern end of Pit 4. Waste emplacement will be occurring in the pits.

Figure 34 to **Figure 40** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 16 operations, showing the effects of Moolarben by itself and the Project in combination with other sources.

Table 11 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 16, the following exceedances are identified.

- 24-hour average PM_{10} above 50 $\mu g/m^3$ due to the Project considered in isolation – 16 receptors (four private receptors and 12 mine-owned receptors);
- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Project and other mines and other sources – 20 receptors (two private receptors and 18 mine-owned receptors);
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – eight receptors (one private receptor and seven mine-owned receptors);
- Annual average TSP above 90 $\mu g/m^3$ due to the Project and other mines and other sources – ten receptors (one private receptor and nine mine-owned receptors); and
- Annual average dust deposition above 4 g/m^2/month/ due to the Project and other mines and other sources – 12 receptors (two private receptors and eight mine-owned receptors).

Table 11. Summary of predicted air quality impacts for Year 16

			Year 16 - Project alone				Year 16 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	**62**	6	9	0.4	NA	23	53	2.1
765265	6431931	11	37	3	4	0.1	NA	18	44	1.7
758370	6421350	20	36	4	6	0.3	NA	20	49	1.9
757342	6421298	22	27	3	5	0.2	NA	19	47	1.9
757110	6421102	23	26	3	4	0.2	NA	19	46	1.8
758484	6423794	25	41	9	14	0.6	NA	25	56	2.3
757430	6423741	26	33	7	10	0.5	NA	23	53	2.1
763756	6415963	29A	**269**	19	45	**3.2**	NA	**35**	88	**4.9**
762840	6415591	29B	**993**	**78**	**187**	**11.9**	NA	**93**	**228**	**13.5**
761168	6415971	29	**79**	7	14	0.9	NA	21	54	2.5
758435	6416631	30	19	2	3	0.2	NA	16	43	1.7
760008	6416123	31	24	3	4	0.2	NA	17	44	1.8
763590	6413194	32	13	1	1	0.0	NA	15	41	1.6
759021	6414840	35	14	1	2	0.1	NA	15	41	1.6
760388	6416975	36	27	4	7	0.4	NA	19	47	2.0
756179	6417106	37	21	2	3	0.1	NA	15	42	1.7
756389	6416414	40	17	2	2	0.1	NA	15	41	1.6
756863	6421212	41A	24	3	4	0.2	NA	19	46	1.8
756194	6415791	41B	15	1	2	0.1	NA	15	40	1.6
760283	6413728	47	13	1	1	0.0	NA	15	40	1.6
765574	6412269	48	12	1	1	0.0	NA	15	40	1.6
765368	6411935	48	12	1	1	0.0	NA	14	40	1.6
756926	6419919	58	29	3	4	0.1	NA	18	45	1.8
756886	6419210	59	31	3	4	0.1	NA	17	44	1.8
756500	6418546	60	29	2	3	0.1	NA	17	43	1.7
756375	6418755	61	28	2	3	0.1	NA	17	43	1.7
756497	6420922	63	23	3	4	0.1	NA	18	45	1.8
756262	6420946	64	21	3	4	0.1	NA	18	45	1.8
767049	6414413	68	15	1	1	0.1	NA	17	43	1.7
756132	6420692	70	22	3	4	0.1	NA	18	45	1.8
756021	6420067	74	23	2	3	0.1	NA	17	44	1.7
756012	6419777	75	24	2	3	0.1	NA	17	44	1.7
755920	6419546	76	24	2	3	0.1	NA	17	44	1.7
756357	6419434	77	27	3	3	0.1	NA	17	44	1.7
755750	6419149	78	24	2	3	0.1	NA	17	43	1.7
756034	6419159	79	26	2	3	0.1	NA	17	43	1.7
755649	6418908	80	24	2	3	0.1	NA	17	43	1.7
756219	6418906	81	27	2	3	0.1	NA	17	43	1.7
756223	6418659	82	28	2	3	0.1	NA	17	43	1.7
755832	6418444	83	25	2	3	0.1	NA	16	43	1.7
756047	6418248	84	26	2	3	0.1	NA	16	43	1.7
755506	6417818	86	23	2	3	0.1	NA	16	42	1.7
755841	6418051	87	25	2	3	0.1	NA	16	43	1.7
756043	6417723	88	24	2	3	0.1	NA	16	42	1.7
755431	6417645	89	22	2	3	0.1	NA	16	42	1.7
755337	6417501	90	21	2	2	0.1	NA	15	42	1.7
755969	6417348	91	22	2	3	0.1	NA	16	42	1.7
754900	6416785	94	18	1	2	0.1	NA	15	41	1.6
755085	6416834	95	18	1	2	0.1	NA	15	41	1.6
755183	6416867	96	18	2	2	0.1	NA	15	41	1.6
755364	6416985	97	19	2	2	0.1	NA	15	41	1.7
755440	6416783	98	18	2	2	0.1	NA	15	41	1.6
755603	6416770	99	19	2	2	0.1	NA	15	41	1.7
755992	6416832	100	19	2	2	0.1	NA	15	41	1.7
755850	6416237	101	16	1	2	0.1	NA	15	41	1.6
755969	6416452	101	17	1	2	0.1	NA	15	41	1.6
755530	6416189	102	16	1	2	0.1	NA	15	41	1.6
755072	6416398	103	17	1	2	0.1	NA	15	41	1.6
755112	6416116	104	16	1	2	0.1	NA	15	40	1.6
755061	6416033	105	15	1	2	0.1	NA	15	40	1.6
755558	6415823	106	15	1	2	0.1	NA	15	40	1.6
755752	6415919	107	15	1	2	0.1	NA	15	40	1.6
755410	6415494	109	14	1	1	0.1	NA	14	40	1.6
755361	6415339	110	13	1	1	0.0	NA	14	40	1.6

			Year 16 - Project alone				Year 16 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
Averaging period			**24-hr**	**Annual**	**Annual**	**Annual**	**24-hr**	**Annual**	**Annual**	**Annual**
MGA coordinates (Zone 55)			***Impact assessment criteria***							
Easting (m)	**Northing (m)**	**ID**	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755052	6415789	111	15	1	2	0.1	NA	14	40	1.6
755138	6415655	112	14	1	1	0.1	NA	14	40	1.6
755269	6415660	113	14	1	1	0.1	NA	14	40	1.6
767545	6414629	136	16	1	1	0.1	NA	18	45	1.7
771960	6415964	137	22	1	1	0.1	NA	17	45	1.8
769659	6414795	138	18	1	1	0.1	NA	17	44	1.7
769645	6414405	143	17	1	1	0.1	NA	16	43	1.7
770276	6413737	146	16	1	1	0.0	NA	15	41	1.6
757984	6425038	151	32	8	12	0.5	NA	25	56	2.2
758351	6425038	160A	35	9	13	0.5	NA	26	56	2.2
758339	6425214	162	35	9	13	0.5	NA	26	57	2.2
758371	6425110	168	35	9	13	0.5	NA	26	57	2.2
756662	6423986	169	29	6	9	0.4	NA	23	51	2.0
755557	6421185	170	19	3	4	0.1	NA	18	45	1.8
753898	6414840	171	13	1	1	0.0	NA	14	40	1.6
756058	6420779	172	21	3	4	0.1	NA	18	45	1.8
755624	6420844	175	19	2	3	0.1	NA	18	44	1.8
755585	6420625	176	20	2	3	0.1	NA	17	44	1.7
755530	6420496	177	20	2	3	0.1	NA	17	44	1.7
755292	6420111	180	20	2	3	0.1	NA	17	44	1.7
755178	6420092	181	19	2	3	0.1	NA	17	44	1.7
755049	6420016	182	19	2	3	0.1	NA	17	43	1.7
754822	6419969	183	19	2	3	0.1	NA	17	43	1.7
755093	6419504	184	20	2	3	0.1	NA	17	43	1.7
754967	6419464	185	20	2	3	0.1	NA	17	43	1.7
754674	6419437	186	19	2	3	0.1	NA	16	43	1.7
754816	6419137	187	20	2	3	0.1	NA	16	43	1.7
754577	6419073	188	20	2	3	0.1	NA	16	43	1.7
754772	6418881	189	21	2	3	0.1	NA	16	43	1.7
754488	6418711	190	20	2	3	0.1	NA	16	42	1.7
754592	6418520	191	21	2	3	0.1	NA	16	42	1.7
754649	6418328	192	21	2	3	0.1	NA	16	42	1.7
754160	6418080	194	20	2	2	0.1	NA	16	42	1.7
754583	6417973	195	21	2	2	0.1	NA	16	42	1.7
754072	6417840	196	19	2	2	0.1	NA	15	41	1.7
754141	6417241	200	19	2	2	0.1	NA	15	41	1.6
754138	6417158	201	19	1	2	0.1	NA	15	41	1.6
754311	6416962	201	18	1	2	0.1	NA	15	41	1.6
754258	6416804	202	18	1	2	0.1	NA	15	41	1.6
754462	6416639	203	17	1	2	0.1	NA	15	41	1.6
754537	6416557	204	17	1	2	0.1	NA	15	41	1.6
754394	6416192	206	16	1	2	0.1	NA	15	40	1.6
754057	6415768	207	15	1	1	0.1	NA	14	40	1.6
753938	6415612	208	14	1	1	0.0	NA	14	40	1.6
753883	6415407	209	14	1	1	0.0	NA	14	40	1.6
753873	6415226	210	13	1	1	0.0	NA	14	40	1.6
754659	6415319	217	14	1	1	0.0	NA	14	40	1.6
754550	6415117	218	13	1	1	0.0	NA	14	40	1.6
754468	6415586	219	14	1	1	0.1	NA	14	40	1.6
754258	6415351	220	14	1	1	0.0	NA	14	40	1.6
754813	6415761	222	14	1	1	0.1	NA	14	40	1.6
754921	6415935	223	15	1	2	0.1	NA	14	40	1.6
754895	6417021	224	19	2	2	0.1	NA	15	41	1.6
754812	6417270	226	19	2	2	0.1	NA	15	41	1.7
755000	6417482	227	20	2	2	0.1	NA	15	42	1.7
755021	6417572	228	21	2	2	0.1	NA	15	42	1.7
755115	6417791	229	22	2	3	0.1	NA	16	42	1.7
755229	6417879	230	22	2	3	0.1	NA	16	42	1.7
755200	6418034	231	23	2	3	0.1	NA	16	42	1.7
755121	6418197	232	23	2	3	0.1	NA	16	42	1.7
755196	6418290	233	23	2	3	0.1	NA	16	42	1.7
755157	6418405	234	23	2	3	0.1	NA	16	42	1.7
755107	6418631	235	22	2	3	0.1	NA	16	43	1.7
755165	6418738	236	22	2	3	0.1	NA	16	43	1.7
755468	6418862	237	24	2	3	0.1	NA	16	43	1.7
755497	6418969	238	23	2	3	0.1	NA	16	43	1.7
755558	6419118	239	23	2	3	0.1	NA	17	43	1.7
755694	6419408	240	23	2	3	0.1	NA	17	43	1.7
755631	6419645	241	22	2	3	0.1	NA	17	44	1.7

			Year 16 - Project alone				Year 16 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Mine-owned receptors										
763424	6421248	2	**491**	**41**	**86**	**5.1**	NA	**61**	**134**	**7.0**
764312	6419748	3	**60**	5	8	0.3	NA	28	61	2.4
758110	6421399	6	33	4	6	0.3	NA	20	48	1.9
761331	6422274	7	**142**	28	**57**	**2.9**	NA	**46**	**101**	**4.7**
763212	6422933	8	**420**	**88**	**188**	**10.0**	NA	**106**	**233**	**11.7**
757478	6422930	9	32	6	9	0.4	NA	22	51	2.1
762910	6431699	10	35	3	4	0.1	NA	19	45	1.7
762881	6431819	10	35	3	4	0.1	NA	19	45	1.7
763608	6426397	12	**275**	29	**51**	**2.5**	NA	**44**	**92**	**4.0**
763860	6426113	13	**234**	26	47	**2.2**	NA	**42**	88	3.8
764864	6425885	14	**126**	16	25	0.9	NA	**31**	65	2.5
764438	6425349	15	**177**	25	43	1.8	NA	**41**	84	3.3
764166	6424816	16	**296**	**57**	**113**	**5.1**	NA	**72**	**154**	**6.7**
765852	6421087	27	**63**	6	10	0.5	NA	**35**	73	3.0
759316	6416451	28	21	2	4	0.2	NA	17	44	1.8
758233	6425134	41C	33	9	13	0.5	NA	26	56	2.2
765785	6419473	44	39	3	5	0.2	NA	**39**	79	3.2
758431	6425114	46	36	9	13	0.5	NA	26	57	2.3
757462	6425554	46	32	8	11	0.4	NA	25	56	2.2
758171	6424610	46A	34	9	13	0.6	NA	25	56	2.2
759087	6422154	46B	39	7	12	0.6	NA	24	55	2.3
763857	6423567	46C	**654**	**147**	**317**	**16.0**	NA	**164**	**361**	**17.7**
758663	6425526	46E	38	9	13	0.5	NA	26	58	2.3
766156	6423783	46G	**112**	18	32	1.6	NA	**35**	75	3.2
757370	6423594	49	33	7	10	0.5	NA	23	52	2.1
761026	6413318	51	13	1	1	0.0	NA	15	40	1.6
768518	6421667	65	34	3	4	0.2	NA	**33**	70	2.7
768932	6421422	65	29	2	3	0.2	NA	30	64	2.5
768051	6420974	65	42	3	4	0.2	NA	**69**	**129**	**4.8**
772907	6417059	65	20	1	1	0.1	NA	18	45	1.8
767777	6417444	65	26	2	2	0.1	NA	**44**	**91**	3.7
766968	6418411	65	30	2	3	0.2	NA	**94**	**188**	**8.5**
769709	6420922	65	24	2	3	0.1	NA	25	56	2.2
772112	6420135	65	18	1	2	0.1	NA	21	49	1.9
768893	6419042	65	37	2	3	0.1	NA	**35**	71	2.8
769599	6417274	65	28	1	2	0.1	NA	**31**	66	2.7
768684	6421859	141	33	3	4	0.2	NA	29	62	2.4
757938	6425052	150	31	8	12	0.5	NA	25	56	2.2
757999	6425110	153	32	8	12	0.5	NA	25	56	2.2
758111	6425214	154	33	8	12	0.5	NA	25	56	2.2
758087	6425077	155	32	8	12	0.5	NA	25	56	2.2
758081	6425050	155	32	8	12	0.5	NA	25	56	2.2
758191	6425191	157	33	9	12	0.5	NA	26	56	2.2
757910	6424897	158	32	8	12	0.5	NA	25	55	2.2
758229	6425118	159	33	9	13	0.5	NA	26	56	2.2
758295	6425058	160B	34	9	13	0.5	NA	26	56	2.2
758311	6425114	161	34	9	13	0.5	NA	26	56	2.2
758274	6425257	165	34	9	13	0.5	NA	26	57	2.2
758391	6425134	167	35	9	13	0.5	NA	26	57	2.2
756321	6423522	173	28	5	8	0.4	NA	22	50	2.0

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

8.8 Year 19

In Year 19, mining will be occurring in the north eastern area of Pit 4. Waste emplacement will be occurring in the pits and in out-of pit emplacement areas adjacent or close to the pits.

Figure 41 to **Figure 47** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 19 operations. These show the effects of Moolarben by itself and the Project in combination with other sources.

Table 12 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 19, the following exceedances are identified.

- 24-hour average PM_{10} above 50 $\mu g/m^3$ due to the Project considered in isolation – 14 receptors two private receptors and 13 mine-owned receptors);
- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Project and other mines and other sources – 17 mined-owned receptors;
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – six receptors (no private receptors and six mine-owned receptors);
- Annual average TSP above 90 $\mu g/m^3$ due to the Project and other mines and other sources – nine mine-owned receptors; and
- Annual average dust deposition above 4 g/m^2/month/ due to the Project and other mines and other sources – seven mine-owned receptors.

Table 12. Summary of predicted air quality impacts for Year 19

			Year 19 - Project alone				Year 19 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	35	4	5	0.2	NA	20	48	1.9
765265	6431931	11	28	4	4	0.1	NA	18	44	1.7
758370	6421350	20	26	3	4	0.2	NA	19	47	1.8
757342	6421298	22	22	3	4	0.1	NA	18	45	1.8
757110	6421102	23	21	2	3	0.1	NA	18	45	1.8
758484	6423794	25	42	7	10	0.5	NA	23	53	2.1
757430	6423741	26	33	5	8	0.4	NA	22	50	2.0
763756	6415963	29A	**57**	5	9	0.7	NA	21	52	2.4
762840	6415591	29B	**164**	13	30	2.0	NA	28	71	3.6
761168	6415971	29	37	3	6	0.4	NA	18	47	2.0
758435	6416631	30	18	2	3	0.2	NA	16	43	1.7
760008	6416123	31	23	2	4	0.2	NA	17	44	1.8
763590	6413194	32	14	1	1	0.0	NA	15	41	1.6
759021	6414840	35	13	1	2	0.1	NA	15	41	1.6
760388	6416975	36	29	4	7	0.4	NA	19	47	2.0
756179	6417106	37	18	2	2	0.1	NA	15	42	1.7
756389	6416414	40	16	1	2	0.1	NA	15	41	1.6
756863	6421212	41A	21	2	3	0.1	NA	18	45	1.8
756194	6415791	41B	13	1	2	0.1	NA	14	40	1.6
760283	6413728	47	11	1	1	0.0	NA	15	40	1.6
765574	6412269	48	9	1	1	0.0	NA	15	40	1.6
765368	6411935	48	9	1	1	0.0	NA	14	40	1.6
756926	6419919	58	22	2	3	0.1	NA	17	44	1.7
756886	6419210	59	22	2	3	0.1	NA	17	44	1.7
756500	6418546	60	21	2	3	0.1	NA	16	43	1.7
756375	6418755	61	21	2	3	0.1	NA	16	43	1.7
756497	6420922	63	19	2	3	0.1	NA	18	44	1.7
756262	6420946	64	19	2	3	0.1	NA	17	44	1.7
767049	6414413	68	17	1	1	0.1	NA	17	43	1.7
756132	6420692	70	19	2	3	0.1	NA	17	44	1.7
756021	6420067	74	19	2	3	0.1	NA	17	44	1.7
756012	6419777	75	19	2	3	0.1	NA	17	43	1.7
755920	6419546	76	19	2	3	0.1	NA	17	43	1.7
756357	6419434	77	20	2	3	0.1	NA	17	43	1.7
755750	6419149	78	19	2	3	0.1	NA	16	43	1.7
756034	6419159	79	20	2	3	0.1	NA	17	43	1.7
755649	6418908	80	19	2	3	0.1	NA	16	43	1.7
756219	6418906	81	20	2	3	0.1	NA	16	43	1.7
756223	6418659	82	21	2	3	0.1	NA	16	43	1.7
755832	6418444	83	19	2	3	0.1	NA	16	43	1.7
756047	6418248	84	20	2	3	0.1	NA	16	43	1.7
755506	6417818	86	18	2	2	0.1	NA	16	42	1.7
755841	6418051	87	19	2	3	0.1	NA	16	42	1.7
756043	6417723	88	19	2	3	0.1	NA	16	42	1.7
755431	6417645	89	18	2	2	0.1	NA	15	42	1.7
755337	6417501	90	17	2	2	0.1	NA	15	42	1.7
755969	6417348	91	19	2	2	0.1	NA	15	42	1.7
754900	6416785	94	15	1	2	0.1	NA	15	41	1.6
755085	6416834	95	16	1	2	0.1	NA	15	41	1.6
755183	6416867	96	16	1	2	0.1	NA	15	41	1.6
755364	6416985	97	16	1	2	0.1	NA	15	41	1.6
755440	6416783	98	16	1	2	0.1	NA	15	41	1.6
755603	6416770	99	16	1	2	0.1	NA	15	41	1.6
755992	6416832	100	17	2	2	0.1	NA	15	41	1.7
755850	6416237	101	15	1	2	0.1	NA	15	41	1.6
755969	6416452	101	16	1	2	0.1	NA	15	41	1.6
755530	6416189	102	15	1	2	0.1	NA	15	40	1.6
755072	6416398	103	15	1	2	0.1	NA	15	41	1.6
755112	6416116	104	14	1	2	0.1	NA	15	40	1.6
755061	6416033	105	14	1	2	0.1	NA	14	40	1.6
755558	6415823	106	14	1	1	0.1	NA	14	40	1.6
755752	6415919	107	14	1	2	0.1	NA	14	40	1.6
755410	6415494	109	13	1	1	0.0	NA	14	40	1.6

			Year 19 - Project alone				Year 19 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755361	6415339	110	13	1	1	0.0	NA	14	40	1.6
755052	6415789	111	14	1	1	0.1	NA	14	40	1.6
755138	6415655	112	13	1	1	0.1	NA	14	40	1.6
755269	6415660	113	13	1	1	0.1	NA	14	40	1.6
767545	6414629	136	17	1	1	0.1	NA	18	44	1.7
771960	6415964	137	23	1	1	0.1	NA	17	45	1.8
769659	6414795	138	18	1	1	0.1	NA	17	44	1.7
769645	6414405	143	17	1	1	0.0	NA	16	43	1.7
770276	6413737	146	17	1	1	0.0	NA	15	41	1.6
757984	6425038	151	35	8	11	0.5	NA	25	55	2.2
758351	6425038	160A	38	8	12	0.6	NA	25	56	2.3
758339	6425214	162	38	8	13	0.6	NA	25	56	2.3
758371	6425110	168	38	8	13	0.6	NA	25	56	2.3
756662	6423986	169	30	5	7	0.3	NA	21	49	2.0
755557	6421185	170	19	2	3	0.1	NA	17	44	1.7
753898	6414840	171	12	1	1	0.0	NA	14	39	1.6
756058	6420779	172	19	2	3	0.1	NA	17	44	1.7
755624	6420844	175	18	2	3	0.1	NA	17	44	1.7
755585	6420625	176	18	2	3	0.1	NA	17	44	1.7
755530	6420496	177	18	2	3	0.1	NA	17	44	1.7
755292	6420111	180	17	2	3	0.1	NA	17	43	1.7
755178	6420092	181	17	2	3	0.1	NA	17	43	1.7
755049	6420016	182	17	2	3	0.1	NA	17	43	1.7
754822	6419969	183	17	2	3	0.1	NA	16	43	1.7
755093	6419504	184	17	2	3	0.1	NA	16	43	1.7
754967	6419464	185	17	2	3	0.1	NA	16	43	1.7
754674	6419437	186	16	2	2	0.1	NA	16	43	1.7
754816	6419137	187	17	2	2	0.1	NA	16	42	1.7
754577	6419073	188	16	2	2	0.1	NA	16	42	1.7
754772	6418881	189	17	2	2	0.1	NA	16	42	1.7
754488	6418711	190	16	2	2	0.1	NA	16	42	1.7
754592	6418520	191	17	2	2	0.1	NA	16	42	1.7
754649	6418328	192	17	2	2	0.1	NA	16	42	1.7
754160	6418080	194	16	2	2	0.1	NA	15	41	1.7
754583	6417973	195	17	2	2	0.1	NA	15	42	1.7
754072	6417840	196	16	2	2	0.1	NA	15	41	1.7
754141	6417241	200	15	1	2	0.1	NA	15	41	1.6
754138	6417158	201	15	1	2	0.1	NA	15	41	1.6
754311	6416962	201	15	1	2	0.1	NA	15	41	1.6
754258	6416804	202	15	1	2	0.1	NA	15	41	1.6
754462	6416639	203	15	1	2	0.1	NA	15	41	1.6
754537	6416557	204	15	1	2	0.1	NA	15	41	1.6
754394	6416192	206	14	1	1	0.1	NA	14	40	1.6
754057	6415768	207	13	1	1	0.0	NA	14	40	1.6
753938	6415612	208	13	1	1	0.0	NA	14	40	1.6
753883	6415407	209	13	1	1	0.0	NA	14	40	1.6
753873	6415226	210	12	1	1	0.0	NA	14	40	1.6
754659	6415319	217	13	1	1	0.0	NA	14	40	1.6
754550	6415117	218	12	1	1	0.0	NA	14	40	1.6
754468	6415586	219	13	1	1	0.0	NA	14	40	1.6
754258	6415351	220	13	1	1	0.0	NA	14	40	1.6
754813	6415761	222	13	1	1	0.1	NA	14	40	1.6
754921	6415935	223	14	1	1	0.1	NA	14	40	1.6
754895	6417021	224	16	1	2	0.1	NA	15	41	1.6
754812	6417270	226	16	1	2	0.1	NA	15	41	1.6
755000	6417482	227	17	2	2	0.1	NA	15	41	1.7
755021	6417572	228	17	2	2	0.1	NA	15	41	1.7
755115	6417791	229	17	2	2	0.1	NA	15	42	1.7
755229	6417879	230	18	2	2	0.1	NA	16	42	1.7
755200	6418034	231	18	2	2	0.1	NA	16	42	1.7
755121	6418197	232	18	2	2	0.1	NA	16	42	1.7
755196	6418290	233	18	2	3	0.1	NA	16	42	1.7
755157	6418405	234	18	2	3	0.1	NA	16	42	1.7
755107	6418631	235	18	2	3	0.1	NA	16	42	1.7
755165	6418738	236	18	2	3	0.1	NA	16	42	1.7
755468	6418862	237	18	2	3	0.1	NA	16	43	1.7
755497	6418969	238	18	2	3	0.1	NA	16	43	1.7
755558	6419118	239	19	2	3	0.1	NA	16	43	1.7
755694	6419408	240	19	2	3	0.1	NA	17	43	1.7

			Year 19 - Project alone				Year 19 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		**24-hr**	**Annual**	**Annual**	**Annual**	**24-hr**	**Annual**	**Annual**	**Annual**
MGA coordinates (Zone 55)			***Impact assessment criteria***							
Easting (m)	**Northing (m)**	**ID**	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755631	6419645	241	18	2	3	0.1	NA	17	43	1.7
Mine-owned receptors										
763424	6421248	2	**85**	8	12	0.5	NA	28	60	2.3
764312	6419748	3	39	3	4	0.1	NA	27	58	2.2
758110	6421399	6	25	3	4	0.2	NA	19	46	1.8
761331	6422274	7	50	7	11	0.5	NA	25	55	2.2
763212	6422933	8	**116**	26	48	**2.5**	NA	**44**	**92**	**4.2**
757478	6422930	9	32	4	6	0.3	NA	20	48	1.9
762910	6431699	10	36	3	4	0.1	NA	19	46	1.7
762881	6431819	10	35	3	4	0.1	NA	19	46	1.7
763608	6426397	12	**296**	**31**	**56**	**2.7**	NA	**47**	**97**	**4.3**
763860	6426113	13	**240**	28	49	**2.3**	NA	**43**	**90**	3.9
764864	6425885	14	**102**	18	28	1.1	NA	**33**	69	2.7
764438	6425349	15	**133**	25	42	1.7	NA	**41**	83	3.3
764166	6424816	16	**171**	**36**	**63**	**2.8**	NA	**51**	**105**	**4.4**
765852	6421087	27	**109**	9	16	0.7	NA	**38**	79	3.3
759316	6416451	28	20	2	4	0.2	NA	16	44	1.8
758233	6425134	41C	37	8	12	0.6	NA	25	56	2.3
765785	6419473	44	42	3	4	0.2	NA	**39**	79	3.1
758431	6425114	46	39	8	13	0.6	NA	25	56	2.3
757462	6425554	46	33	7	11	0.5	NA	25	55	2.2
758171	6424610	46A	39	7	11	0.5	NA	24	54	2.2
759087	6422154	46B	28	4	6	0.3	NA	21	49	1.9
763857	6423567	46C	**214**	**53**	**102**	**5.4**	NA	**71**	**145**	**7.0**
758663	6425526	46E	43	9	14	0.6	NA	27	58	2.4
766156	6423783	46G	**220**	**41**	**75**	**4.0**	NA	**58**	**118**	**5.6**
757370	6423594	49	33	5	7	0.3	NA	21	50	2.0
761026	6413318	51	11	1	1	0.0	NA	14	40	1.6
768518	6421667	65	**62**	4	7	0.4	NA	**35**	73	2.9
768932	6421422	65	**51**	3	5	0.3	NA	**30**	65	2.6
768051	6420974	65	**88**	4	6	0.3	NA	**70**	**130**	**4.9**
772907	6417059	65	30	1	1	0.1	NA	18	45	1.8
767777	6417444	65	27	2	2	0.1	NA	**44**	**91**	3.7
766968	6418411	65	34	2	3	0.1	NA	**94**	**187**	**8.5**
769709	6420922	65	42	2	3	0.2	NA	25	57	2.2
772112	6420135	65	29	1	2	0.1	NA	21	49	1.9
768893	6419042	65	45	2	3	0.2	NA	**35**	72	2.8
769599	6417274	65	28	1	2	0.1	NA	**31**	66	2.7
768684	6421859	141	**56**	4	6	0.3	NA	**30**	64	2.5
757938	6425052	150	35	8	11	0.5	NA	24	55	2.2
757999	6425110	153	35	8	11	0.5	NA	25	55	2.2
758111	6425214	154	36	8	12	0.5	NA	25	56	2.3
758087	6425077	155	35	8	12	0.5	NA	25	55	2.2
758081	6425050	155	35	8	12	0.5	NA	25	55	2.2
758191	6425191	157	36	8	12	0.6	NA	25	56	2.3
757910	6424897	158	36	7	11	0.5	NA	24	54	2.2
758229	6425118	159	37	8	12	0.6	NA	25	56	2.3
758295	6425058	160B	37	8	12	0.6	NA	25	56	2.3
758311	6425114	161	38	8	12	0.6	NA	25	56	2.3
758274	6425257	165	38	8	12	0.6	NA	25	56	2.3
758391	6425134	167	39	8	13	0.6	NA	25	56	2.3
756321	6423522	173	25	4	6	0.3	NA	20	48	1.9

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

8.9 Year 24

From the commencement of mining in Pit 4, the open pit area will have extended from the south up to the northern limits close to the road connecting Ulan and Wollar, across to the east and by Year 24 mining will be progressing to the south. Waste emplacement will be occurring in the previously mined areas of the pit; generally to the north and west.

Mining at Ulan and WCPL will most likely still be continuing but there are no approved operations that cover this period. This makes it impracticable to account for a cumulative assessment taking account of emissions from other mines. Further mining at Ulan and WCPL covering 2024 will require a new approval and no doubt the new approval would be required to take into account the plans for mining at Moolarben as disclosed here, or as they are at the time the assessment is undertaken. Thus the air quality effects would be taken into account in an appropriate way.

The four figures, **Figure 48** to **Figure 51** show the predicted PM_{10} and TSP concentrations and dust deposition levels for Year 24 operations; showing the effects of Moolarben by itself.

Table 13 summarises the impacts at all residential locations and community centres. Those locations which are predicted to experience either concentration or deposition levels above the DECC's assessment criteria are shown in bold. Properties that are highlighted are subject to acquisition by MCM upon written request from the landowner under the Stage 1 Project Approval.

In summary for Year 24, the following exceedances are identified.

- 24-hour average PM_{10} above 50 $\mu g/m^3$ due to the Project considered in isolation – 14 receptors (no private receptors and 14 mine-owned receptors);
- Annual average PM_{10} above 30 $\mu g/m^3$ due to the Project considered in isolation - two mine-owned receptors;
- Annual average TSP above 90 $\mu g/m^3$ due to the Project considered in isolation – one mine-owned receptor; and
- Annual average deposition above 2 g/m^2/month due to the Project considered in isolation – one receptor mine-owned.

Note the discussion above is different from that for previous years because it does not take into account the effect of dust from other mines or other sources. The reason for this is that there is no reliable information on what dust generating activities will be occurring in the area in Year 24.

Table 13. Summary of predicted air quality impacts for Year 24

			Year 24 - Project alone				Year 24 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Freehold receptors										
759764	6420796	5	31	4	5	0	NA	NA	NA	NA
765265	6431931	11	28	3	4	0	NA	NA	NA	NA
758370	6421350	20	21	3	5	0	NA	NA	NA	NA
757342	6421298	22	18	3	4	0	NA	NA	NA	NA
757110	6421102	23	16	3	4	0	NA	NA	NA	NA
758484	6423794	25	38	7	10	0	NA	NA	NA	NA
757430	6423741	26	32	5	8	0	NA	NA	NA	NA
763756	6415963	29A	21	2	2	0	NA	NA	NA	NA
762840	6415591	29B	50	3	6	0	NA	NA	NA	NA
761168	6415971	29	22	2	2	0	NA	NA	NA	NA
758435	6416631	30	25	1	2	0	NA	NA	NA	NA
760008	6416123	31	21	1	2	0	NA	NA	NA	NA
763590	6413194	32	12	1	1	0	NA	NA	NA	NA
759021	6414840	35	15	1	1	0	NA	NA	NA	NA
760388	6416975	36	29	2	3	0	NA	NA	NA	NA
756179	6417106	37	19	1	2	0	NA	NA	NA	NA
756389	6416414	40	20	1	1	0	NA	NA	NA	NA
756863	6421212	41A	16	3	4	0	NA	NA	NA	NA
756194	6415791	41B	19	1	1	0	NA	NA	NA	NA
760283	6413728	47	12	1	1	0	NA	NA	NA	NA
765574	6412269	48	11	1	1	0	NA	NA	NA	NA
765368	6411935	48	11	1	1	0	NA	NA	NA	NA
756926	6419919	58	18	2	3	0	NA	NA	NA	NA
756886	6419210	59	20	2	2	0	NA	NA	NA	NA
756500	6418546	60	19	2	2	0	NA	NA	NA	NA
756375	6418755	61	19	2	2	0	NA	NA	NA	NA
756497	6420922	63	14	2	3	0	NA	NA	NA	NA
756262	6420946	64	13	2	3	0	NA	NA	NA	NA
767049	6414413	68	16	1	1	0	NA	NA	NA	NA
756132	6420692	70	14	2	3	0	NA	NA	NA	NA
756021	6420067	74	15	2	3	0	NA	NA	NA	NA
756012	6419777	75	15	2	2	0	NA	NA	NA	NA
755920	6419546	76	16	2	2	0	NA	NA	NA	NA
756357	6419434	77	17	2	2	0	NA	NA	NA	NA
755750	6419149	78	16	2	2	0	NA	NA	NA	NA
756034	6419159	79	17	2	2	0	NA	NA	NA	NA
755649	6418908	80	16	2	2	0	NA	NA	NA	NA
756219	6418906	81	18	2	2	0	NA	NA	NA	NA
756223	6418659	82	19	2	2	0	NA	NA	NA	NA
755832	6418444	83	18	2	2	0	NA	NA	NA	NA
756047	6418248	84	18	2	2	0	NA	NA	NA	NA
755506	6417818	86	17	1	2	0	NA	NA	NA	NA
755841	6418051	87	18	1	2	0	NA	NA	NA	NA
756043	6417723	88	18	1	2	0	NA	NA	NA	NA
755431	6417645	89	17	1	2	0	NA	NA	NA	NA
755337	6417501	90	17	1	2	0	NA	NA	NA	NA
755969	6417348	91	18	1	2	0	NA	NA	NA	NA
754900	6416785	94	16	1	1	0	NA	NA	NA	NA
755085	6416834	95	17	1	1	0	NA	NA	NA	NA
755183	6416867	96	17	1	1	0	NA	NA	NA	NA
755364	6416985	97	17	1	1	0	NA	NA	NA	NA
755440	6416783	98	17	1	1	0	NA	NA	NA	NA
755603	6416770	99	18	1	1	0	NA	NA	NA	NA
755992	6416832	100	19	1	2	0	NA	NA	NA	NA
755850	6416237	101	19	1	1	0	NA	NA	NA	NA
755969	6416452	101	19	1	1	0	NA	NA	NA	NA
755530	6416189	102	18	1	1	0	NA	NA	NA	NA
755072	6416398	103	17	1	1	0	NA	NA	NA	NA
755112	6416116	104	17	1	1	0	NA	NA	NA	NA
755061	6416033	105	17	1	1	0	NA	NA	NA	NA
755558	6415823	106	18	1	1	0	NA	NA	NA	NA
755752	6415919	107	18	1	1	0	NA	NA	NA	NA
755410	6415494	109	17	1	1	0	NA	NA	NA	NA
755361	6415339	110	17	1	1	0	NA	NA	NA	NA

			Year 24 - Project alone				Year 24 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
755052	6415789	111	17	1	1	0	NA	NA	NA	NA
755138	6415655	112	17	1	1	0	NA	NA	NA	NA
755269	6415660	113	17	1	1	0	NA	NA	NA	NA
767545	6414629	136	17	1	1	0	NA	NA	NA	NA
771960	6415964	137	25	1	2	0	NA	NA	NA	NA
769659	6414795	138	20	1	1	0	NA	NA	NA	NA
769645	6414405	143	18	1	1	0	NA	NA	NA	NA
770276	6413737	146	17	1	1	0	NA	NA	NA	NA
757984	6425038	151	35	7	10	0	NA	NA	NA	NA
758351	6425038	160A	40	8	11	0	NA	NA	NA	NA
758339	6425214	162	40	8	11	0	NA	NA	NA	NA
758371	6425110	168	41	8	11	0	NA	NA	NA	NA
756662	6423986	169	29	5	7	0	NA	NA	NA	NA
755557	6421185	170	14	2	3	0	NA	NA	NA	NA
753898	6414840	171	14	1	1	0	NA	NA	NA	NA
756058	6420779	172	13	2	3	0	NA	NA	NA	NA
755624	6420844	175	13	2	3	0	NA	NA	NA	NA
755585	6420625	176	13	2	3	0	NA	NA	NA	NA
755530	6420496	177	12	2	3	0	NA	NA	NA	NA
755292	6420111	180	12	2	2	0	NA	NA	NA	NA
755178	6420092	181	12	2	2	0	NA	NA	NA	NA
755049	6420016	182	12	2	2	0	NA	NA	NA	NA
754822	6419969	183	12	2	2	0	NA	NA	NA	NA
755093	6419504	184	14	2	2	0	NA	NA	NA	NA
754967	6419464	185	13	2	2	0	NA	NA	NA	NA
754674	6419437	186	13	2	2	0	NA	NA	NA	NA
754816	6419137	187	14	1	2	0	NA	NA	NA	NA
754577	6419073	188	14	1	2	0	NA	NA	NA	NA
754772	6418881	189	14	1	2	0	NA	NA	NA	NA
754488	6418711	190	14	1	2	0	NA	NA	NA	NA
754592	6418520	191	15	1	2	0	NA	NA	NA	NA
754649	6418328	192	15	1	2	0	NA	NA	NA	NA
754160	6418080	194	14	1	2	0	NA	NA	NA	NA
754583	6417973	195	15	1	2	0	NA	NA	NA	NA
754072	6417840	196	14	1	1	0	NA	NA	NA	NA
754141	6417241	200	15	1	1	0	NA	NA	NA	NA
754138	6417158	201	15	1	1	0	NA	NA	NA	NA
754311	6416962	201	15	1	1	0	NA	NA	NA	NA
754258	6416804	202	15	1	1	0	NA	NA	NA	NA
754462	6416639	203	16	1	1	0	NA	NA	NA	NA
754537	6416557	204	16	1	1	0	NA	NA	NA	NA
754394	6416192	206	16	1	1	0	NA	NA	NA	NA
754057	6415768	207	15	1	1	0	NA	NA	NA	NA
753938	6415612	208	15	1	1	0	NA	NA	NA	NA
753883	6415407	209	15	1	1	0	NA	NA	NA	NA
753873	6415226	210	15	1	1	0	NA	NA	NA	NA
754659	6415319	217	16	1	1	0	NA	NA	NA	NA
754550	6415117	218	16	1	1	0	NA	NA	NA	NA
754468	6415586	219	16	1	1	0	NA	NA	NA	NA
754258	6415351	220	15	1	1	0	NA	NA	NA	NA
754813	6415761	222	16	1	1	0	NA	NA	NA	NA
754921	6415935	223	17	1	1	0	NA	NA	NA	NA
754895	6417021	224	16	1	1	0	NA	NA	NA	NA
754812	6417270	226	16	1	1	0	NA	NA	NA	NA
755000	6417482	227	16	1	2	0	NA	NA	NA	NA
755021	6417572	228	16	1	2	0	NA	NA	NA	NA
755115	6417791	229	17	1	2	0	NA	NA	NA	NA
755229	6417879	230	17	1	2	0	NA	NA	NA	NA
755200	6418034	231	17	1	2	0	NA	NA	NA	NA
755121	6418197	232	16	1	2	0	NA	NA	NA	NA
755196	6418290	233	16	1	2	0	NA	NA	NA	NA
755157	6418405	234	16	1	2	0	NA	NA	NA	NA
755107	6418631	235	16	1	2	0	NA	NA	NA	NA
755165	6418738	236	15	1	2	0	NA	NA	NA	NA
755468	6418862	237	16	2	2	0	NA	NA	NA	NA
755497	6418969	238	16	2	2	0	NA	NA	NA	NA
755558	6419118	239	16	2	2	0	NA	NA	NA	NA
755694	6419408	240	15	2	2	0	NA	NA	NA	NA
755631	6419645	241	14	2	2	0	NA	NA	NA	NA

			Year 24 - Project alone				Year 24 - Project and other sources			
			PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)	PM_{10} ($\mu g/m^3$)		TSP ($\mu g/m^3$)	Dust Deposition (g/m^2/mth)
	Averaging period		24-hr	Annual	Annual	Annual	24-hr	Annual	Annual	Annual
MGA coordinates (Zone 55)			*Impact assessment criteria*							
Easting (m)	Northing (m)	ID	*50*	*30*	*90*	*2*	*150*[1]	*30*	*90*	*4*
Mine-owned receptors										
763424	6421248	2	**72**	11	19	1	NA	NA	NA	NA
764312	6419748	3	**71**	6	9	0	NA	NA	NA	NA
758110	6421399	6	20	3	5	0	NA	NA	NA	NA
761331	6422274	7	49	8	13	1	NA	NA	NA	NA
763212	6422933	8	**87**	18	31	2	NA	NA	NA	NA
757478	6422930	9	30	5	7	0	NA	NA	NA	NA
762910	6431699	10	38	4	4	0	NA	NA	NA	NA
762881	6431819	10	37	3	4	0	NA	NA	NA	NA
763608	6426397	12	**118**	19	32	1	NA	NA	NA	NA
763860	6426113	13	**102**	16	27	1	NA	NA	NA	NA
764864	6425885	14	**95**	13	20	1	NA	NA	NA	NA
764438	6425349	15	**106**	16	25	1	NA	NA	NA	NA
764166	6424816	16	**119**	21	34	1	NA	NA	NA	NA
765852	6421087	27	**194**	34	63	3	NA	NA	NA	NA
759316	6416451	28	24	2	2	0	NA	NA	NA	NA
758233	6425134	41C	39	7	11	0	NA	NA	NA	NA
765785	6419473	44	**67**	7	12	0	NA	NA	NA	NA
758431	6425114	46	42	8	11	0	NA	NA	NA	NA
757462	6425554	46	29	7	9	0	NA	NA	NA	NA
758171	6424610	46A	35	7	10	0	NA	NA	NA	NA
759087	6422154	46B	32	5	7	0	NA	NA	NA	NA
763857	6423567	46C	**112**	26	44	2	NA	NA	NA	NA
758663	6425526	46E	44	9	12	1	NA	NA	NA	NA
766156	6423783	46G	**996**	**177**	**391**	19	NA	NA	NA	NA
757370	6423594	49	32	5	8	0	NA	NA	NA	NA
761026	6413318	51	12	1	1	0	NA	NA	NA	NA
768518	6421667	65	**101**	11	22	1	NA	NA	NA	NA
768932	6421422	65	**66**	5	10	1	NA	NA	NA	NA
768051	6420974	65	**123**	9	15	1	NA	NA	NA	NA
772907	6417059	65	34	1	2	0	NA	NA	NA	NA
767777	6417444	65	34	2	3	0	NA	NA	NA	NA
766968	6418411	65	45	3	4	0	NA	NA	NA	NA
769709	6420922	65	48	3	6	0	NA	NA	NA	NA
772112	6420135	65	31	2	3	0	NA	NA	NA	NA
768893	6419042	65	50	3	5	0	NA	NA	NA	NA
769599	6417274	65	34	2	3	0	NA	NA	NA	NA
768684	6421859	141	**85**	8	16	1	NA	NA	NA	NA
757938	6425052	150	34	7	10	0	NA	NA	NA	NA
757999	6425110	153	35	7	10	0	NA	NA	NA	NA
758111	6425214	154	37	7	10	0	NA	NA	NA	NA
758087	6425077	155	36	7	10	0	NA	NA	NA	NA
758081	6425050	155	36	7	10	0	NA	NA	NA	NA
758191	6425191	157	38	7	11	0	NA	NA	NA	NA
757910	6424897	158	33	7	10	0	NA	NA	NA	NA
758229	6425118	159	39	7	11	0	NA	NA	NA	NA
758295	6425058	160B	40	8	11	0	NA	NA	NA	NA
758311	6425114	161	40	8	11	0	NA	NA	NA	NA
758274	6425257	165	39	8	11	0	NA	NA	NA	NA
758391	6425134	167	41	8	11	0	NA	NA	NA	NA
756321	6423522	173	28	4	6	0	NA	NA	NA	NA

[1] Typical approval conditions require that the 99-percentile of 24-hour PM_{10} concentrations be less than 150 $\mu g/m^3$. Since maximum 24-hour background levels are determined by bushfire smoke, dust storms and other essentially unpredictable events there is no reliable way of predicting the cumulative 24-hour concentrations.

9 MONITORING AND MITIGATION

Depending on which period in the life of the mine is being considered, there will be significant numbers of residences to the west and east of dust emissions sources that are part of the Proposal. These residences, particularly those to the west, will be in the prevailing downwind direction. Because of this, it will be necessary to ensure that dust emissions are kept to the minimum practicable level. This section outlines procedures proposed for the management and control of dust emissions. The modelling results presented above are based on the assumption that the

project is operated using a standard of dust control that would meet the definition of best practice for current open cut mining in NSW.

The following procedures are proposed for the management of dust emissions from the mine. The aim of these procedures is to minimise the emission of dust and the effects of these are included in the model simulations. Dust can be generated from two primary sources, these being:

- windblown dust from exposed areas, and
- dust generated by mining activities.

Table 14 and **Table 15** list the different sources of windblown and mining generated dust respectively, and the proposed controls.

Table 14. Control procedures for windblown dust

Source	Control Procedures
Areas disturbed by mining	Disturb only the minimum area necessary for mining. Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable after the completion of overburden tipping.
Coal handling areas / stockpiles	Maintain coal-handling areas / stockpiles in a moist condition using water carts to minimise windblown and traffic generated dust.
ROM Coal Stockpiles	Have available water sprays on ROM coal stockpiles and use sprays to reduce airborne dust, as required.

Table 15. Mine generated dust and controls

Source	Control procedures
Haul Road Dust	All roads and trafficked areas will be watered using water carts and chemically treated to minimise the generation of dust. The modelling assumes 85% of dust control. All haul roads will have edges clearly defined with marker posts or equivalent to control their locations, especially when crossing large overburden emplacement areas. Obsolete roads will be ripped and re-vegetated.
Minor roads	Development of minor roads will be limited and the locations of these will be clearly defined. Minor roads used regularly for access etc will be watered. Obsolete minor roads will be ripped and re-vegetated.
Topsoil Stripping	Access tracks used by topsoil stripping equipment during their loading and unloading cycle will be watered.
Topsoil Stockpiling	Long term topsoil stockpiles not used for over 6 months will be re-vegetated.
Drilling	Dust aprons will be lowered during drilling. Drills will be equipped with dust extraction cyclones, or water injection systems. Water injection or dust suppression sprays will be used when high levels of dust are being generated.
Blasting	Appropriate stemming will be used in all blasts.

It is envisaged that the monitoring program necessary to verify environmental performance will incorporate the following.

- Two existing meteorological stations;

- One high volume PM_{10} sampler (existing);
- The current network of deposition gauges, or as otherwise approved by the DECC, would be used to monitor dust fallout along with the installation of an additional dust gauges as required as a condition of EPL 12932; and
- In addition it will be necessary to employ real-time management procedures to minimise the incidence of short term high concentrations of PM_{10} in the residential areas to the west of the Open Cut 1. This will involve the continuous monitoring of PM_{10} concentrations and contingency plans to reduce emissions should monitoring indicate that the 24-hour average PM_{10} concentrations exceed the DECC assessment criterion of 50 $\mu g/m^3$ due to emissions from Moolarben. The Stage 1 project includes three TEOMs (two fixed and one mobile) to assist in the control of short-term emissions.

10 CONCLUSIONS

This report has assessed the potential air quality impacts of the proposed Moolarben Open Cut Mine near Ulan. It is concluded that the project has the potential to cause a number of exceedances of the DECC's 24-hour PM_{10} assessment criteria at approximately four freehold and 23 mine-owned receptors during the project's life. The application of a real-time dust management strategy could be used to manage these short-term impacts in the residential area to the west of open cut 2. However, it is recognised that a condition of approval will be necessary that requires the project to negotiate and maybe acquire affected properties.

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"User's Guide for the Industrial Source Complex (ISC3) Dispersion Models - Volume 1 User's Instructions" and "Volume 2 Description of Model Algorithms" US Environmental Protection Agency, Office of Air Quality Planning and Standards Emissions, Monitoring and Analysis Division, Research Triangle Park, North Carolina 27711.

APPENDIX A:
JOINT WS, WIND DIRECTION AND STABILITY CLASS FREQUENCY TABLES FOR ULAN METEOROLOGICAL STATION (MET 1) DATA 2005

STATISTICS FOR FILE: C:\Jobs\MoolEA2\Met\MOOL05.isc
MONTHS: All
HOURS : All
OPTION: Frequency

PASQUILL STABILITY CLASS 'A'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.001027	0.001027	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.002283
NE	0.001370	0.002055	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.003653
ENE	0.000799	0.002740	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.003653
E	0.000571	0.001712	0.000913	0.000000	0.000000	0.000000	0.000000	0.000000	0.003196
ESE	0.000685	0.000571	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001256
SE	0.000342	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000571
SSE	0.000342	0.000457	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.001142
S	0.000685	0.000571	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.001370
SSW	0.000000	0.000913	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000913
SW	0.001712	0.000457	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.002283
WSW	0.000228	0.000228	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000685
W	0.000571	0.000342	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.001027
WNW	0.000457	0.000228	0.000228	0.000000	0.000000	0.000000	0.000000	0.000000	0.000913
NW	0.000342	0.000685	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001027
NNW	0.000228	0.000342	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.000913
N	0.000685	0.000685	0.000114	0.000000	0.000000	0.000000	0.000000	0.000000	0.001484
CALM									0.007877
TOTAL	0.010046	0.013242	0.003082	0.000000	0.000000	0.000000	0.000000	0.000000	0.034247

MEAN WS (m/s) = 1.56
NUMBER OF OBSERVATIONS = 300

PASQUILL STABILITY CLASS 'B'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000799	0.000799	0.000913	0.000000	0.000000	0.000000	0.000000	0.000000	0.002511
NE	0.001256	0.003311	0.000457	0.000228	0.000000	0.000000	0.000000	0.000000	0.005251
ENE	0.001027	0.005365	0.002397	0.000228	0.000000	0.000000	0.000000	0.000000	0.009018
E	0.000457	0.009703	0.007763	0.002511	0.000000	0.000000	0.000000	0.000000	0.020434
ESE	0.000457	0.001826	0.001712	0.000342	0.000000	0.000000	0.000000	0.000000	0.004338
SE	0.000114	0.001256	0.000799	0.000000	0.000000	0.000000	0.000000	0.000000	0.002169
SSE	0.000457	0.000913	0.000457	0.000000	0.000000	0.000000	0.000000	0.000000	0.001826
S	0.000685	0.000913	0.000685	0.000000	0.000000	0.000000	0.000000	0.000000	0.002283
SSW	0.000342	0.001027	0.001370	0.000342	0.000000	0.000000	0.000000	0.000000	0.003082
SW	0.000457	0.001370	0.002626	0.001142	0.000000	0.000000	0.000000	0.000000	0.005594
WSW	0.000342	0.000571	0.004224	0.002055	0.000000	0.000000	0.000000	0.000000	0.007192
W	0.000457	0.000685	0.001256	0.000342	0.000000	0.000000	0.000000	0.000000	0.002740
WNW	0.000342	0.001256	0.000913	0.000000	0.000000	0.000000	0.000000	0.000000	0.002511
NW	0.000228	0.001826	0.001027	0.000913	0.000000	0.000000	0.000000	0.000000	0.003995
NNW	0.000457	0.001142	0.000571	0.000342	0.000000	0.000000	0.000000	0.000000	0.002511
N	0.000457	0.001712	0.000571	0.000000	0.000000	0.000000	0.000000	0.000000	0.002740
CALM									0.005365
TOTAL	0.008333	0.033676	0.027740	0.008447	0.000000	0.000000	0.000000	0.000000	0.083562

MEAN WS (m/s) = 2.84
NUMBER OF OBSERVATIONS = 732

PASQUILL STABILITY CLASS 'C'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000685	0.000457	0.000685	0.000114	0.000000	0.000000	0.000000	0.000000	0.001941
NE	0.000457	0.000571	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001027
ENE	0.000799	0.000685	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.001826
E	0.000457	0.002169	0.011073	0.009132	0.002169	0.000000	0.000000	0.000000	0.025000
ESE	0.001370	0.003539	0.003539	0.002169	0.001027	0.000685	0.000000	0.000000	0.012329
SE	0.001142	0.001598	0.001370	0.000000	0.000000	0.000000	0.000000	0.000000	0.004110
SSE	0.001142	0.000913	0.001142	0.000342	0.000000	0.000000	0.000000	0.000000	0.003539
S	0.000913	0.000685	0.001598	0.000000	0.000000	0.000000	0.000000	0.000000	0.003196
SSW	0.000799	0.001256	0.001598	0.000799	0.000000	0.000000	0.000000	0.000000	0.004452
SW	0.001256	0.000571	0.002169	0.002055	0.000571	0.000114	0.000000	0.000000	0.006735
WSW	0.000342	0.000342	0.001142	0.005137	0.002283	0.000457	0.000000	0.000000	0.009703
W	0.000799	0.000799	0.002626	0.003311	0.002283	0.000571	0.000000	0.000000	0.010388
WNW	0.000228	0.001370	0.002055	0.001027	0.001826	0.000342	0.000000	0.000000	0.006849
NW	0.000342	0.000457	0.000799	0.000799	0.001826	0.000342	0.000000	0.000000	0.004566
NNW	0.000342	0.000571	0.000799	0.001027	0.000685	0.000000	0.000000	0.000000	0.003425
N	0.000228	0.000685	0.000342	0.000799	0.000114	0.000000	0.000000	0.000000	0.002169
CALM									0.006393
TOTAL	0.011301	0.016667	0.031279	0.026712	0.012785	0.002511	0.000000	0.000000	0.107648

MEAN WS (m/s) = 3.88
NUMBER OF OBSERVATIONS = 943

PASQUILL STABILITY CLASS 'D'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.003425	0.004680	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.008447
NE	0.002169	0.007420	0.003539	0.000571	0.000000	0.000000	0.000000	0.000000	0.013699
ENE	0.002169	0.006050	0.006393	0.003881	0.000457	0.000000	0.000000	0.000000	0.018950
E	0.001826	0.006393	0.014498	0.015639	0.010845	0.001826	0.001712	0.000000	0.052740
ESE	0.001941	0.009132	0.017466	0.014954	0.010731	0.004224	0.000342	0.000000	0.058790
SE	0.001712	0.005479	0.003311	0.002283	0.000114	0.000000	0.000000	0.000000	0.012900
SSE	0.003082	0.004566	0.002169	0.000799	0.000114	0.000000	0.000000	0.000000	0.010731
S	0.003196	0.003995	0.002740	0.001484	0.000114	0.000000	0.000000	0.000000	0.011530
SSW	0.007763	0.004224	0.002968	0.001256	0.000228	0.000228	0.000000	0.000000	0.016667
SW	0.013584	0.004566	0.004224	0.003539	0.001256	0.000799	0.000571	0.000114	0.028653
WSW	0.003425	0.002397	0.005708	0.005479	0.004680	0.003539	0.002055	0.000114	0.027397
W	0.001027	0.001941	0.002397	0.006393	0.003425	0.002740	0.001712	0.001598	0.021233
WNW	0.000913	0.002968	0.002169	0.003196	0.002283	0.001142	0.000913	0.000342	0.013927
NW	0.000799	0.002397	0.004224	0.002854	0.001826	0.000799	0.001598	0.000228	0.014726
NNW	0.000913	0.001712	0.001598	0.002626	0.001027	0.000457	0.000228	0.000000	0.008562
N	0.001142	0.001826	0.001712	0.000571	0.000228	0.000000	0.000000	0.000000	0.005479
CALM									0.027968
TOTAL	0.049087	0.069749	0.075457	0.065525	0.037329	0.015753	0.009132	0.002397	0.352397

MEAN WS (m/s) = 3.84
NUMBER OF OBSERVATIONS = 3087

PASQUILL STABILITY CLASS 'E'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.001256	0.001826	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003082
NE	0.000685	0.001712	0.004566	0.000342	0.000000	0.000000	0.000000	0.000000	0.007306
ENE	0.000799	0.001826	0.007192	0.003425	0.000000	0.000000	0.000000	0.000000	0.013242
E	0.000457	0.002169	0.012557	0.005023	0.000000	0.000000	0.000000	0.000000	0.020205
ESE	0.000228	0.003425	0.031050	0.005822	0.000000	0.000000	0.000000	0.000000	0.040525
SE	0.001484	0.003082	0.006050	0.001027	0.000000	0.000000	0.000000	0.000000	0.011644
SSE	0.001142	0.000913	0.006050	0.000913	0.000000	0.000000	0.000000	0.000000	0.009018
S	0.000799	0.001370	0.010274	0.001941	0.000000	0.000000	0.000000	0.000000	0.014384
SSW	0.001484	0.002055	0.011301	0.001256	0.000000	0.000000	0.000000	0.000000	0.016096
SW	0.003539	0.004110	0.016210	0.002740	0.000000	0.000000	0.000000	0.000000	0.026598
WSW	0.002169	0.001941	0.005137	0.000685	0.000000	0.000000	0.000000	0.000000	0.009932
W	0.000457	0.001598	0.004338	0.001484	0.000000	0.000000	0.000000	0.000000	0.007877
WNW	0.000799	0.003311	0.002283	0.000114	0.000000	0.000000	0.000000	0.000000	0.006507
NW	0.000571	0.001826	0.002968	0.000228	0.000000	0.000000	0.000000	0.000000	0.005594
NNW	0.000114	0.001598	0.001826	0.000799	0.000000	0.000000	0.000000	0.000000	0.004338
N	0.000228	0.001941	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.002511
CALM									0.013128
TOTAL	0.016210	0.034703	0.122146	0.025799	0.000000	0.000000	0.000000	0.000000	0.211986

MEAN WS (m/s) = 3.30
NUMBER OF OBSERVATIONS = 1857

PASQUILL STABILITY CLASS 'F'

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.000228	0.001598	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001826
NE	0.000571	0.002968	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.003539
ENE	0.000685	0.004680	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.005365
E	0.000571	0.003425	0.001484	0.000000	0.000000	0.000000	0.000000	0.000000	0.005479
ESE	0.001142	0.018037	0.016667	0.000000	0.000000	0.000000	0.000000	0.000000	0.035845
SE	0.001142	0.017466	0.008333	0.000000	0.000000	0.000000	0.000000	0.000000	0.026941
SSE	0.000228	0.007648	0.004566	0.000000	0.000000	0.000000	0.000000	0.000000	0.012443
S	0.002397	0.005708	0.004680	0.000000	0.000000	0.000000	0.000000	0.000000	0.012785
SSW	0.001826	0.009589	0.005023	0.000000	0.000000	0.000000	0.000000	0.000000	0.016438
SW	0.005137	0.011644	0.005365	0.000000	0.000000	0.000000	0.000000	0.000000	0.022146
WSW	0.002968	0.007306	0.004224	0.000000	0.000000	0.000000	0.000000	0.000000	0.014498
W	0.000913	0.005023	0.001256	0.000000	0.000000	0.000000	0.000000	0.000000	0.007192
WNW	0.000228	0.004110	0.002055	0.000000	0.000000	0.000000	0.000000	0.000000	0.006393
NW	0.000571	0.002740	0.001142	0.000000	0.000000	0.000000	0.000000	0.000000	0.004452
NNW	0.000228	0.003082	0.001256	0.000000	0.000000	0.000000	0.000000	0.000000	0.004566
N	0.001142	0.001826	0.000342	0.000000	0.000000	0.000000	0.000000	0.000000	0.003311
CALM									0.026941
TOTAL	0.019977	0.106849	0.056393	0.000000	0.000000	0.000000	0.000000	0.000000	0.210160

MEAN WS (m/s) = 2.33
NUMBER OF OBSERVATIONS = 1841

ALL PASQUILL STABILITY CLASSES

WS Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.007420	0.010388	0.002169	0.000114	0.000000	0.000000	0.000000	0.000000	0.020091
NE	0.006507	0.018037	0.008790	0.001142	0.000000	0.000000	0.000000	0.000000	0.034475
ENE	0.006279	0.021347	0.016438	0.007534	0.000457	0.000000	0.000000	0.000000	0.052055
E	0.004338	0.025571	0.048288	0.032306	0.013014	0.001826	0.001712	0.000000	0.127055
ESE	0.005822	0.036530	0.070434	0.023288	0.011758	0.004909	0.000342	0.000000	0.153082
SE	0.005936	0.029110	0.019863	0.003311	0.000114	0.000000	0.000000	0.000000	0.058333
SSE	0.006393	0.015411	0.014726	0.002055	0.000114	0.000000	0.000000	0.000000	0.038699
S	0.008676	0.013242	0.020091	0.003425	0.000114	0.000000	0.000000	0.000000	0.045548
SSW	0.012215	0.019064	0.022260	0.003653	0.000228	0.000228	0.000000	0.000000	0.057648
SW	0.025685	0.022717	0.030708	0.009475	0.001826	0.000913	0.000571	0.000114	0.092009
WSW	0.009475	0.012785	0.020662	0.013356	0.006963	0.003995	0.002055	0.000114	0.069406
W	0.004224	0.010388	0.011986	0.011530	0.005708	0.003311	0.001712	0.001598	0.050457
WNW	0.002968	0.013242	0.009703	0.004338	0.004110	0.001484	0.000913	0.000342	0.037100
NW	0.002854	0.009932	0.010160	0.004795	0.003653	0.001142	0.001598	0.000228	0.034361
NNW	0.002283	0.008447	0.006393	0.004795	0.001712	0.000457	0.000228	0.000000	0.024315
N	0.003881	0.008676	0.003425	0.001370	0.000342	0.000000	0.000000	0.000000	0.017694
CALM									0.087671
TOTAL	0.114954	0.274886	0.316096	0.126484	0.050114	0.018265	0.009132	0.002397	1.000000

MEAN WS (m/s) = 3.25
NUMBER OF OBSERVATIONS = 8760

FREQUENCY OF OCCURENCE OF STABILITY CLASSES

A : 3.4%
B : 8.4%
C : 10.8%
D : 35.2%
E : 21.2%
F : 21.0%

STABILITY CLASS BY HOUR OF DAY

Hour	A	B	C	D	E	F
01	0000	0000	0000	0063	0160	0142
02	0000	0000	0000	0062	0161	0142
03	0000	0000	0000	0062	0143	0160
04	0000	0000	0000	0062	0142	0161
05	0000	0000	0000	0060	0133	0172
06	0000	0000	0000	0188	0081	0096
07	0004	0001	0043	0232	0035	0050
08	0005	0020	0096	0244	0000	0000
09	0012	0074	0097	0182	0000	0000
10	0018	0105	0094	0148	0000	0000
11	0029	0123	0076	0137	0000	0000
12	0045	0102	0087	0131	0000	0000
13	0049	0082	0086	0148	0000	0000
14	0051	0076	0088	0150	0000	0000
15	0046	0062	0091	0166	0000	0000
16	0035	0043	0091	0196	0000	0000
17	0006	0044	0058	0214	0019	0024
18	0000	0000	0036	0184	0071	0074
19	0000	0000	0000	0156	0096	0113
20	0000	0000	0000	0053	0154	0158
21	0000	0000	0000	0061	0151	0153
22	0000	0000	0000	0059	0171	0135
23	0000	0000	0000	0062	0174	0129
24	0000	0000	0000	0067	0166	0132

STABILITY CLASS BY MIXING HEIGHT

Mixing height	A	B	C	D	E	F
<=500 m	0028	0231	0365	1726	1768	1796
<=1000 m	0082	0240	0257	0766	0052	0026
<=1500 m	0077	0120	0148	0361	0037	0019
<=2000 m	0076	0086	0110	0141	0000	0000
<=3000 m	0031	0047	0047	0070	0000	0000
>3000 m	0006	0008	0016	0023	0000	0000

MIXING HEIGHT BY HOUR OF DAY

Hour	0000 to 0100	0100 to 0200	0200 to 0400	0400 to 0800	0800 to 1600	1600 to 3200	Greater than 3200
01	0119	0109	0093	0029	0003	0012	0000
02	0117	0099	0105	0034	0002	0008	0000
03	0114	0102	0109	0034	0001	0005	0000
04	0125	0097	0104	0036	0002	0001	0000
05	0139	0086	0103	0033	0003	0001	0000
06	0148	0085	0099	0029	0003	0001	0000
07	0158	0082	0110	0013	0002	0000	0000
08	0114	0096	0100	0055	0000	0000	0000
09	0087	0054	0123	0099	0002	0000	0000
10	0019	0061	0084	0165	0035	0001	0000
11	0003	0020	0069	0136	0125	0012	0000
12	0001	0005	0034	0139	0154	0032	0000
13	0002	0003	0020	0079	0204	0054	0003
14	0002	0003	0019	0063	0194	0078	0006
15	0005	0001	0025	0054	0185	0087	0008
16	0005	0006	0024	0050	0177	0093	0010
17	0012	0024	0044	0050	0141	0085	0009
18	0086	0055	0038	0036	0088	0058	0004
19	0130	0075	0111	0037	0007	0005	0000
20	0166	0081	0087	0025	0000	0006	0000
21	0174	0083	0077	0020	0003	0008	0000
22	0155	0100	0073	0027	0003	0007	0000
23	0136	0111	0081	0028	0001	0008	0000
24	0115	0120	0093	0023	0003	0011	0000

APPENDIX B
ESTIMATING DUST EMISSIONS

The dust emissions from the mine have been estimated from the operational description of the proposed mining activities provided by MCM using emission factor equations that relate the quantity of dust liberated from particular activities to the intensity of the activity and the properties of the material being handled and/or the prevailing meteorological conditions. Estimated emissions are presented for all significant dust generating activities associated with the operations. The relevant emission factors used for the study are described below.

To fully replicate the modelling work presented in this report, readers may find it more convenient to access the information in computer compatible format. Any reader wishing to have access to such data should contact Holmes Air Sciences at the address on the front of this report. The computer-compatible files provide information on the location of the dust emissions sources, the dust emission rate for each hour of the year for each particle size category used in the model and for each dust generating activity. They are too voluminous to be provided in printed form.

Stripping topsoil
This is done using a scoop and it has been assumed that the scoop generates 1.5 times the dust that a grader does undertaking a similar operation at 8 km/h.

Estimated TSP emissions from grading roads have been made using the US EPA (1985 and updates) emission factor equation (Equation 1).

Equation 1

$$E_{TSP} = 0.0034 \times S^{2.5} \qquad \text{kg/VKT}$$

where,
S = speed of the grader in km/h (taken to be 8 km/h)
VKT = Vehicle kilometres travelled

Loading coal and overburden
Each tonne of material loaded will generate a quantity of TSP that will depend on the WS and the moisture content. Equation 2 shows the relationship between these variables.

Equation 2

$$E_{TSP} = k \times 0.0016 \times \left(\frac{\left(\frac{U}{2.2} \right)^{1.3}}{\left(\frac{M}{2} \right)^{1.4}} \right) \qquad kg/t$$

where,
E_{TSP} = *TSP emissions*
$k = 0.74$
U = *wind speed(m/s)*
M = *moisture content (%)*
[where $0.25 \leq M \leq 4.8$*]*

Hauling ore and overburden on unsealed surfaces
The uncontrolled emission factor for vehicles travelling on unsealed road is estimated to be 4 kg/VKT (SPCC, 1983). Buonicore and Davis (1992) (refer Page 144) show the level of control that can be achieved through the application of water and or chemical stabilisers (such as DustMag™ or Dustblock). Controls of up to 95% can be achieved provided the moisture content of the surface

material is maintained at 9%. For the current assessment a control of 85%, which is proposed to be achieved through the use of water and proprietary chemical stabilisers will be used on haul roads as required.

Dozers on overburden

Emissions from dozers on overburden have been calculated using the US EPA emission factor equation (US EPA, 1985 and updates). The equation is as follows:

Equation 3

$$E_{TSP} = 2.6 \times \frac{s^{1.2}}{M^{1.3}} \qquad \text{kg/hour}$$

where,

$E_{TSP} = TSP \ \ emissions$

s = silt content (%), and

M = moisture (%)

Dozers ripping/working on coal

Emissions from dozers on coal have been calculated using the US EPA emission factor equation (US EPA (1985 and updates available from the web). The equation is as follows:

Equation 4

$$E_{TSP} = 35.6 \times \left(\frac{s^{1.2}}{M^{1.4}} \right) \qquad \text{kg/h}$$

where,

s = silt content in %

M = moisture content %

Wind erosion

The emission factor for wind erosion is given in Equation 4 below.

Equation 4

$$E_{TSP} = 1.9 \times \left(\frac{s}{1.5} \right) \times \left(\frac{365 - p}{235} \right) \times \left(\frac{f}{15} \right) \qquad \text{kg/ha/day}$$

where,

s = silt content (%)

p = number of raindays per year, and

f = percentage of the time that WS is above 5.4 m/s

Grading roads

Estimated TSP emissions from grading roads have been made using the US EPA (1985 and updates) emission factor equation (Equation 5).

Equation 5

$$E_{TSP} = 0.0034 \times S^{2.5} \qquad \text{kg/VKT}$$

where,
S = speed of the grader in km/h (taken to be 8 km/h)

Using these equations emissions have been estimated for the main dust generating activity associated with mining. The tables below summarise the estimates.

The apportionment of the emissions to particular locations on the ground is shown in **Figure 8** to **Figure 12**, which should be examined in reference to the tabulated data below the tables.

ESTIMATED EMISSIONS: MOOLARBEN

Year 2

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
OB - Stripping topsoil - Pit 1	280	20	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	280	20	h/y	14.0	kg/h						
OB - Drilling - Pit 1	1,628	2,760	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	1,628	2,760	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	8,811	119	blasts/y	74	kg/blast	4836	Area of blast in square metres				
OB - Blasting - Pit 2	-	119	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 3	-	119	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	8,811	119	blasts/y	74	kg/blast	4836	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	55,997	20,040,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Sh/Ex/FELs loading - Pit 2		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Sh/Ex/FELs loading - Pit 4	55,997	20,040,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Hauling to emplacement - Pit 1	100,200	20,040,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	100,200	20,040,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	55,997	20,040,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Emplacing at dumps - Pit 2	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Emplacing at dumps - Pit 4	55,997	20,040,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC in coal %		
OB - Dozers on O/B - Pit 1	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on O/B - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on O/B - Pit 4	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on Rehabilitation - Pit 1	41,838	2,500	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on Rehabilitation - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
OB - Dozers on Rehabilitation - Pit 4	41,838	2,500	h/y	16.7	kg/h	10	silt content in %	2	MC in coal %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	-	0	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Dozers ripping - Pit 1	49,974	2,500	h/y	20.0	kg/h	5	silt content in %	6	MC in coal %		
CL - Dozers ripping - Pit 2	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in % %		
CL - Dozers ripping - Pit 3	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in % %		
CL - Dozers ripping - Pit 4	49,974	2,500	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in % %		
CL - Loading ROM to trucks -Pit 1	472,873	7,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	270,213	4,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	133,000	7,000,000	t/y	0.01900	kg/t	240	t/load	7.6	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	178,000	4,000,000	t/y	0.04450	kg/t	240	t/load	17.8	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - unloading ROM coal at stockpile/hopper Pit 1	472,873	7,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	270,213	4,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	-	0	t/y	0.0676	kg/t						
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)											
CL - Rehandle ROM coal at stockpilepile/hopper	148,617	2,200,000	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	39,61	66,000,000	t/y	0.00060	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	6	MC of coal in %		
CL - Dozers at CHPP	305,872	20,000	h/y	15.3	kg/h	4	silt content in %	6	MC of coal in %		
CL - Loading rejects (too wet)	-	2,200,000	t/y								
CL - Transporting rejects (nominal) back to Pit 1	25,200	1,400,000	t/y	0.01800	kg/t	240	t/load	7.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	35,600	800,000	t/y	0.04450	kg/t	240	t/load	17.8	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	2,200,000	t/y								
CL - Loading product coal stockpile	3,229	11,000,000	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Loading coal to trains	3,229	11,000,000	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
WE - OB spoil area - All pits	632,957	93	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds >5.4 m/s
WE - Open pit - All pits	327,142	48	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds > 5.4 m/s
WE - ROM stockpiles	7,786	2	ha	3385.2	kg/ha/y	73.2	Average number of raindays	5	silt content in %	17.69	% of winds > 5.4 m/s
WE - Product stockpiles	12,457	5	ha	2708.1	kg/ha/y	73.2	Average number of raindays	4	silt content in %	17.69	% of winds > 5.4 m/s
Grading roads	73,856	120,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 9 - Wi	3,479,119										
Wilpinjong Yr 9 - Ws	641,641										
Wilpinjong Yr 9 - We	632,135										
Ulan UG - Wi	147,228										
Ulan UG - Ws	27,153										
Ulan UG - We	26,750										
Ulan OC - Wi	2,859,308										
Ulan OC - Ws	527,331										
Ulan OC - We	519,519										
TOTAL	**4,376,887**										
ROM coal production	11,000,000										
ROM Ratio	0.40										

Key: WS=Wind Speed, MC=Moisture Content

Year 7

ACTIVITY	TSP emission/year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
OB - Stripping topsoil - Pit 1	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	280	20	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	280	20	h/y	14.0	kg/h						
OB - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	3,328	5,640	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	3,328	5,640	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	-	117	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 2	25,189	117	blasts/y	216	kg/blast	9882	Area of blast in square metres				
OB - Blasting - Pit 3	-	117	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	25,189	117	blasts/y	216	kg/blast	9882	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 2		40,080,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 4	111,993	40,080,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Hauling to emplacement - Pit 1	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	200,400	40,080,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	200,400	40,080,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 2	111,993	40,080,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 4	111,993	40,080,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Dozers on O/B - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 2	334,707	20,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 4	334,707	20,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 2	83,677	5,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 4	83,677	5,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	1,876	3,180	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	1,876	3,180	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	123	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 2	10,411	123	blasts/y	85	kg/blast	5300	Area of blast in square metres				
CL - Blasting - Pit 3	-	123	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	10,411	123	blasts/y	85	kg/blast	5300	Area of blast in square metres				

ACTIVITY	TSP emission/year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Dozers ripping - Pit 1	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 2	99,948	5,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 3	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 4	99,948	5,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading ROM to trucks -Pit 1	1,882	27,853	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	53,512	792,147	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	270,213	4,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	212,593	3,147,042	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	529	27,853	t/y	0.01900	kg/t	240	t/load	7.6	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	28,121	792,147	t/y	0.03550	kg/t	240	t/load	14.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	142,000	4,000,000	t/y	0.03550	kg/t	240	t/load	14.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	-	3,147,042	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - unloading ROM coal at stockpile/hopper Pit 1	1,882	27,853	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	53,512	792,147	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	270,213	4,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	212,593	3,147,042	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	-	0	t/y	0.0676	kg/t						
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)	-										
CL - Rehandle ROM coal at stockpilepile/hopper	107,640	1,593,408	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	28,691	47,802,252	t/y	0.00060	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	6	MC of coal in %		
CL - Dozers at CHPP	382,340	25,000	h/y	15.3	kg/h	4	silt content in %	6	MC of coal in %		
CL - Loading rejects (too wet)	-	1,593,408	t/y								
CL - Transporting rejects (nominal) back to Pit 1	100	5,571	t/y	0.01800	kg/t	240	t/load	7.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	5,624	158,429	t/y	0.03550	kg/t	240	t/load	14.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	28,400	800,000	t/y	0.03550	kg/t	240	t/load	14.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	-	629,408	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	1,593,408	t/y								
CL - Loading product coal stockpile	2,339	7,967,042	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
CL - Loading coal to trains	2,339	7,967,042	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
WE - OB spoil area - All pits	646,836	96	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds z> 5.4 m/s
WE - Open pit - All pits	111,643	16	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds > 5.4 m/s

ACTIVITY	TSP emission/year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
WE - ROM stockpiles	7,786	2	ha	3385.2	kg/ha/y	73.2	Average number of raindays	5	silt content in %	17.69	% of winds > 5.4 m/s
WE - Product stockpiles	12,457	5	ha	2708.1	kg/ha/y	73.2	Average number of raindays	4	silt content in %	17.69	% of winds > 5.4 m/s
Grading roads	98,475	160,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 13 - Wi	3,642,525										
Wilpinjong Yr 13 - Ws	671,777										
Wilpinjong Yr 13 - We	661,825										
Ulan UG - Wi	147,228										
Ulan UG - Ws	27,153										
Ulan UG - We	26,750										
Ulan OC - Wi	2,859,308										
Ulan OC - Ws	527,331										
Ulan OC - We	519,519										
TOTAL	**4,537,328**										
ROM coal production	12000000										
ROM Ratio	0.38										

Key: WS=Wind Speed, MC=Moisture Content

Year 12

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
OB - Stripping topsoil - Pit 1	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	560	40	h/y	14.0	kg/h						
OB - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	6,584	11,160	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	-	117	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 2	-	117	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 3	-	117	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	70,862	118	blasts/y	602	kg/blast	19553	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 2		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 4	223,986	80,160,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Hauling to emplacement - Pit 1	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	400,800	80,160,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 2	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 4	223,986	80,160,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Dozers on O/B - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 4	836,767	50,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 4	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	7,009	11,880	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	26,268	121	blasts/y	217	kg/blast	9900	Area of blast in square metres				

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Dozers ripping - Pit 1	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 2	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 3	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 4	99,948	5,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading ROM to trucks -Pit 1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	810,639	12,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	204,939	3,033,745	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	474,000	12,000,000	t/y	0.03950	kg/t	240	t/load	15.8	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	48,540	3,033,745	t/y	0.01600	kg/t	240	t/load	6.4	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - unloading ROM coal at stockpile/hopper Pit 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	67,553	1,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	810,639	12,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	204,939	3,033,745	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	-	0	t/y	0.0676	kg/t						
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)	206,164										
CL - Rehandle ROM coal at stockpilepile/hopper	230,137	3,406,749	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	61,342	102,202,470	t/y	0.00060	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	6	MC of coal in %		
CL - Dozers at CHPP	499,738	25,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading rejects (too wet)	-	3,406,749	t/y								
CL - Transporting rejects (nominal) back to Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	94,800	2,400,000	t/y	0.03950	kg/t	240	t/load	15.8	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	9,708	606,749	t/y	0.01600	kg/t	240	t/load	6.4	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	3,406,749	t/y								
CL - Loading product coal stockpile	4,707	16,033,745	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
CL - Loading coal to trains	4,707	16,033,745	t/y	0.00029	kg/t	2.360	Avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
WE - OB spoil area - All pits	1,112,093	164	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds above 5.4 m/s
WE - Open pit - All pits	287,874	43	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds above 5.4 m/s

ACTIVITY	TSP emission/yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
WE - ROM stockpiles	7,786	2	ha	3385.2	kg/ha/y	73.2	Average number of raindays	5	silt content in %	17.69	% of winds above 5.4 m/s
WE - Product stockpiles	12,457	5	ha	2708.1	kg/ha/y	73.2	Average number of raindays	4	silt content in %	17.69	% of winds above 5.4 m/s
Grading roads	123,093	200,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 14 - Wi	3,223,557										
Wilpinjong Yr 14 - Ws	594,508										
Wilpinjong Yr 14 - We	585,701										
Ulan UG - Wi	147,228										
Ulan UG - Ws	27,153										
Ulan UG - We	26,750										
Ulan OC - Wi	2,859,308										
Ulan OC - Ws	527,331										
Ulan OC - We	519,519										
TOTAL	**7,455,979**										
ROM coal production	13000000										
ROM Ratio	0.57										

Key: WS=Wind Speed, MC=Moisture Content

Year 16

ACTIVITY	TSP emission/ yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
OB - Stripping topsoil - Pit 1	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	560	40	h/y	14.0	kg/h						
OB - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	8,284	14,040	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	99,351	117	blasts/y	849	kg/blast	24599	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 2		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 4	335,979	120,240,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Hauling to emplacement - Pit 1	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	601,200	120,240,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 2	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 4	335,979	120,240,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Dozers on O/B - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 4	836,767	50,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 4	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	7,009	11,880	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	26,268	121	blasts/y	217	kg/blast	9900	Area of blast in square metres				

ACTIVITY	TSP emission/ yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Dozers ripping - Pit 1	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 2	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 3	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 4	199,895	10,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading ROM to trucks -Pit 1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	810,639	12,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG2	149,482	2,212,800	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	222,000	12,000,000	t/y	0.01850	kg/t	240	t/load	7.4	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	35,405	2,212,800	t/y	0.01600	kg/t	240	t/load	6.4	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL -unloading ROM coal at stockpile/hopper Pit 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	67,553	1,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	810,639	12,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	149,482	2,212,800	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	-	0	t/y	0.0676	kg/t						
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)	235,674										
CL - Rehandle ROM coal at stockpilepile/hopper	219,046	3,242,560	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	58,385	97,276,800	t/y	0.00060	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	6	MC of coal in %		
CL - Dozers at CHPP	499,738	25,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading rejects (too wet)	-	3,242,560	t/y								
CL - Transporting rejects (nominal) back to Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	44,400	2,400,000	t/y	0.01850	kg/t	240	t/load	7.4	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	7,081	442,560	t/y	0.01600	kg/t	240	t/load	6.4	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	3,242,560	t/y								
CL - Loading product coal stockpile	4,466	15,212,800	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
CL - Loading coal to trains	4,466	15,212,800	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
WE - OB spoil area - All pits	1,283,179	190	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds > 5.4 m/s
WE - Open pit - All pits	174,403	26	ha	6770.3	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.69	% of winds >5.4 m/s

ACTIVITY	TSP emission/ yr	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
WE - ROM stockpiles	7,786	2	ha	3385.2	kg/ha/y	73.2	Average number of raindays	5	silt content in %	17.69	% of winds > 5.4 m/s
WE - Product stockpiles	12,457	5	ha	2708.1	kg/ha/y	73.2	Average number of raindays	4	silt content in %	17.69	% of winds > 5.4 m/s
Grading roads	123,093	200,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 14 - Wi	3,323,556										
Wilpinjong Yr 14 - Ws	612,951										
Wilpinjong Yr 14 - We	603,870										
Ulan UG - Wi	147,228										
Ulan UG - Ws	27,153										
Ulan UG - We	26,750										
Ulan OC - Wi	2,859,308										
Ulan OC - Ws	527,331										
Ulan OC - We	519,519										
TOTAL	**7,654,020**										
ROM coal production	13000000										
ROM Ratio	0.59										

Key: WS= Wind Speed, MC = Moisture Content

Year 19

ACTIVITY	TSP emission/ year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
OB - Stripping topsoil - Pit 1	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	560	40	h/y	14.0	kg/h						
OB - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	8,284	14,040	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	99,351	117	blasts/y	849	kg/blast	24599	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 2		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Sh/Ex/FELs loading - Pit 4	279,983	100,200,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Hauling to emplacement - Pit 1	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	501,000	100,200,000	t/y	0.00500	kg/t	240	t/truck load	2	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 2	-	0	t/y	0.00279	kg/t	2.360	Avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Emplacing at dumps - Pit 4	279,983	100,200,000	t/y	0.00279	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	2	MC of coal in %		
OB - Dozers on O/B - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on O/B - Pit 4	836,767	50,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
OB - Dozers on Rehabilitation - Pit 4	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	MC of coal in %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	7,009	11,880	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	26,268	121	blasts/y	217	kg/blast	9900	Area of blast in square metres				

ACTIVITY	TSP emission/ year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
CL - Dozers ripping - Pit 1	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 2	-	0	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 3	-		h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Dozers ripping - Pit 4	199,895	10,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading ROM to trucks -Pit 1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	810,639	12,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	236,435	3,499,973	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	396,000	12,000,000	t/y	0.03300	kg/t	240	t/load	13.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	3,499,973	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - unloading ROM coal at stockpile/hopper Pit 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	67,553	1,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	810,639	12,000,000	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	236,435	3,499,973	t/y	0.0676	kg/t						
CL - Total for Pit 3 (taken as dust produced per tonne of coal mined)	226,341										
CL - Rehandle ROM coal at stockpilepile/hopper	236,436	3499994.6	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	63,021	104,999,838	t/y	0.00060	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	6	MC of coal in %		
CL - Dozers at CHPP	499,738	25,000	h/y	20.0	kg/h	5	silt content in %	6	MC of coal in %		
CL - Loading rejects (too wet)	-	3,499,995	t/y								
CL - Transporting rejects (nominal) back to Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	79,200	2,400,000	t/y	0.03300	kg/t	240	t/load	13.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	699,995	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	3,499,995	t/y								
CL - Loading product coal stockpile	4,844	16,499,973	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
CL - Loading coal to trains	4,844	16,499,973	t/y	0.00029	kg/t	2.360	avg of (WS/2.2)^1.3 in m/s	10	MC of coal in %		
WE - OB spoil area - All pits	1,655,761	245	ha	6766.5	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.68	% of winds > 5.4 m/s
WE - Open pit - All pits	201,371	30	ha	6766.5	kg/ha/y	73.2	Average number of raindays	10	silt content in %	17.68	% of winds above 5.4

ACTIVITY	TSP emission/ year	Intensity	units	Emission factor	units	Var 1	units	Var 2	units	Var 3	units
											m/s
WE - ROM stockpiles	7,781	2	ha	3383.2	kg/ha/y	73.2	Average number of raindays	5	silt content in %	17.68	% of winds > 5.4 m/s
WE - Product stockpiles	12,450	5	ha	2706.6	kg/ha/y	73.2	Average number of raindays	4	silt content in %	17.68	% of winds > 5.4 m/s
Grading roads	123,093	200,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 14 - Wi	3,323,556										
Wilpinjong Yr 14 - Ws	612,951										
Wilpinjong Yr 14 - We	603,870										
Ulan UG - Wi	147,228										
Ulan UG - Ws	27,153										
Ulan UG - We	26,750										
Ulan OC - Wi	2,859,308										
Ulan OC - Ws	527,331										
Ulan OC - We	519,519										
TOTAL	**8,19,034**										
ROM coal production	13000000										
ROM Ratio	0.63										

Key: WS=Wind Speed, MC = Moisture Content

Year 24

ACTIVITY	TSP emission/ year	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units
OB - Stripping topsoil - Pit 1	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 2	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 3	-	0	h/y	14.0	kg/h						
OB - Stripping topsoil - Pit 4	560	40	h/y	14.0	kg/h						
OB - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
OB - Drilling - Pit 4	14,302	24,240	holes/y	0.59	kg/hole						
OB - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
OB - Blasting - Pit 4	171,458	202	blasts/y	849	kg/blast	24599	Area of blast in square metres				
OB - Sh/Ex/FELs loading - Pit 1	-	0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Sh/Ex/FELs loading - Pit 2		0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Sh/Ex/FELs loading - Pit 3		0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Sh/Ex/FELs loading - Pit 4	233,646	83,617,169	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Hauling to emplacement - Pit 1	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 2	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 3	-	0	t/y	0.00000	kg/t	240	t/truck load	0	km/return trip	0.6	kg/VKT
OB - Hauling to emplacement - Pit 4	1,045,215	83,617,169	t/y	0.01250	kg/t	240	t/truck load	5	km/return trip	0.6	kg/VKT
OB - Emplacing at dumps - Pit 1	-	0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Emplacing at dumps - Pit 2	-	0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Emplacing at dumps - Pit 3	-	0	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		

OB - Emplacing at dumps - Pit 4	233,646	83,617,169	t/y	0.00279	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %		
OB - Dozers on O/B - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on O/B - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on O/B - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on O/B - Pit 4	836,767	50,000	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on Rehabilitation - Pit 1	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on Rehabilitation - Pit 2	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on Rehabilitation - Pit 3	-	0	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
OB - Dozers on Rehabilitation - Pit 4	167,353	10,000	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %		
CL - Drilling - Pit 1	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 2	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 3	-	0	holes/y	0.59	kg/hole						
CL - Drilling - Pit 4	7,009	11,880	holes/y	0.59	kg/hole						
CL - Blasting - Pit 1	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 2	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 3	-	0	blasts/y	0	kg/blast	0	Area of blast in square metres				
CL - Blasting - Pit 4	9,268	120	blasts/y	77	kg/blast	4977	Area of blast in square metres				
CL - Dozers ripping - Pit 1	-	0	h/y	20.0	kg/h	5	silt content in %	6	moisture content in %		
CL - Dozers ripping - Pit 2	-	0	h/y	20.0	kg/h	5	silt content in %	6	moisture content in %		
CL - Dozers ripping - Pit 3	-		h/y	20.0	kg/h	5	silt content in %	6	moisture content in %		
CL - Dozers ripping - Pit 4	199,895	10,000	h/y	20.0	kg/h	5	silt content in %	6	moisture content in %		
CL - Loading ROM to trucks -Pit 1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 3	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -Pit 4	633,918	9,383,976	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG1	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				

CL - Loading ROM to trucks -UG2	-	0	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Loading ROM to trucks -UG3	270,213	4,000,000	t/y	0.06755	kg/t	6	moisture content of coal in %				
CL - Hauling ROM coal to dump hopper - Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 3	58,000	1,000,000	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - Pit 4	234,599	9,383,976	t/y	0.02500	kg/t	240	t/load	10	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Hauling ROM coal to dump hopper - UG 3	-	4,000,000	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - unloading ROM coal at stockpile/hopper Pit 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 3	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper Pit 4	633,918	9,383,976	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 1	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 2	-	0	t/y	0.0676	kg/t						
CL - unloading ROM coal at stockpile/hopper UG 3	270,213	4,000,000	t/y	0.0676	kg/t						
CL - Rehandle ROM coal at stockpilepile/hopper	194,337	2,876,795	t/y	0.0676	kg/t						
CL - Handling coal at CHPP	51,799	86,303,856	t/y	0.00060	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	6	moisture content of coal in %		
CL - Dozers at CHPP	499,738	25,000	h/y	20.0	kg/h	5	silt content in %	6	moisture content in %		
CL - Loading rejects (too wet)	-	2,876,795	t/y								
CL - Transporting rejects (nominal) back to Pit 1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 3	-	0	t/y	0.05800	kg/t	240	t/load	23.2	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to Pit 4	46,920	1,876,795	t/y	0.02500	kg/t	240	t/load	10	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG1	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG2	-	0	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Transporting rejects (nominal) back to UG3	-	800,000	t/y	0.00000	kg/t	240	t/load	0	km/return trip	0.6	kg/VKT
CL - Unloading rejects (too wet)	-	2,876,795	t/y								
CL - Loading product coal stockpile	4,223	14,383,976	t/y	0.00029	kg/t	2.360	average `of (wind speed/2.2)^1.3 in m/s	10	moisture content of coal in %		
CL - Loading coal to trains	4,223	14,383,976	t/y	0.00029	kg/t	2.360	average of (wind speed/2.2)^1.3 in m/s	10	moisture content of coal in %		
WE - OB spoil area - All pits	1,939,345	287	ha	6766.5	kg/ha /y	73.2	Average number of raindays	10	silt content in %	17.68	% of winds above 5.4 m/s
WE - Open pit - All pits	201,371	30	ha	6766.5	kg/ha	73.2	Average number of raindays	10	silt content in %	17.68	% of winds above 5.4

					/y						m/s
WE - ROM stockpiles	7,781	2	ha	3383.2	kg/ha /y	73.2	Average number of raindays	5	silt content in %	17.68	% of winds above 5.4 m/s
WE - Product stockpiles	12,450	5	ha	2706.6	kg/ha /y	73.2	Average number of raindays	4	silt content in %	17.68	% of winds above 5.4 m/s
Grading roads	123,093	200,000	km	0.61547	kg/VKT	8	speed of graders in km/h				
Wilpinjong Yr 14 - Wi	NA										
Wilpinjong Yr 14 - Ws	NA										
Wilpinjong Yr 14 - We	NA										
Ulan CHPP - Wi	NA										
Ulan CHPP - Ws	NA										
Ulan CHPP - We	NA										
Ulan OC &UG - Wi	NA										
Ulan OC & UG - Ws	NA										
Ulan OC & UG- We	NA										
TOTAL	**8,105,262**										
ROM coal production	14,383,976										
ROM Ratio	0.56										

Key: WS=Wind Speed, MC = Moisture Content. NA means not available because approvals for Wilpinjong and Ulan extend do not currently extend to this period.

APPENDIX C:
EXAMPLE OF ISC INPUT FILE
(Note: to save space only a portion of the output is provided. The complete files can be provided on request.)

```
**  ISCST3 model input runstream : Dust
CO STARTING
   TITLEONE ISCST3 Dust Model Run
   MODELOPT RURAL CONC DDEP DRYDPLT HE>ZI
   AVERTIME 24 PERIOD
   POLLUTID TSP
**   ERRORFIL error.log
   TERRHGTS ELEV
   RUNORNOT RUN
CO FINISHED

SO STARTING
   LOCATION  POINT1  VOLUME  762819 6426230 445.0
   LOCATION  POINT2  VOLUME  763288 6426108 463.0
   LOCATION  POINT3  VOLUME  763776 6425741 453.0
   LOCATION  POINT4  VOLUME  764041 6425253 434.0
   LOCATION  POINT5  VOLUME  764102 6424682 423.0
   LOCATION  POINT6  VOLUME  763960 6424153 422.0
   LOCATION  POINT7  VOLUME  763654 6423623 426.0
   LOCATION  POINT8  VOLUME  763165 6423358 437.0
   LOCATION  POINT9  VOLUME  762860 6422747 438.0
   LOCATION  POINT10  VOLUME  763023 6422116 445.0
   LOCATION  POINT11  VOLUME  763125 6421545 449.0
   LOCATION  POINT12  VOLUME  763064 6421016 460.0
   LOCATION  POINT13  VOLUME  763226 6420486 467.0
   LOCATION  POINT14  VOLUME  763512 6419957 483.0
   LOCATION  POINT15  VOLUME  763899 6419631 493.0
   LOCATION  POINT16  VOLUME  763389 6419488 499.0
   LOCATION  POINT17  VOLUME  762391 6426169 446.0
   LOCATION  POINT18  VOLUME  761760 6426149 427.0
   LOCATION  POINT19  VOLUME  761454 6425782 437.0
   LOCATION  POINT20  VOLUME  761108 6425354 433.0
   LOCATION  POINT21  VOLUME  760741 6424967 432.0
   LOCATION  POINT22  VOLUME  760477 6424540 440.0
   LOCATION  POINT23  VOLUME  759988 6424519 456.0
   LOCATION  POINT24  VOLUME  759621 6424275 465.0
   LOCATION  POINT25  VOLUME  759621 6423847 478.0
   LOCATION  POINT26  VOLUME  759397 6423338 478.0
   LOCATION  POINT27  VOLUME  760212 6424316 457.0
   LOCATION  POINT28  VOLUME  760925 6424071 457.0
   LOCATION  POINT29  VOLUME  760415 6423786 481.0
   LOCATION  POINT30  VOLUME  759784 6424214 466.0
   LOCATION  POINT31  VOLUME  759927 6423888 483.0
   LOCATION  POINT32  VOLUME  760680 6424723 436.0
   LOCATION  POINT33  VOLUME  761047 6424560 449.0
   LOCATION  POINT34  VOLUME  763349 6419569 497.0
   LOCATION  POINT35  VOLUME  764082 6419386 491.0
   LOCATION  POINT36  VOLUME  764571 6419244 489.0
   LOCATION  POINT37  VOLUME  762880 6419610 527.0
   LOCATION  POINT38  VOLUME  763084 6419162 525.0
   LOCATION  POINT39  VOLUME  763389 6418673 542.0
   LOCATION  POINT40  VOLUME  764917 6418897 496.0
   LOCATION  POINT41  VOLUME  765263 6418368 510.0
   LOCATION  POINT42  VOLUME  761780 6426658 417.0
   LOCATION  POINT43  VOLUME  762127 6426740 423.0
   LOCATION  POINT44  VOLUME  762819 6426373 442.0
   LOCATION  POINT45  VOLUME  762412 6426454 435.0
   LOCATION  POINT46  VOLUME  762595 6426821 428.0
   LOCATION  POINT47  VOLUME  770397 6416371 435.0
   LOCATION  POINT48  VOLUME  770845 6417655 404.0
   LOCATION  POINT49  VOLUME  772474 6418653 378.0
   LOCATION  POINT50  VOLUME  773391 6418062 386.0
   LOCATION  POINT51  VOLUME  759377 6428838 431.0
   LOCATION  POINT52  VOLUME  762819 6426230 445.0
   LOCATION  POINT53  VOLUME  763288 6426108 463.0
   LOCATION  POINT54  VOLUME  763776 6425741 453.0
   LOCATION  POINT55  VOLUME  764041 6425253 434.0
   LOCATION  POINT56  VOLUME  764102 6424682 423.0
   LOCATION  POINT57  VOLUME  763960 6424153 422.0
   LOCATION  POINT58  VOLUME  763654 6423623 426.0
   LOCATION  POINT59  VOLUME  763165 6423358 437.0
   LOCATION  POINT60  VOLUME  762860 6422747 438.0
   LOCATION  POINT61  VOLUME  763023 6422116 445.0
   LOCATION  POINT62  VOLUME  763125 6421545 449.0
   LOCATION  POINT63  VOLUME  763064 6421016 460.0
   LOCATION  POINT64  VOLUME  763226 6420486 467.0
```

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LOCATION  POINT65  VOLUME  763512 6419957 483.0
LOCATION  POINT66  VOLUME  763899 6419631 493.0
LOCATION  POINT67  VOLUME  763389 6419488 499.0
LOCATION  POINT68  VOLUME  762391 6426169 446.0
LOCATION  POINT69  VOLUME  761760 6426149 427.0
LOCATION  POINT70  VOLUME  761454 6425782 437.0
LOCATION  POINT71  VOLUME  761108 6425354 433.0
LOCATION  POINT72  VOLUME  760741 6424967 432.0
LOCATION  POINT73  VOLUME  760477 6424540 440.0
LOCATION  POINT74  VOLUME  759988 6424519 456.0
LOCATION  POINT75  VOLUME  759621 6424275 465.0
LOCATION  POINT76  VOLUME  759621 6423847 478.0
LOCATION  POINT77  VOLUME  759397 6423338 478.0
LOCATION  POINT78  VOLUME  760212 6424316 457.0
LOCATION  POINT79  VOLUME  760925 6424071 457.0
LOCATION  POINT80  VOLUME  760415 6423786 481.0
LOCATION  POINT81  VOLUME  759784 6424214 466.0
LOCATION  POINT82  VOLUME  759927 6423888 483.0
LOCATION  POINT83  VOLUME  760680 6424723 436.0
LOCATION  POINT84  VOLUME  761047 6424560 449.0
LOCATION  POINT85  VOLUME  763349 6419569 497.0
LOCATION  POINT86  VOLUME  764082 6419386 491.0
LOCATION  POINT87  VOLUME  764571 6419244 489.0
LOCATION  POINT88  VOLUME  762880 6419610 527.0
LOCATION  POINT89  VOLUME  763084 6419162 525.0
LOCATION  POINT90  VOLUME  763389 6418673 542.0
LOCATION  POINT91  VOLUME  764917 6418897 496.0
LOCATION  POINT92  VOLUME  765263 6418368 510.0
LOCATION  POINT93  VOLUME  761780 6426658 417.0
LOCATION  POINT94  VOLUME  762127 6426740 423.0
LOCATION  POINT95  VOLUME  762819 6426373 442.0
LOCATION  POINT96  VOLUME  762412 6426454 435.0
LOCATION  POINT97  VOLUME  762595 6426821 428.0
LOCATION  POINT98  VOLUME  770397 6416371 435.0
LOCATION  POINT99  VOLUME  770845 6417655 404.0
LOCATION  POINT100  VOLUME  772474 6418653 378.0
LOCATION  POINT101  VOLUME  773391 6418062 386.0
LOCATION  POINT102  VOLUME  759377 6428838 431.0
LOCATION  POINT103  VOLUME  762819 6426230 445.0
LOCATION  POINT104  VOLUME  763288 6426108 463.0
LOCATION  POINT105  VOLUME  763776 6425741 453.0
LOCATION  POINT106  VOLUME  764041 6425253 434.0
LOCATION  POINT107  VOLUME  764102 6424682 423.0
LOCATION  POINT108  VOLUME  763960 6424153 422.0
LOCATION  POINT109  VOLUME  763654 6423623 426.0
LOCATION  POINT110  VOLUME  763165 6423358 437.0
LOCATION  POINT111  VOLUME  762860 6422747 438.0
LOCATION  POINT112  VOLUME  763023 6422116 445.0
LOCATION  POINT113  VOLUME  763125 6421545 449.0
LOCATION  POINT114  VOLUME  763064 6421016 460.0
LOCATION  POINT115  VOLUME  763226 6420486 467.0
LOCATION  POINT116  VOLUME  763512 6419957 483.0
LOCATION  POINT117  VOLUME  763899 6419631 493.0
LOCATION  POINT118  VOLUME  763389 6419488 499.0
LOCATION  POINT119  VOLUME  762391 6426169 446.0
LOCATION  POINT120  VOLUME  761760 6426149 427.0
LOCATION  POINT121  VOLUME  761454 6425782 437.0
LOCATION  POINT122  VOLUME  761108 6425354 433.0
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LOCATION  POINT124  VOLUME  760477 6424540 440.0
LOCATION  POINT125  VOLUME  759988 6424519 456.0
LOCATION  POINT126  VOLUME  759621 6424275 465.0
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LOCATION  POINT128  VOLUME  759397 6423338 478.0
LOCATION  POINT129  VOLUME  760212 6424316 457.0
LOCATION  POINT130  VOLUME  760925 6424071 457.0
LOCATION  POINT131  VOLUME  760415 6423786 481.0
LOCATION  POINT132  VOLUME  759784 6424214 466.0
LOCATION  POINT133  VOLUME  759927 6423888 483.0
LOCATION  POINT134  VOLUME  760680 6424723 436.0
LOCATION  POINT135  VOLUME  761047 6424560 449.0
LOCATION  POINT136  VOLUME  763349 6419569 497.0
LOCATION  POINT137  VOLUME  764082 6419386 491.0
LOCATION  POINT138  VOLUME  764571 6419244 489.0
LOCATION  POINT139  VOLUME  762880 6419610 527.0
LOCATION  POINT140  VOLUME  763084 6419162 525.0
```

```
   LOCATION  POINT141  VOLUME  763389 6418673 542.0
   LOCATION  POINT142  VOLUME  764917 6418897 496.0
   LOCATION  POINT143  VOLUME  765263 6418368 510.0
   LOCATION  POINT144  VOLUME  761780 6426658 417.0
   LOCATION  POINT145  VOLUME  762127 6426740 423.0
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   LOCATION  POINT147  VOLUME  762412 6426454 435.0
   LOCATION  POINT148  VOLUME  762595 6426821 428.0
   LOCATION  POINT149  VOLUME  770397 6416371 435.0
   LOCATION  POINT150  VOLUME  770845 6417655 404.0
   LOCATION  POINT151  VOLUME  772474 6418653 378.0
   LOCATION  POINT152  VOLUME  773391 6418062 386.0
   LOCATION  POINT153  VOLUME  759377 6428838 431.0
** Point Source       QS   RH  IL   IV
** Parameters        ----  --- ---  ---
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   SRCPARAM  POINT2  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT4  1.0 2.0 10.0 2.0
   SRCPARAM  POINT5  1.0 2.0 10.0 2.0
   SRCPARAM  POINT6  1.0 2.0 10.0 2.0
   SRCPARAM  POINT7  1.0 2.0 10.0 2.0
   SRCPARAM  POINT8  1.0 2.0 10.0 2.0
   SRCPARAM  POINT9  1.0 2.0 10.0 2.0
   SRCPARAM  POINT10  1.0 2.0 10.0 2.0
   SRCPARAM  POINT11  1.0 2.0 10.0 2.0
   SRCPARAM  POINT12  1.0 2.0 10.0 2.0
   SRCPARAM  POINT13  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT15  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT17  1.0 2.0 10.0 2.0
   SRCPARAM  POINT18  1.0 2.0 10.0 2.0
   SRCPARAM  POINT19  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT28  1.0 2.0 10.0 2.0
   SRCPARAM  POINT29  1.0 2.0 10.0 2.0
   SRCPARAM  POINT30  1.0 2.0 10.0 2.0
   SRCPARAM  POINT31  1.0 2.0 10.0 2.0
   SRCPARAM  POINT32  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT35  1.0 2.0 10.0 2.0
   SRCPARAM  POINT36  1.0 2.0 10.0 2.0
   SRCPARAM  POINT37  1.0 2.0 10.0 2.0
   SRCPARAM  POINT38  1.0 2.0 10.0 2.0
   SRCPARAM  POINT39  1.0 2.0 10.0 2.0
   SRCPARAM  POINT40  1.0 2.0 10.0 2.0
   SRCPARAM  POINT41  1.0 2.0 10.0 2.0
   SRCPARAM  POINT42  1.0 2.0 10.0 2.0
   SRCPARAM  POINT43  1.0 2.0 10.0 2.0
   SRCPARAM  POINT44  1.0 2.0 10.0 2.0
   SRCPARAM  POINT45  1.0 2.0 10.0 2.0
   SRCPARAM  POINT46  1.0 2.0 10.0 2.0
   SRCPARAM  POINT47  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT54  1.0 2.0 10.0 2.0
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   SRCPARAM  POINT57  1.0 2.0 10.0 2.0
   SRCPARAM  POINT58  1.0 2.0 10.0 2.0
   SRCPARAM  POINT59  1.0 2.0 10.0 2.0
   SRCPARAM  POINT60  1.0 2.0 10.0 2.0
```

```
SRCPARAM  POINT61  1.0 2.0 10.0 2.0
SRCPARAM  POINT62  1.0 2.0 10.0 2.0
SRCPARAM  POINT63  1.0 2.0 10.0 2.0
SRCPARAM  POINT64  1.0 2.0 10.0 2.0
SRCPARAM  POINT65  1.0 2.0 10.0 2.0
SRCPARAM  POINT66  1.0 2.0 10.0 2.0
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SRCPARAM  POINT68  1.0 2.0 10.0 2.0
SRCPARAM  POINT69  1.0 2.0 10.0 2.0
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SRCPARAM  POINT76  1.0 2.0 10.0 2.0
SRCPARAM  POINT77  1.0 2.0 10.0 2.0
SRCPARAM  POINT78  1.0 2.0 10.0 2.0
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SRCPARAM  POINT80  1.0 2.0 10.0 2.0
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SRCPARAM  POINT91  1.0 2.0 10.0 2.0
SRCPARAM  POINT92  1.0 2.0 10.0 2.0
SRCPARAM  POINT93  1.0 2.0 10.0 2.0
SRCPARAM  POINT94  1.0 2.0 10.0 2.0
SRCPARAM  POINT95  1.0 2.0 10.0 2.0
SRCPARAM  POINT96  1.0 2.0 10.0 2.0
SRCPARAM  POINT97  1.0 2.0 10.0 2.0
SRCPARAM  POINT98  1.0 2.0 10.0 2.0
SRCPARAM  POINT99  1.0 2.0 10.0 2.0
SRCPARAM  POINT100  1.0 2.0 10.0 2.0
SRCPARAM  POINT101  1.0 2.0 10.0 2.0
SRCPARAM  POINT102  1.0 2.0 10.0 2.0
SRCPARAM  POINT103  1.0 2.0 10.0 2.0
SRCPARAM  POINT104  1.0 2.0 10.0 2.0
SRCPARAM  POINT105  1.0 2.0 10.0 2.0
SRCPARAM  POINT106  1.0 2.0 10.0 2.0
SRCPARAM  POINT107  1.0 2.0 10.0 2.0
SRCPARAM  POINT108  1.0 2.0 10.0 2.0
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SRCPARAM  POINT110  1.0 2.0 10.0 2.0
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SRCPARAM  POINT112  1.0 2.0 10.0 2.0
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SRCPARAM  POINT116  1.0 2.0 10.0 2.0
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SRCPARAM  POINT118  1.0 2.0 10.0 2.0
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SRCPARAM  POINT121  1.0 2.0 10.0 2.0
SRCPARAM  POINT122  1.0 2.0 10.0 2.0
SRCPARAM  POINT123  1.0 2.0 10.0 2.0
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SRCPARAM  POINT127  1.0 2.0 10.0 2.0
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   PARTDIAM  POINT103-POINT153  17.3
   MASSFRAX  POINT1-POINT153  1.0
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RE DISCCART 755489 6422491 591
RE DISCCART 753416 6423818 488
RE DISCCART 753084 6421413 527
RE DISCCART 755323 6420418 573
RE DISCCART 756898 6418346 571

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   PLOTFILE  PERIOD  REST  RE1Y.PLO
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   PLOTFILE  24 CMC FIRST  CM1DC.PLO
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FIGURES

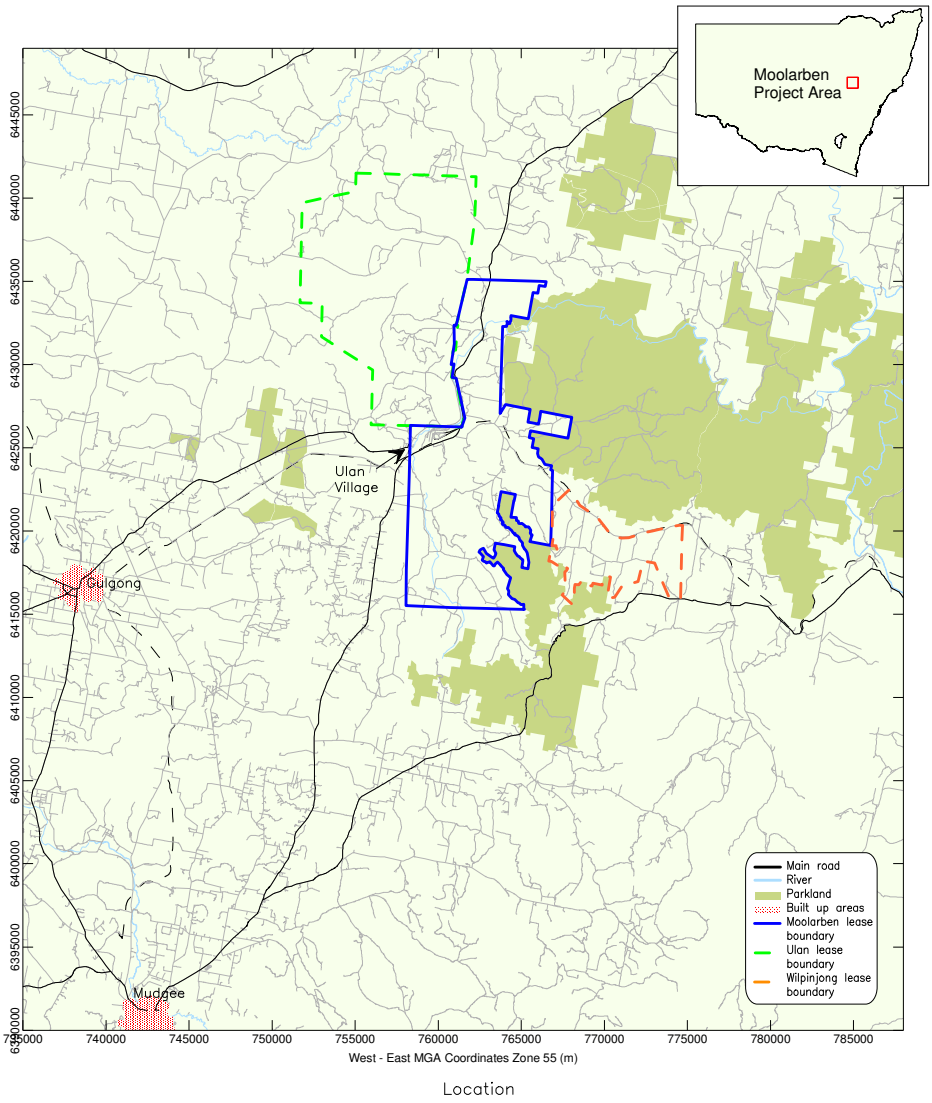

Figure 1: Site Location

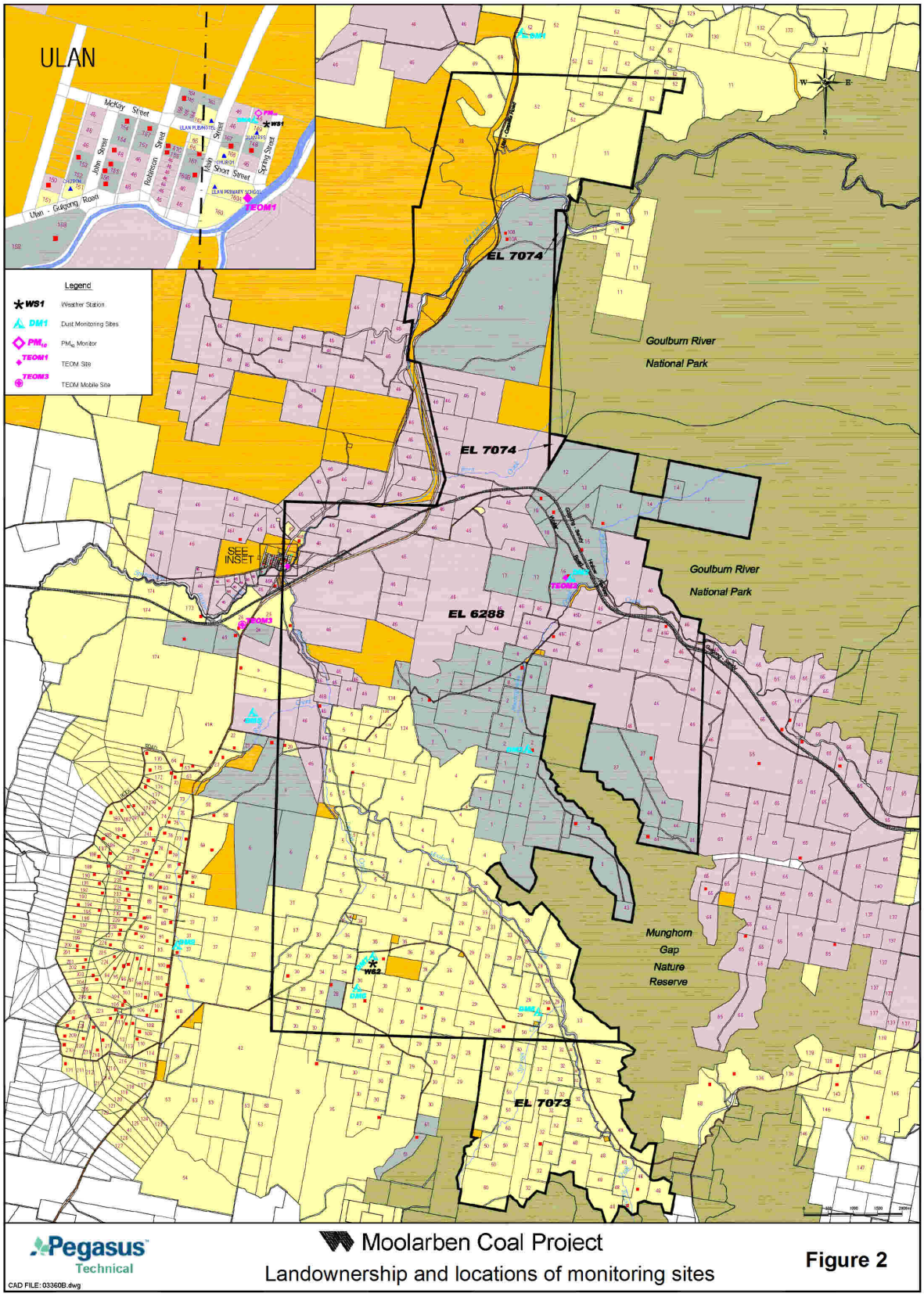

Figure 2: Landownership and locations of monitoring sites

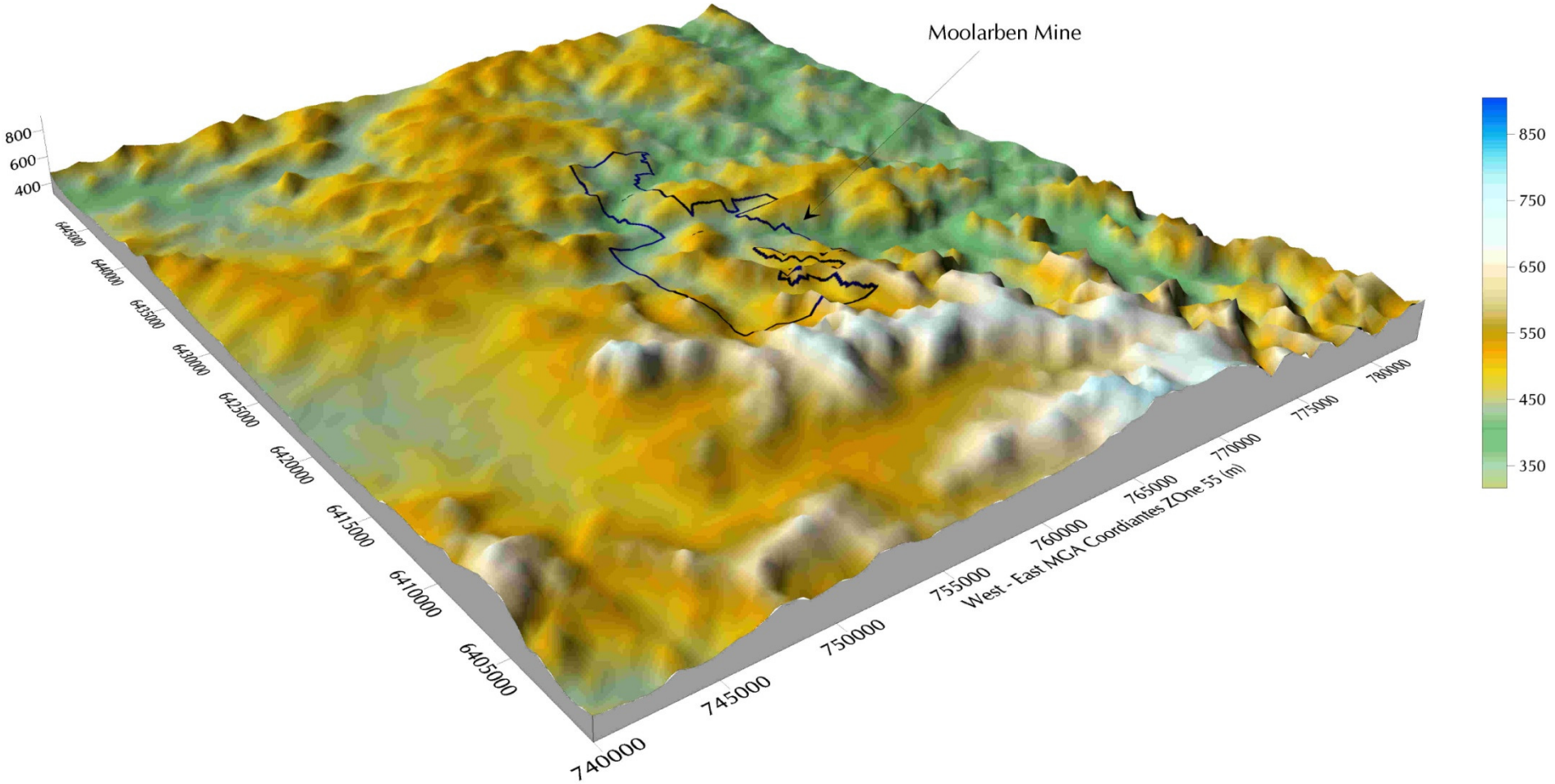

Figure 3: Pseudo-3D plot of area

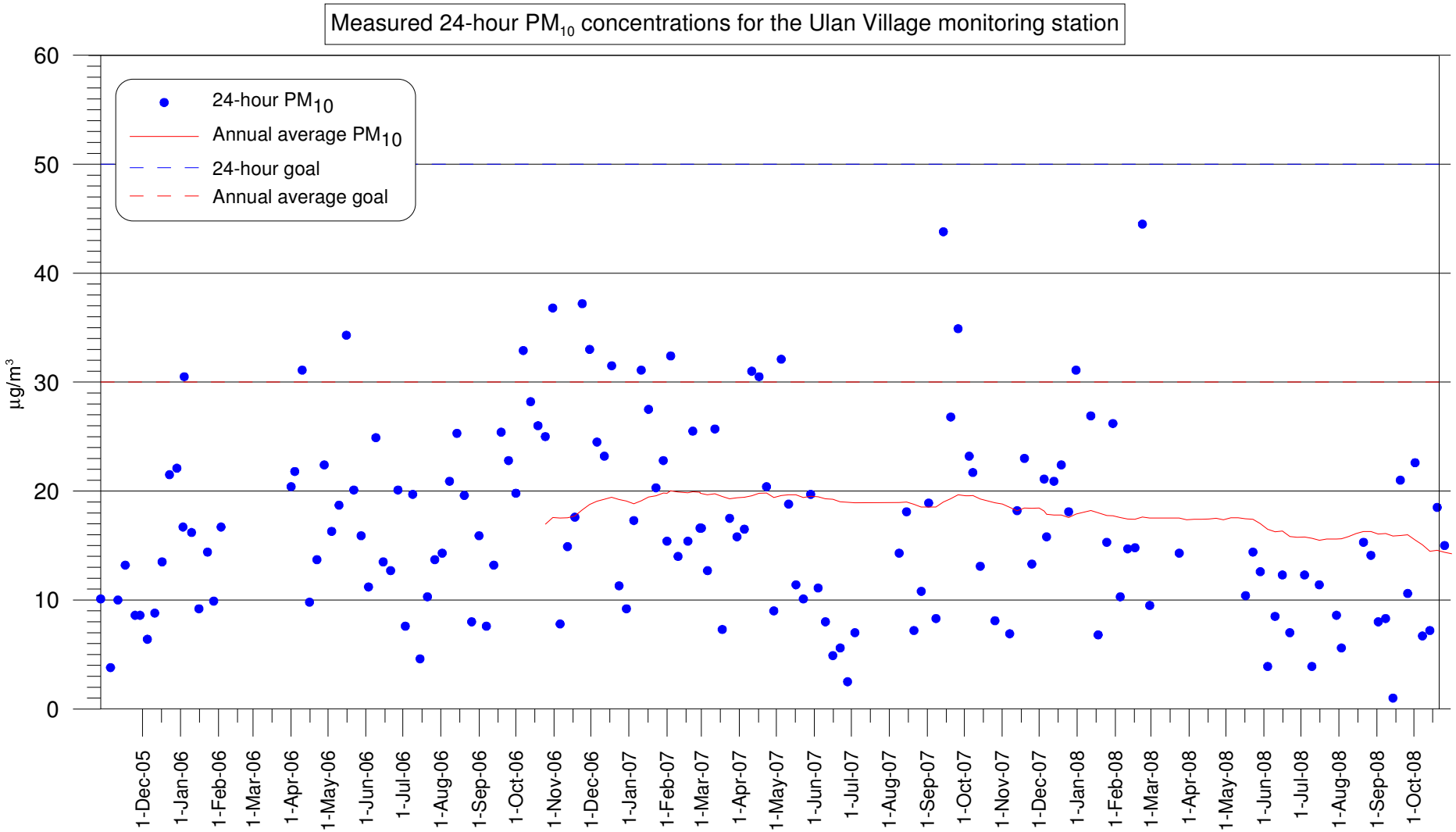

Figure 4: HVAS PM_{10} concentrations – Ulan Village Monitoring Station

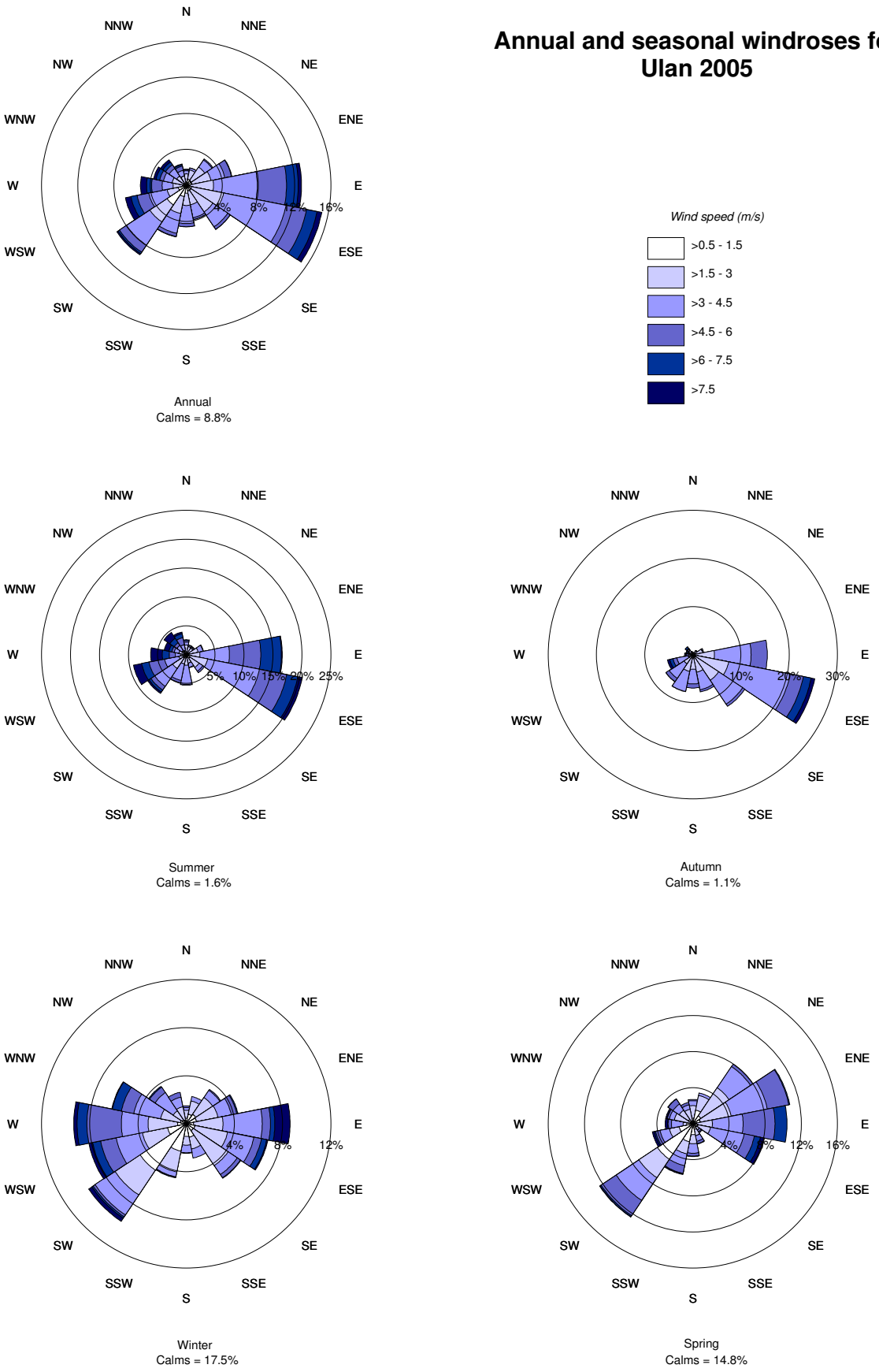

Figure 5: Annual and seasonal windroses for Ulan (2005)

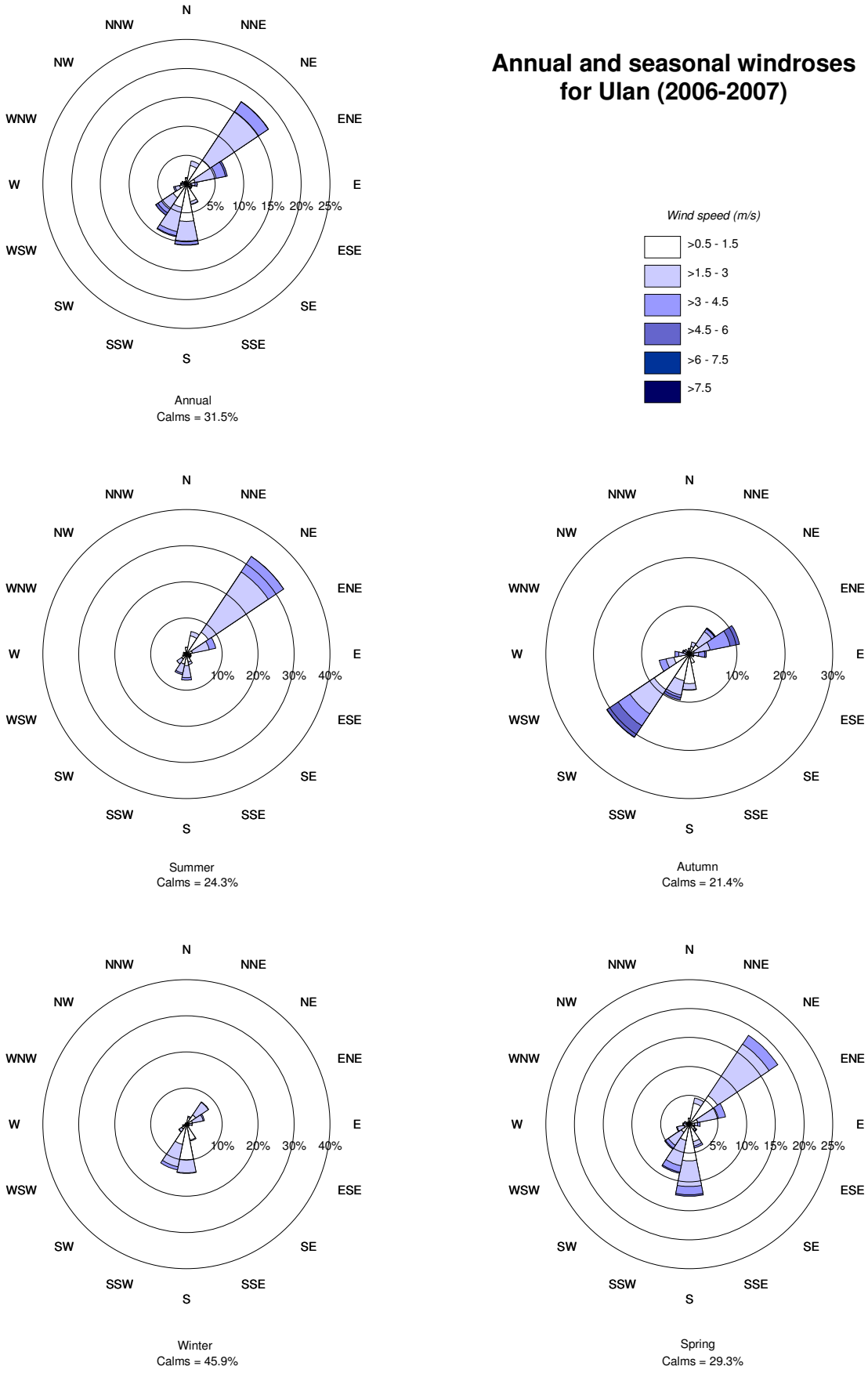

Figure 6: Annual and seasonal windroses for Ulan (2006-2007)

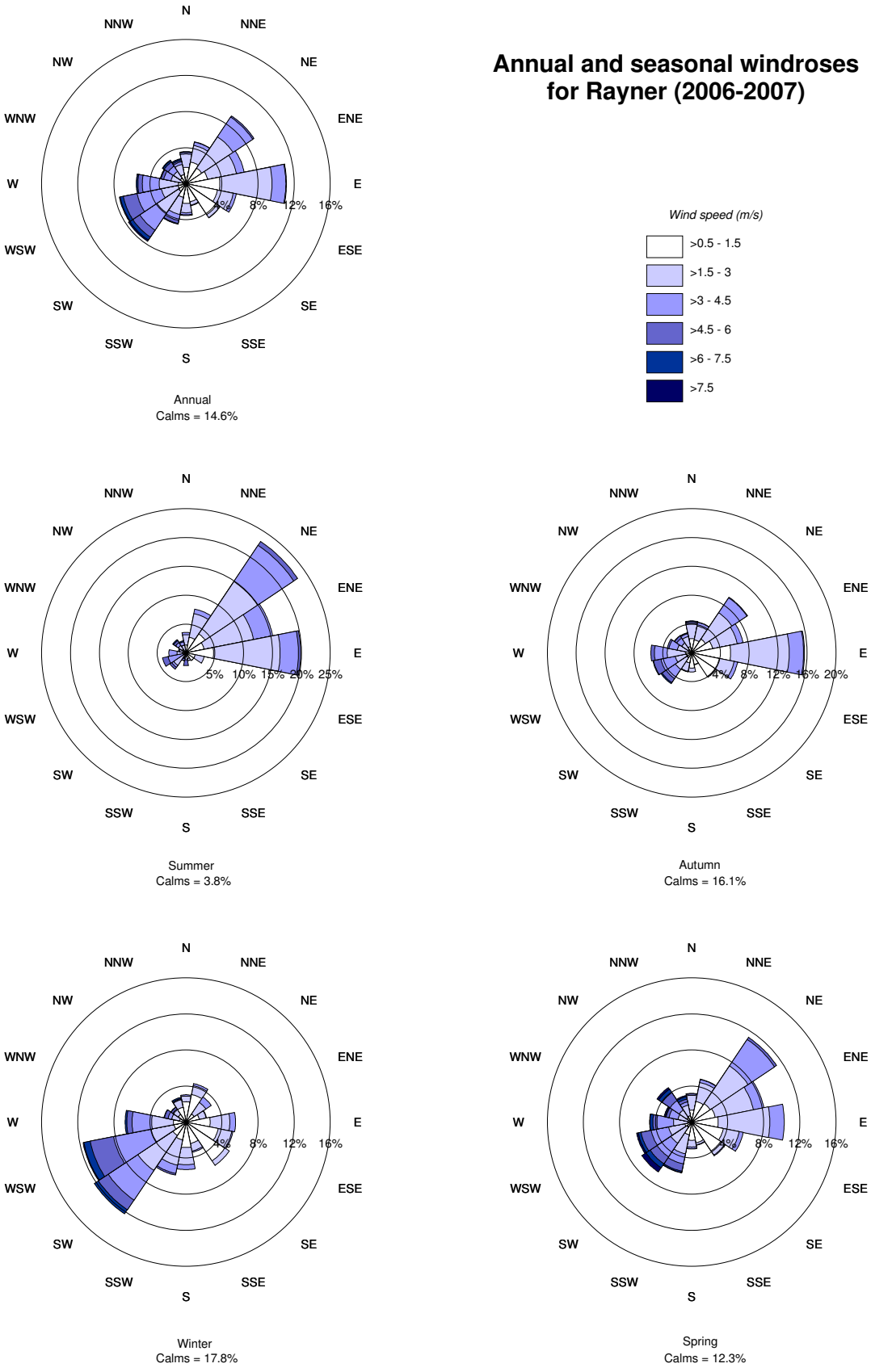

Figure 7: Annual and seasonal windroses for Rayner (2006-2007)

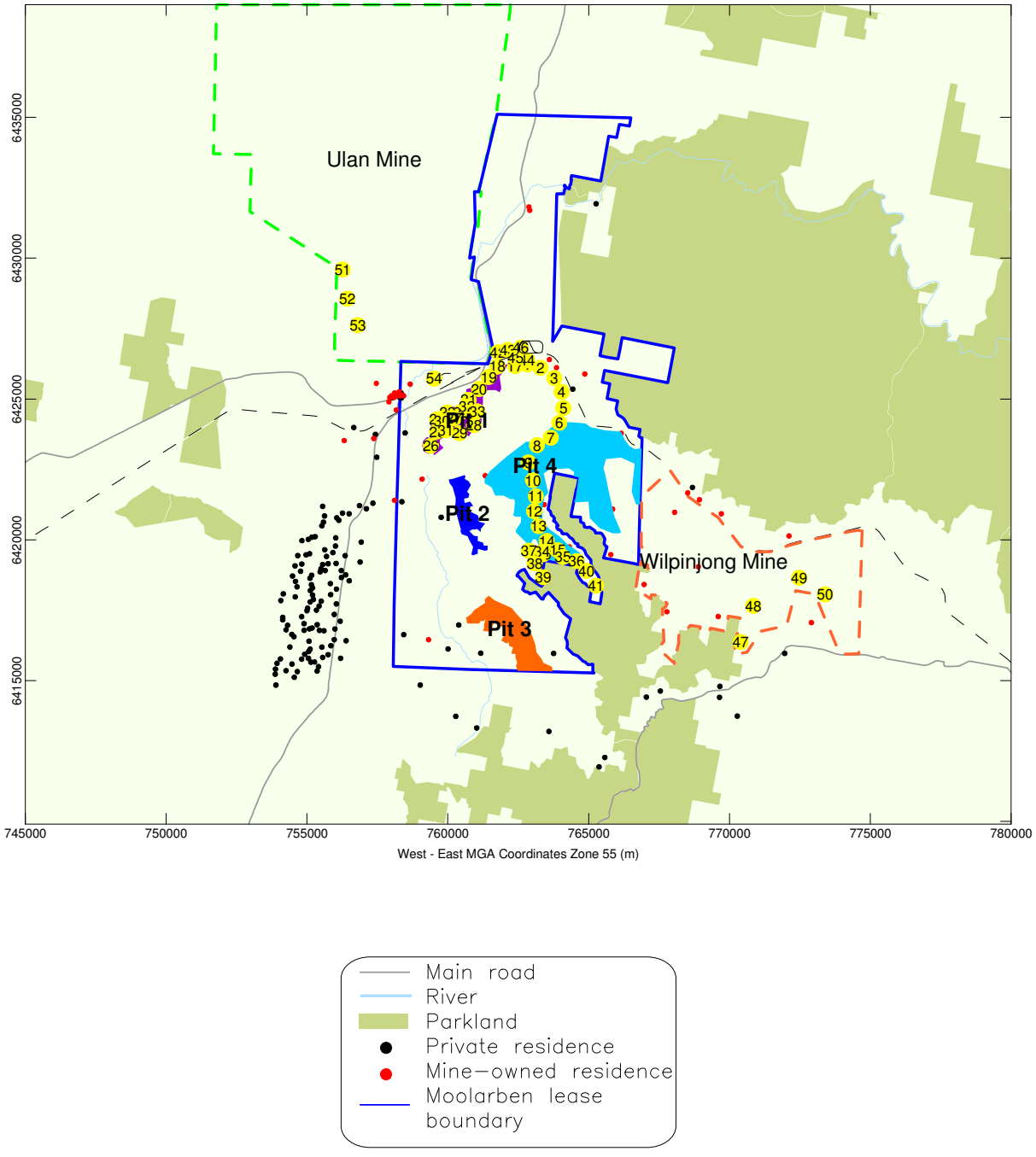

Figure 8: Location of modelled dust sources – Year 2

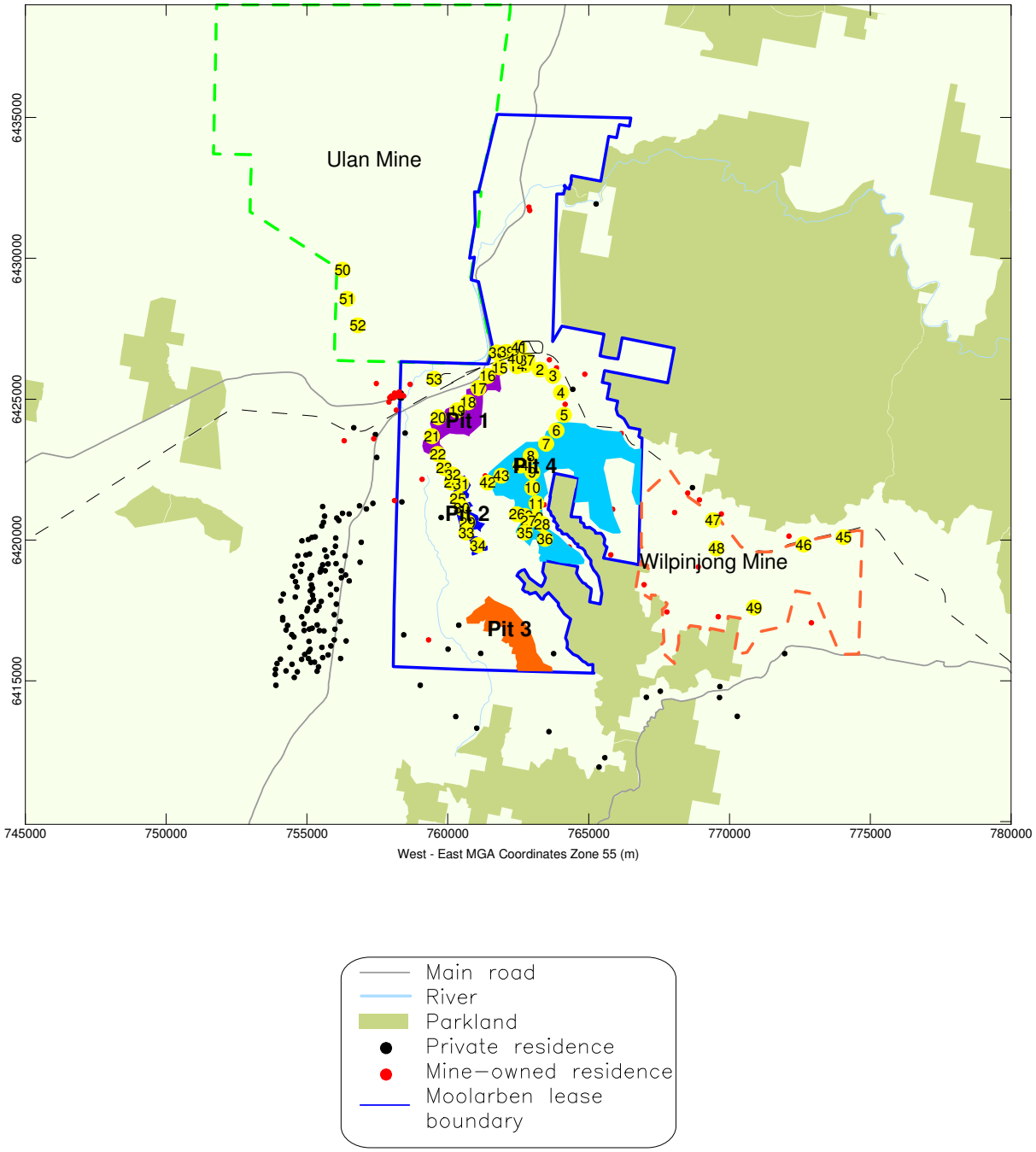

Figure 9: Location of modelled dust sources – Year 7

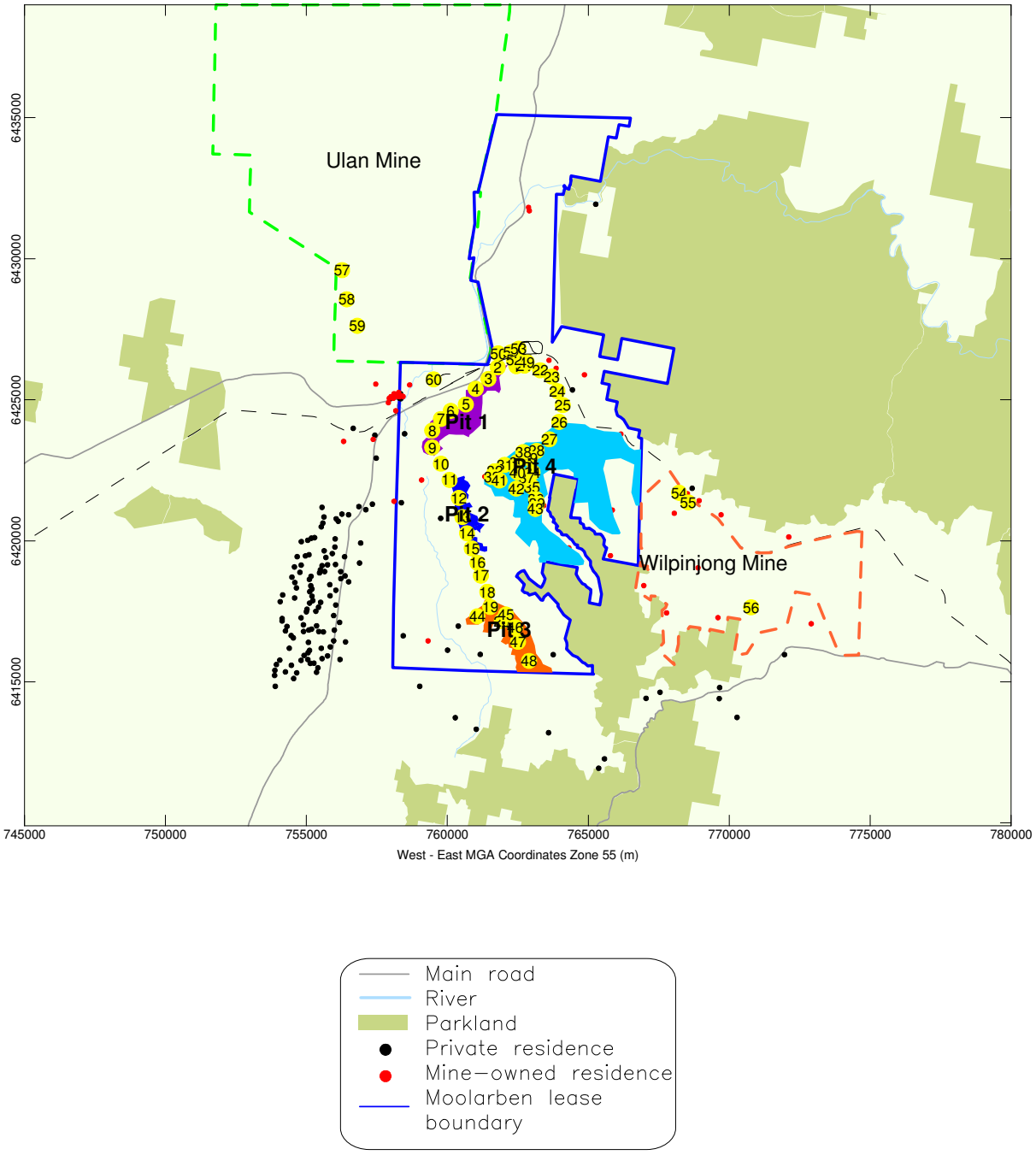

Figure 10: Location of modelled dust sources – Year 12

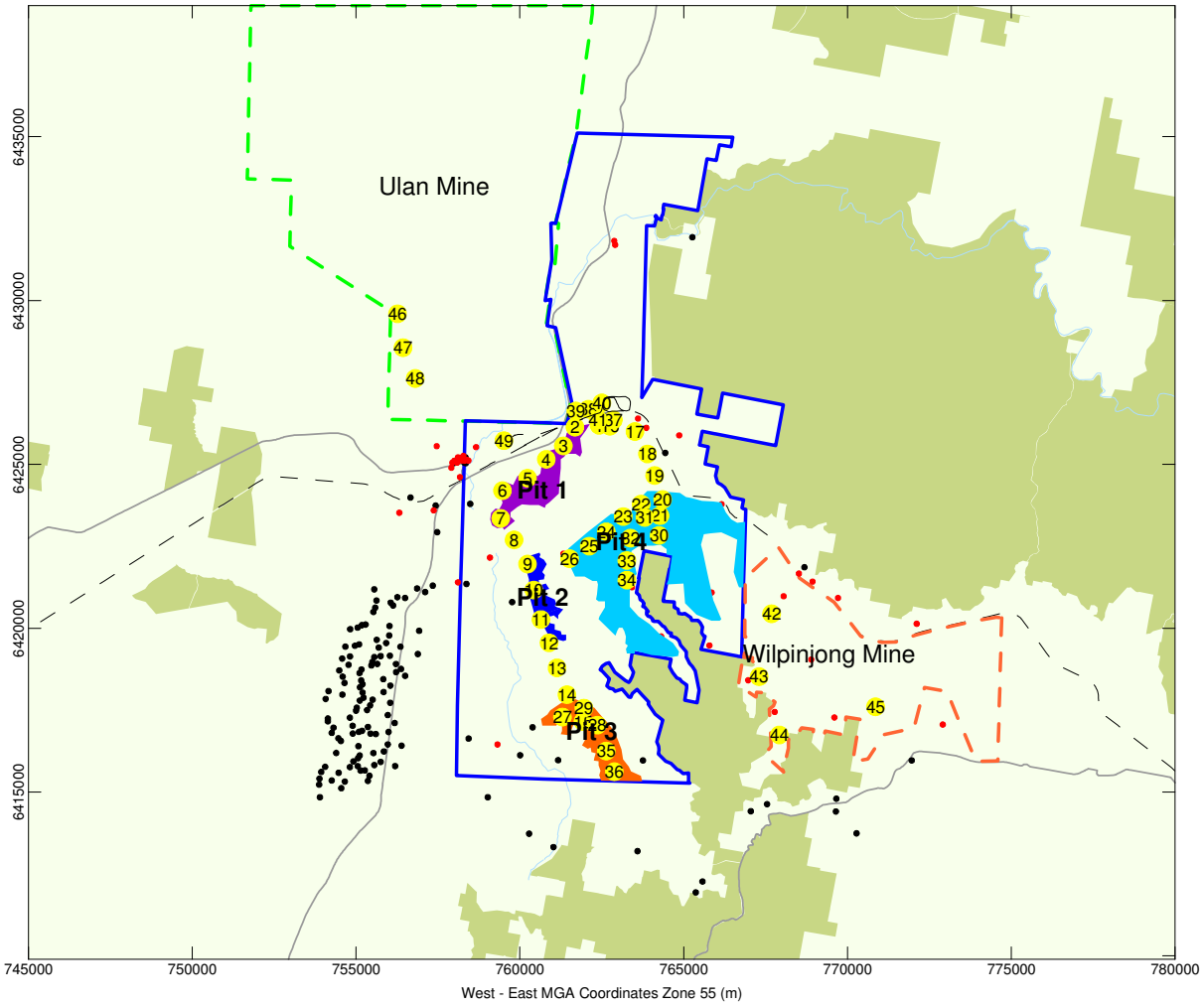

Figure 11: Location of modelled dust sources – Year 16

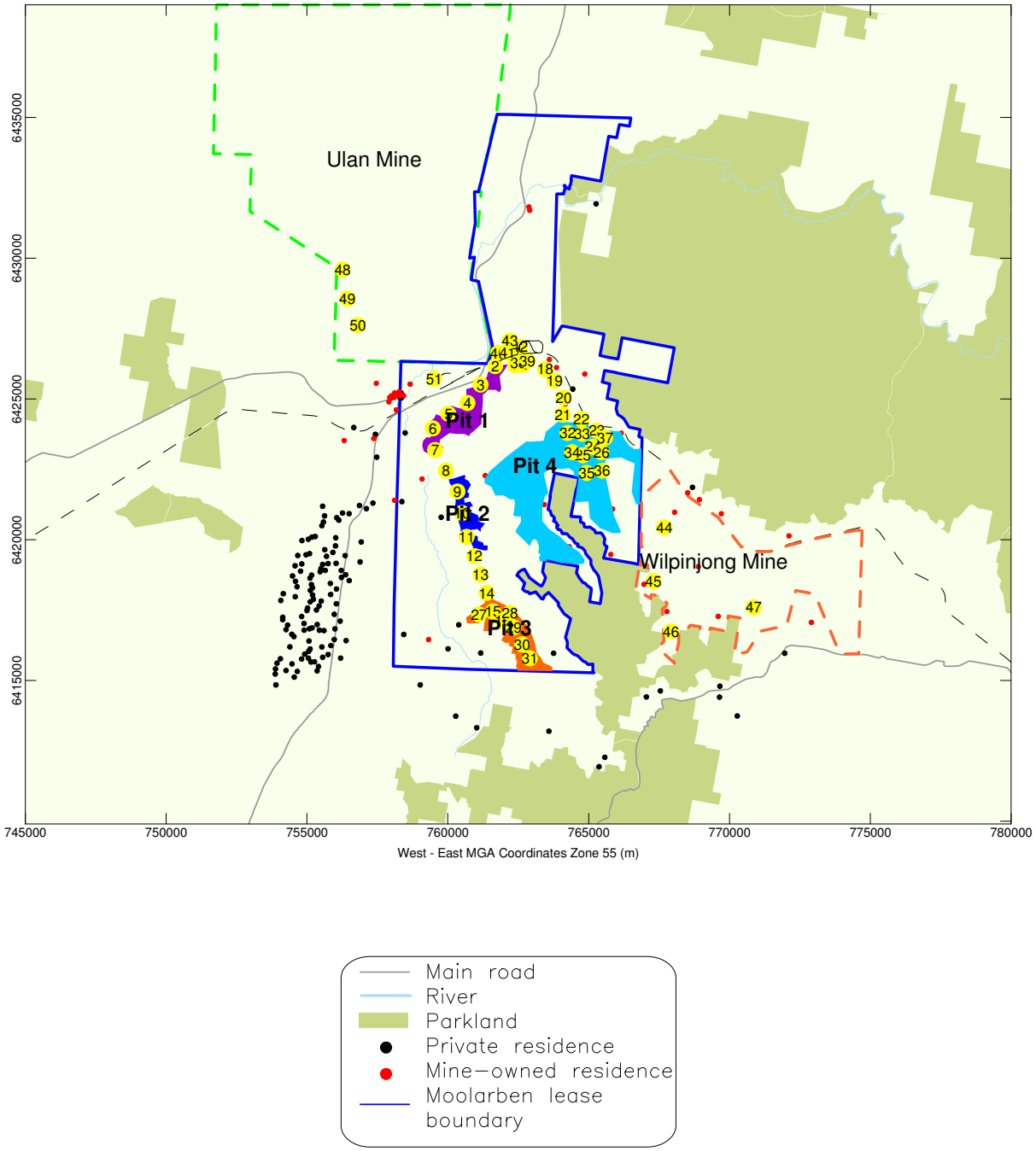

Figure 12: Location of modelled dust sources – Year 19

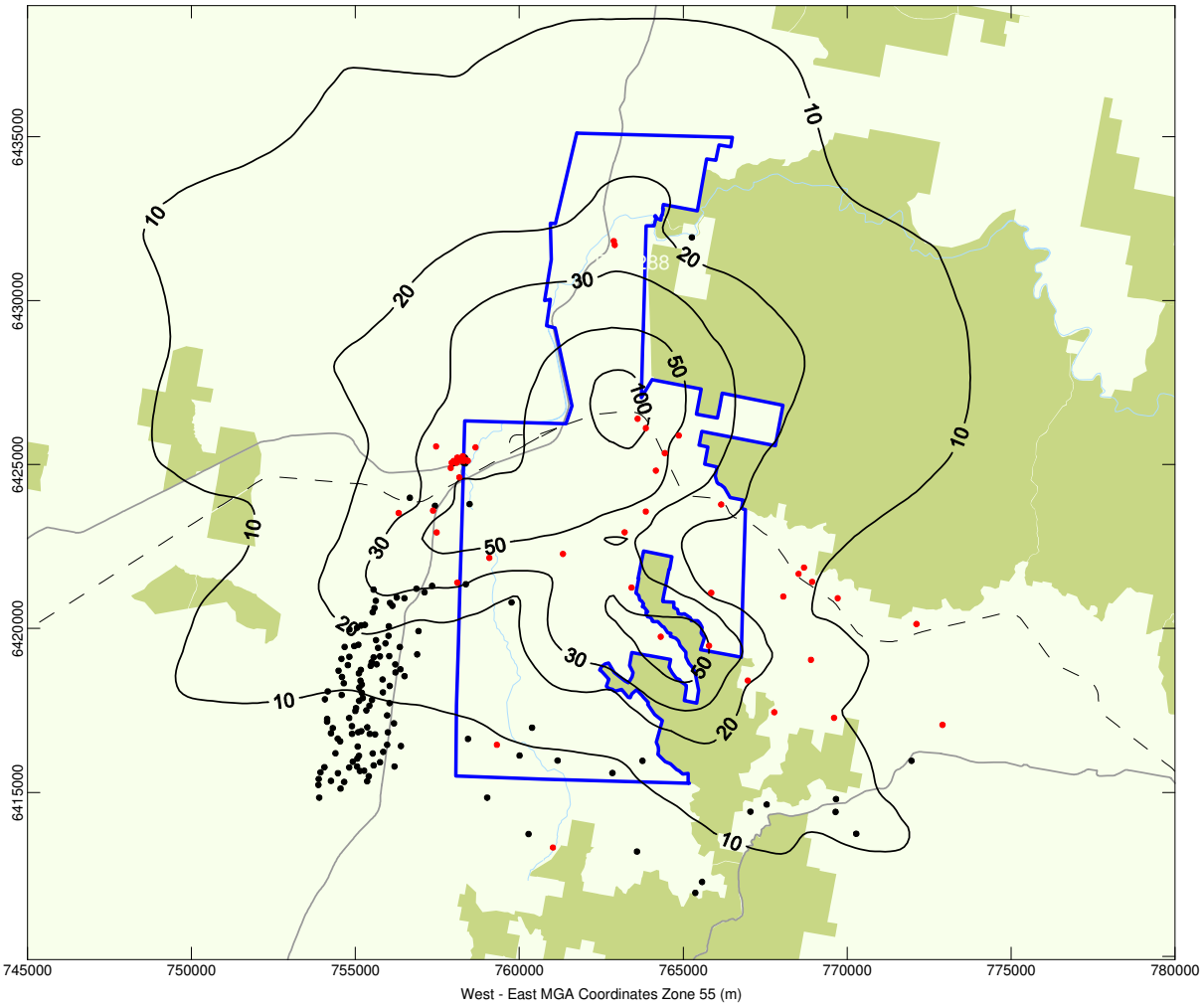

Figure 13: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal - Year 2 ($\mu g/m^3$)

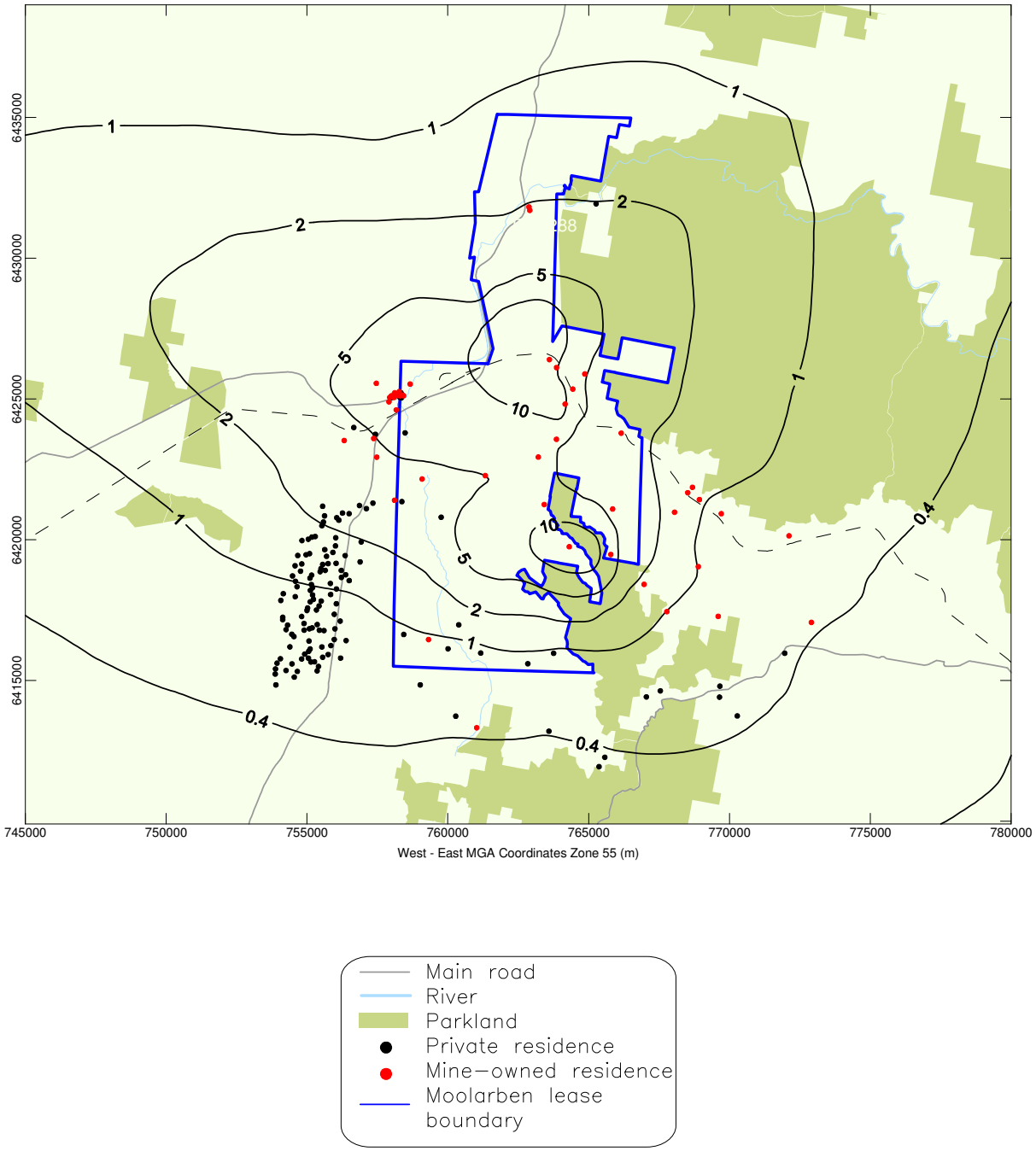

Figure 14: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 2 (µg/m^3)

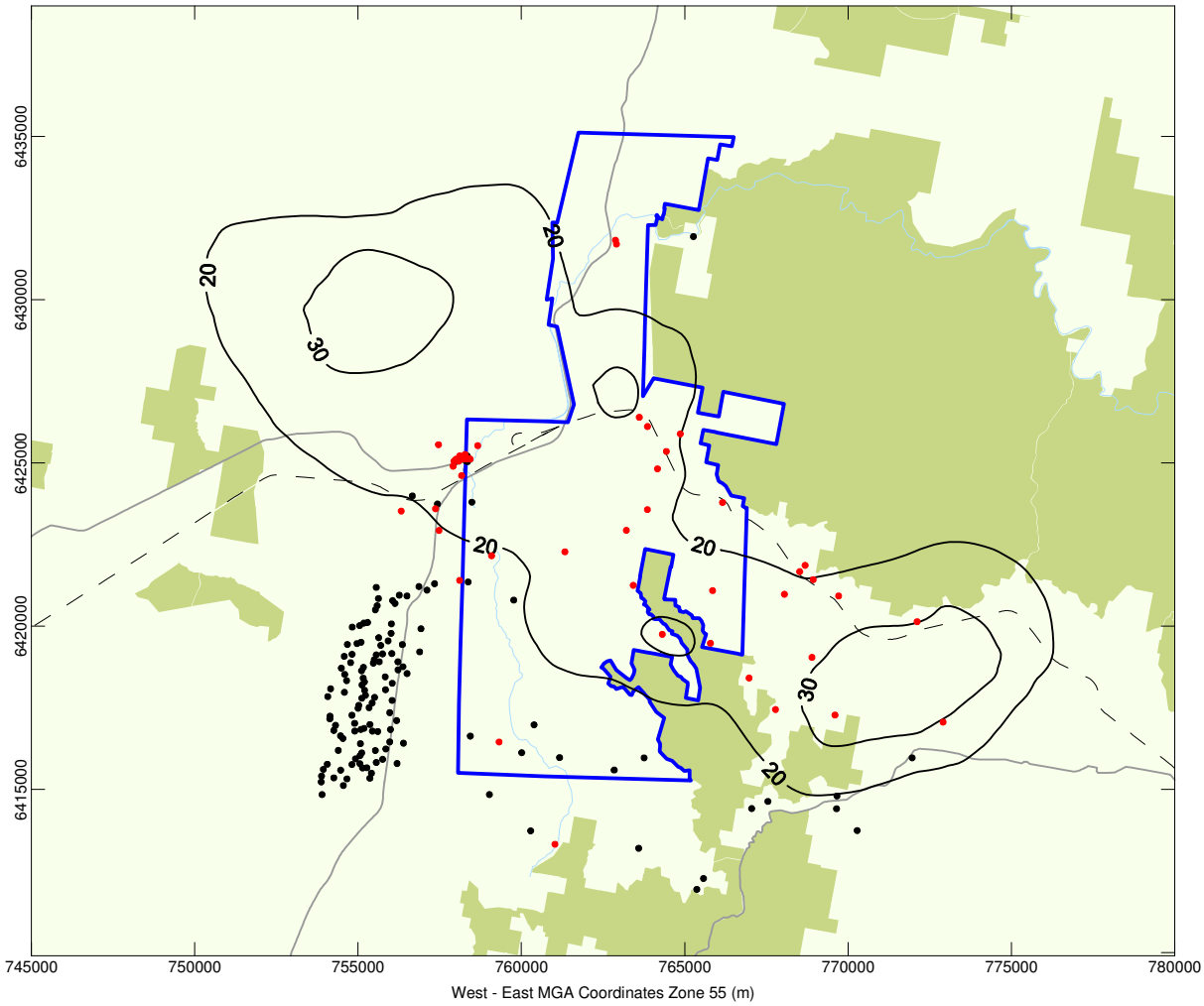

Figure 15: Predicted annual average PM_{10} concentration due to emissions from the Proposal and other sources - Year 2 (µg/m^3)

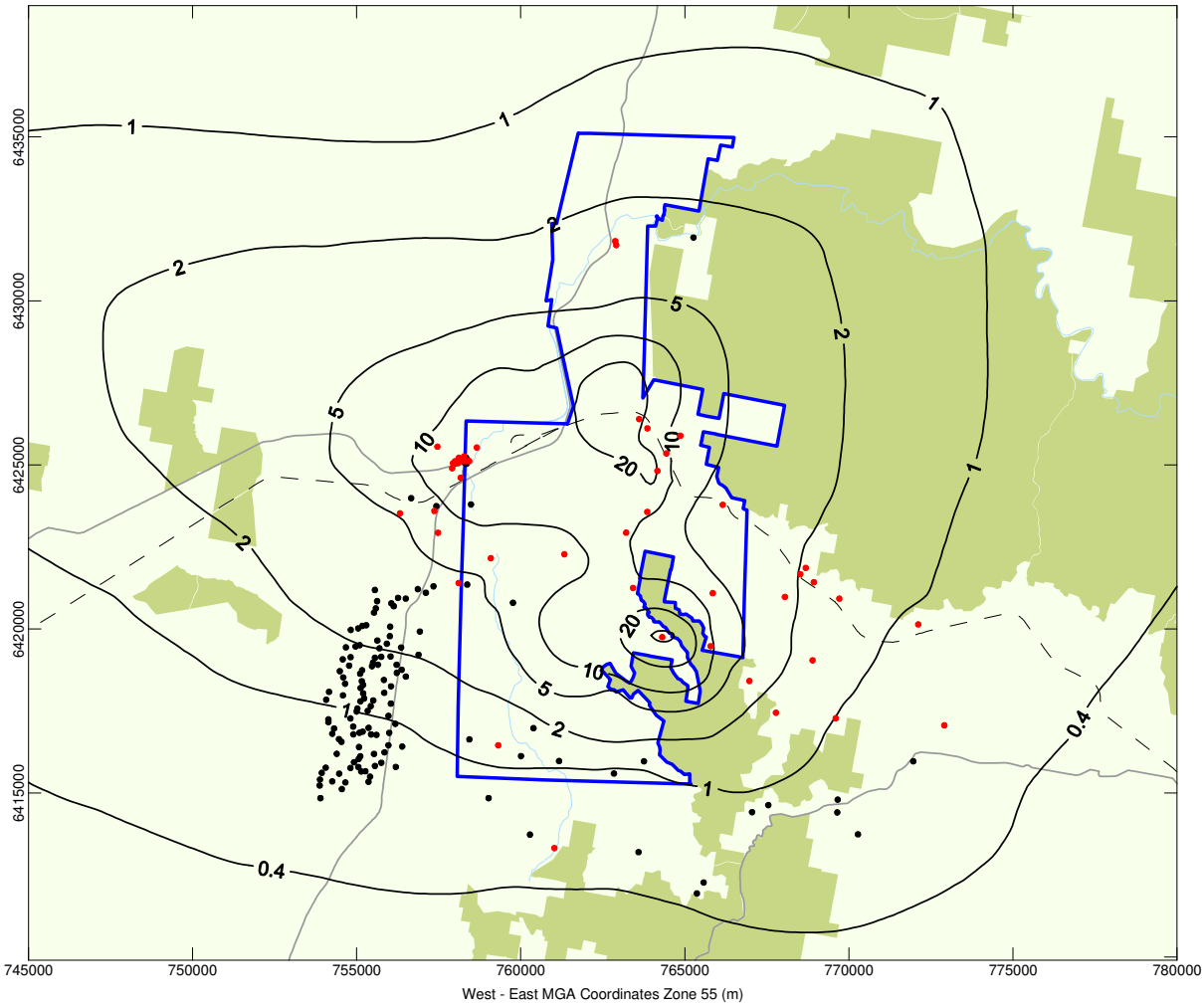

Figure 16: Predicted annual average TSP concentration due to emissions from the Proposal - Year 2 (µg/m^3)

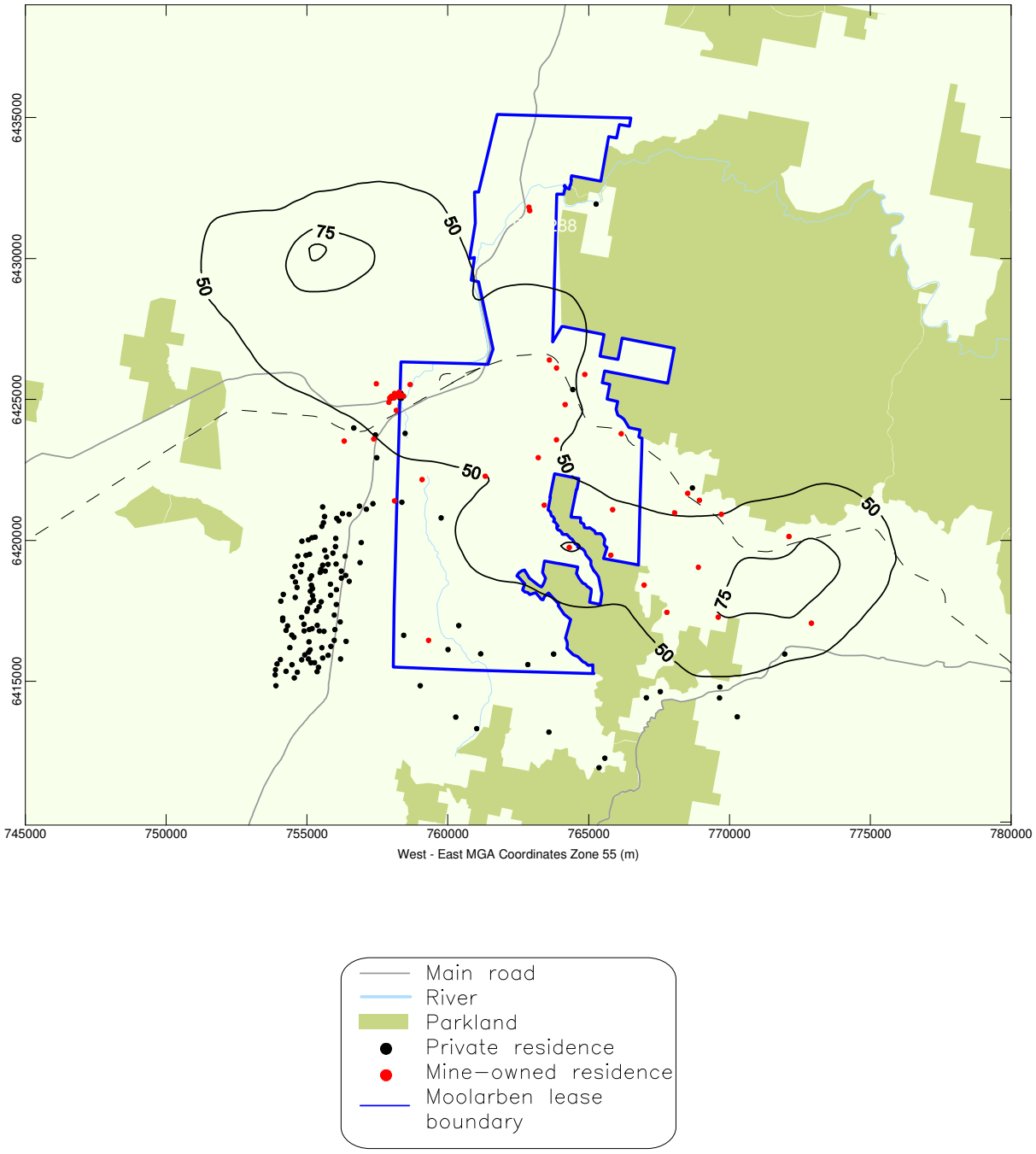

Figure 17: Predicted annual average TSP concentration due to emissions from the Proposal and other sources - Year 2 (µg/m^3)

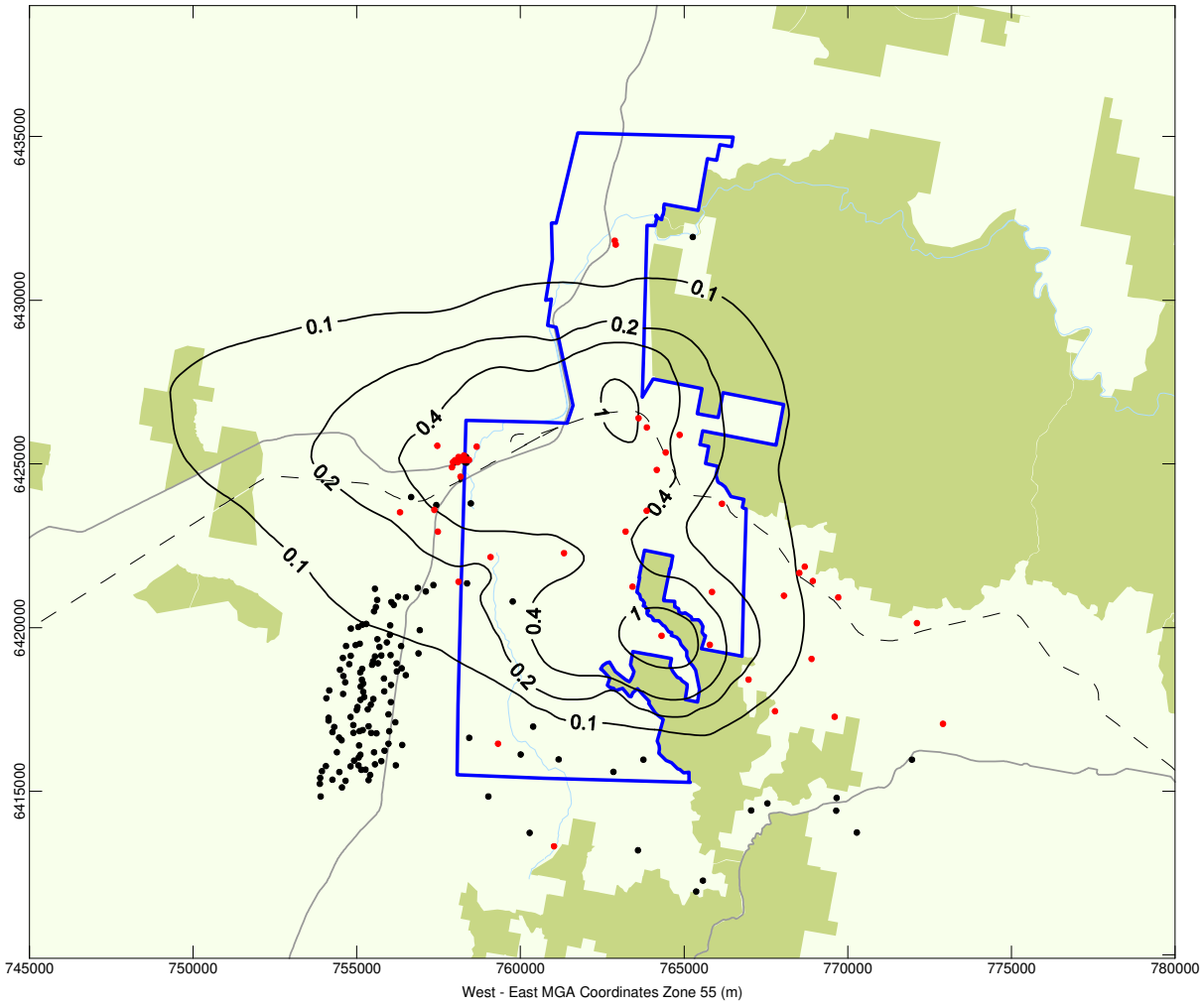

Figure 18: Predicted annual average dust deposition due to emissions from the Proposal - Year 2 (g/m^2/month)

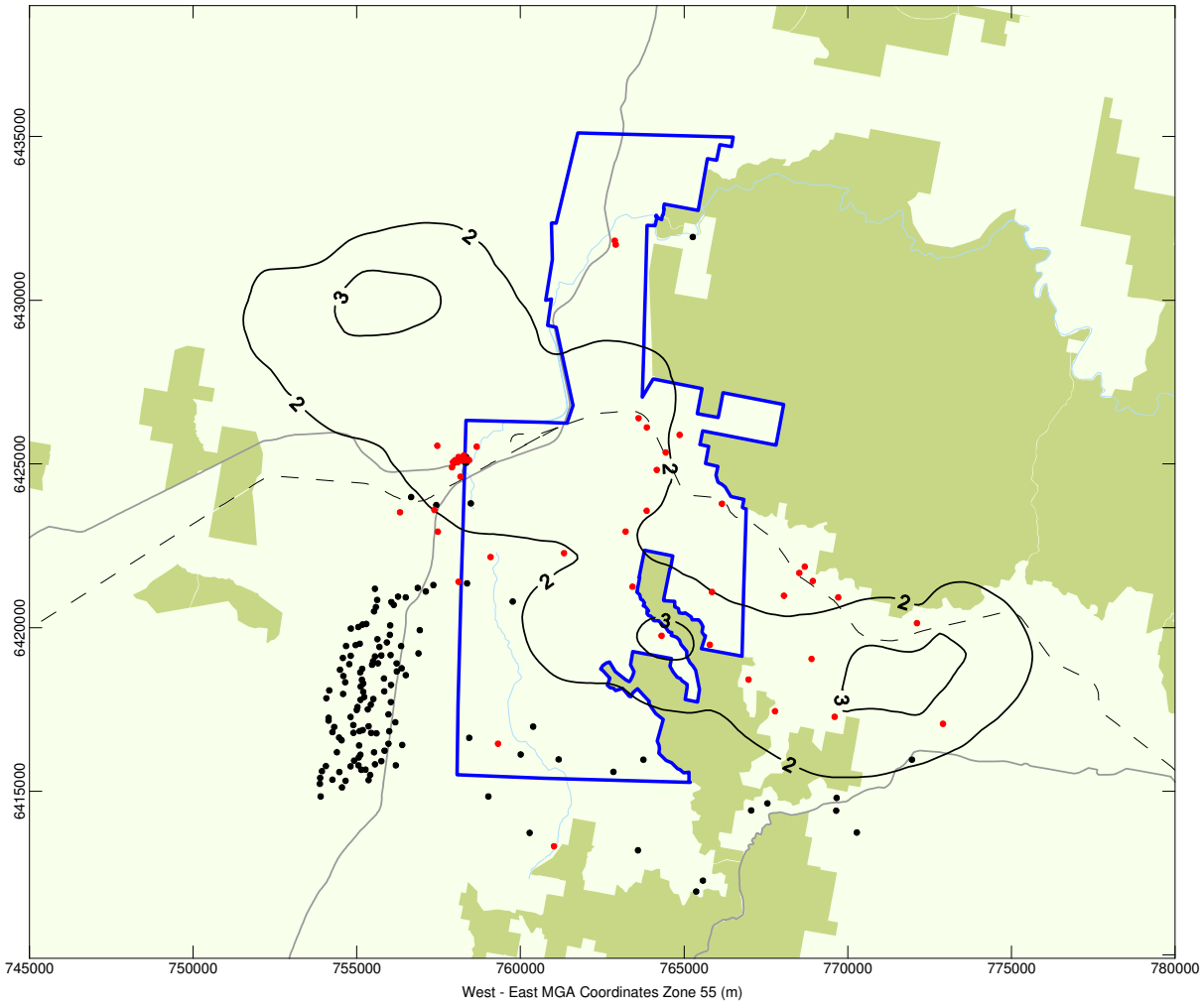

Figure 19: Predicted annual average dust deposition due to emissions from the Proposal and other sources - Year 2 (g/m^2/month)

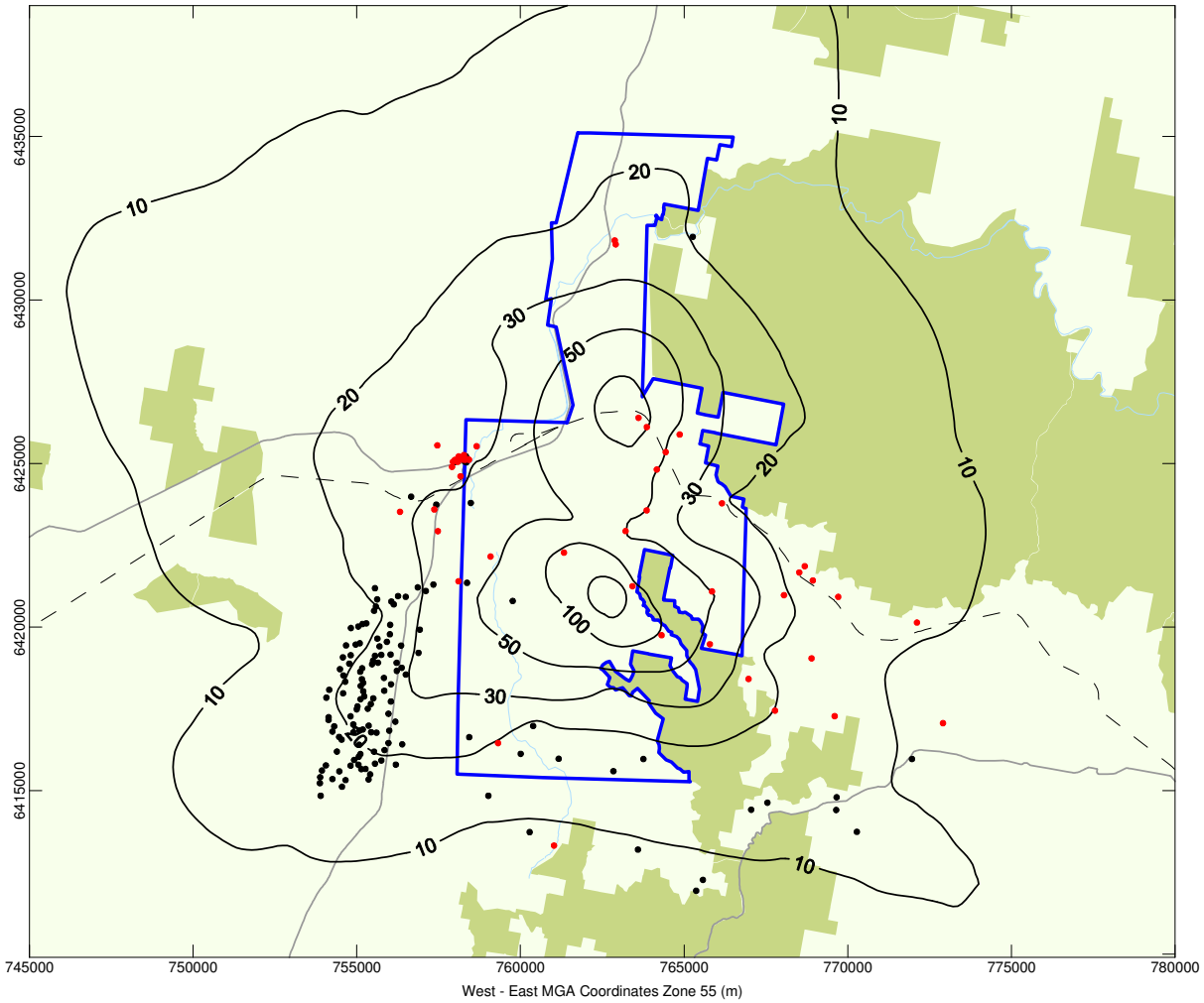

Figure 20: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal- Year 7 ($\mu g/m^3$)

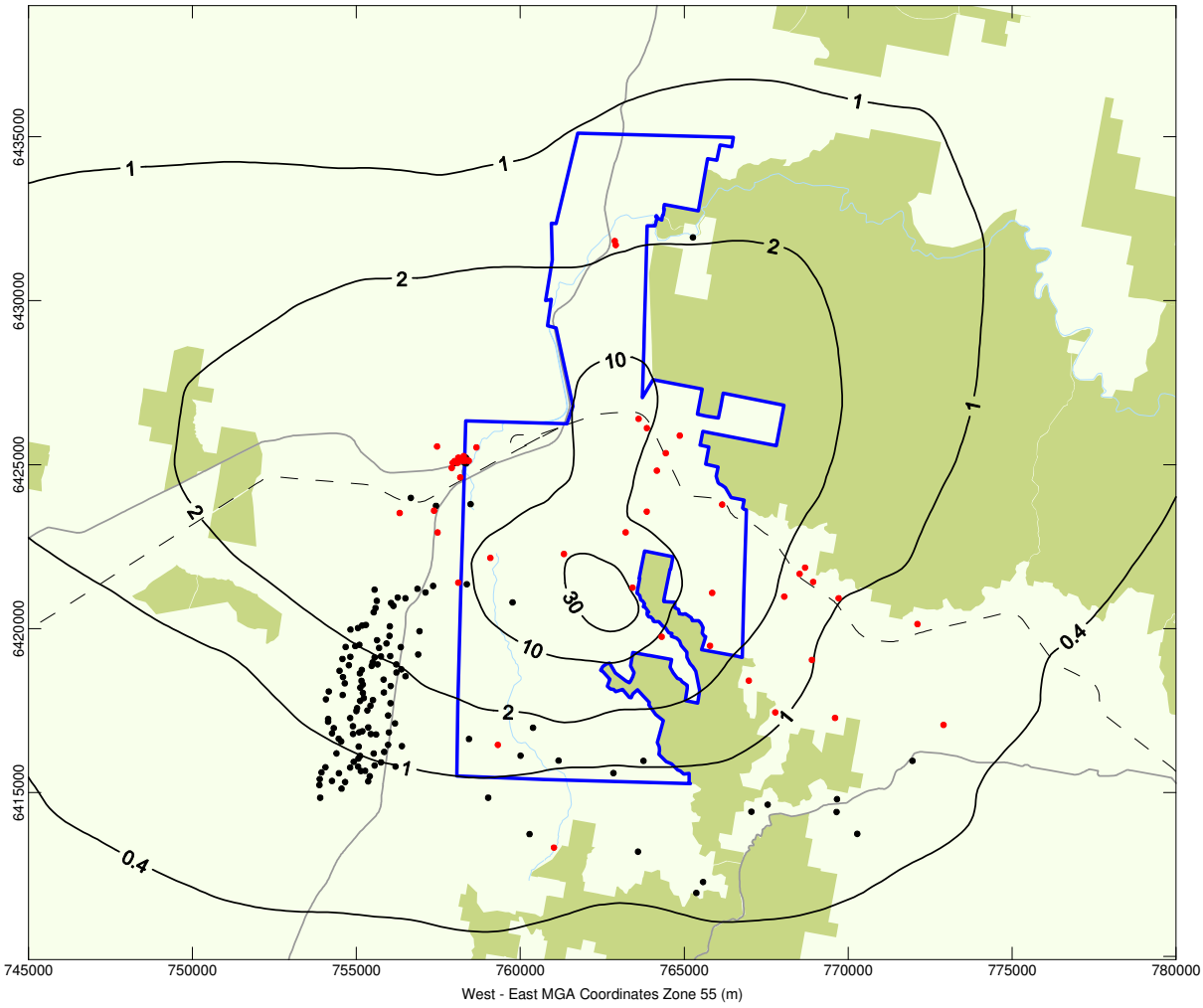

Figure 21: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 7 (µg/m^3)

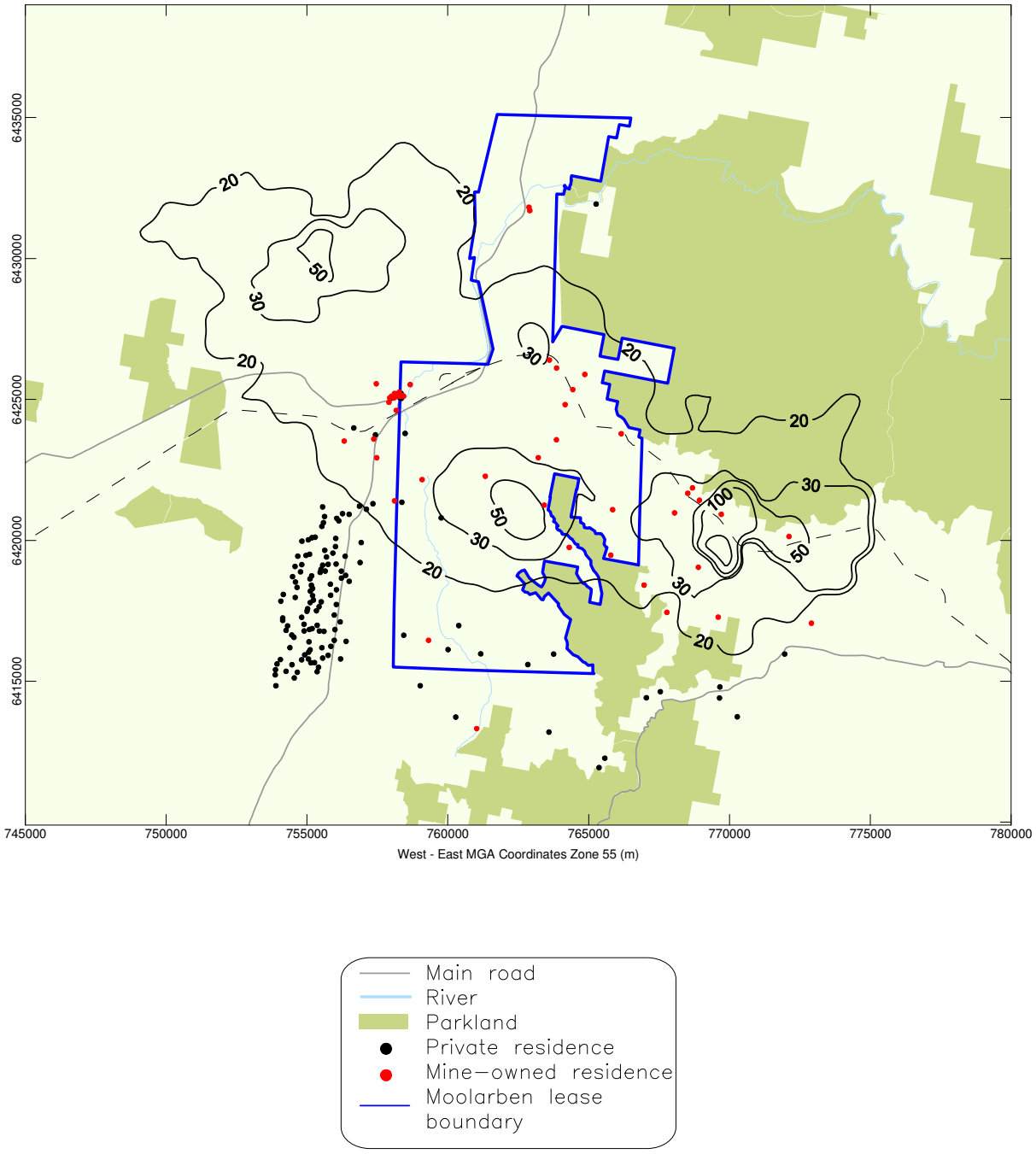

Figure 22: Predicted annual average PM_{10} concentration due to emissions from the Proposal and other sources - Year 7 ($\mu g/m^3$)

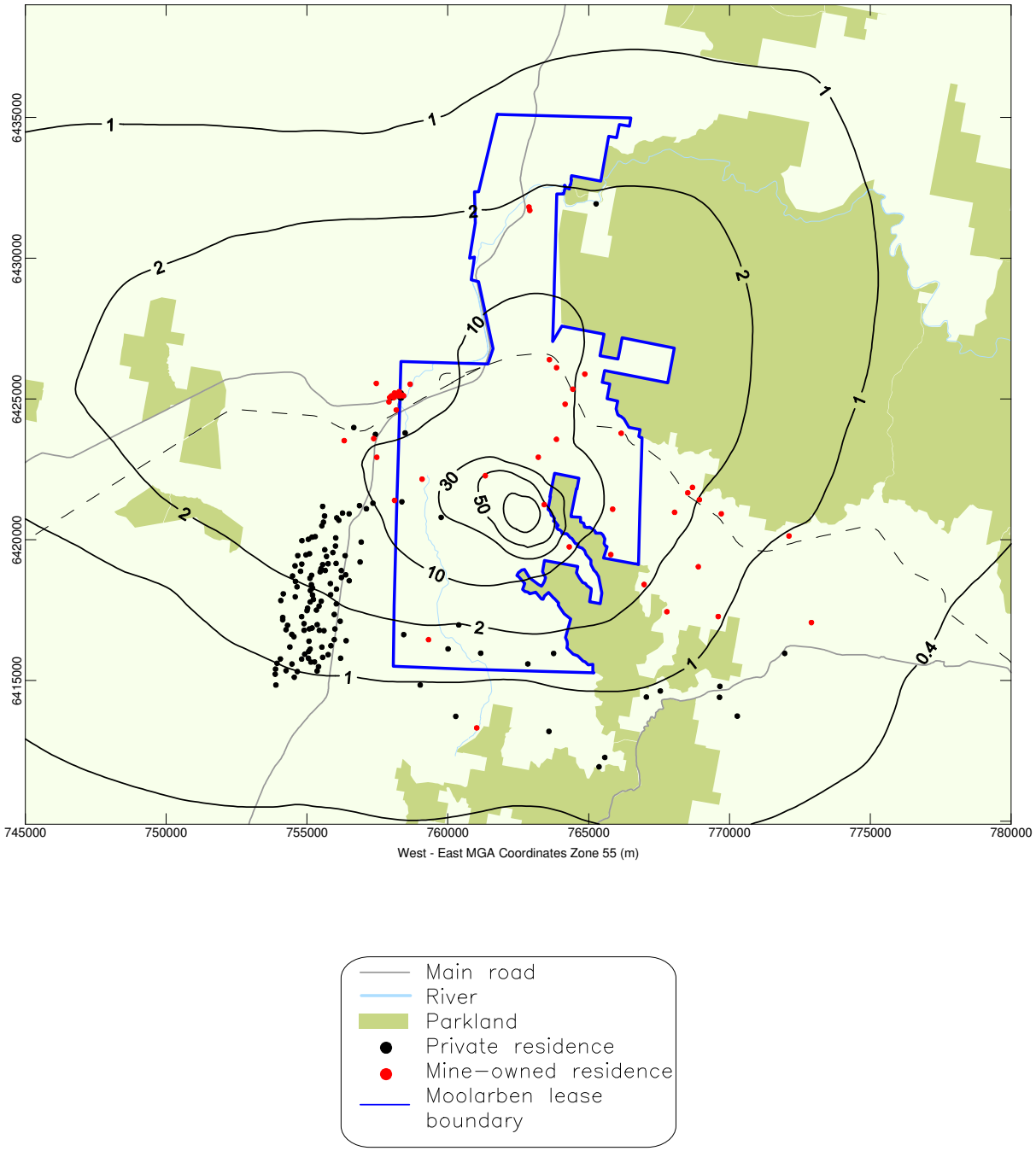

Figure 23: Predicted annual average TSP concentration due to emissions from the Proposal - Year 7 (µg/m^3)

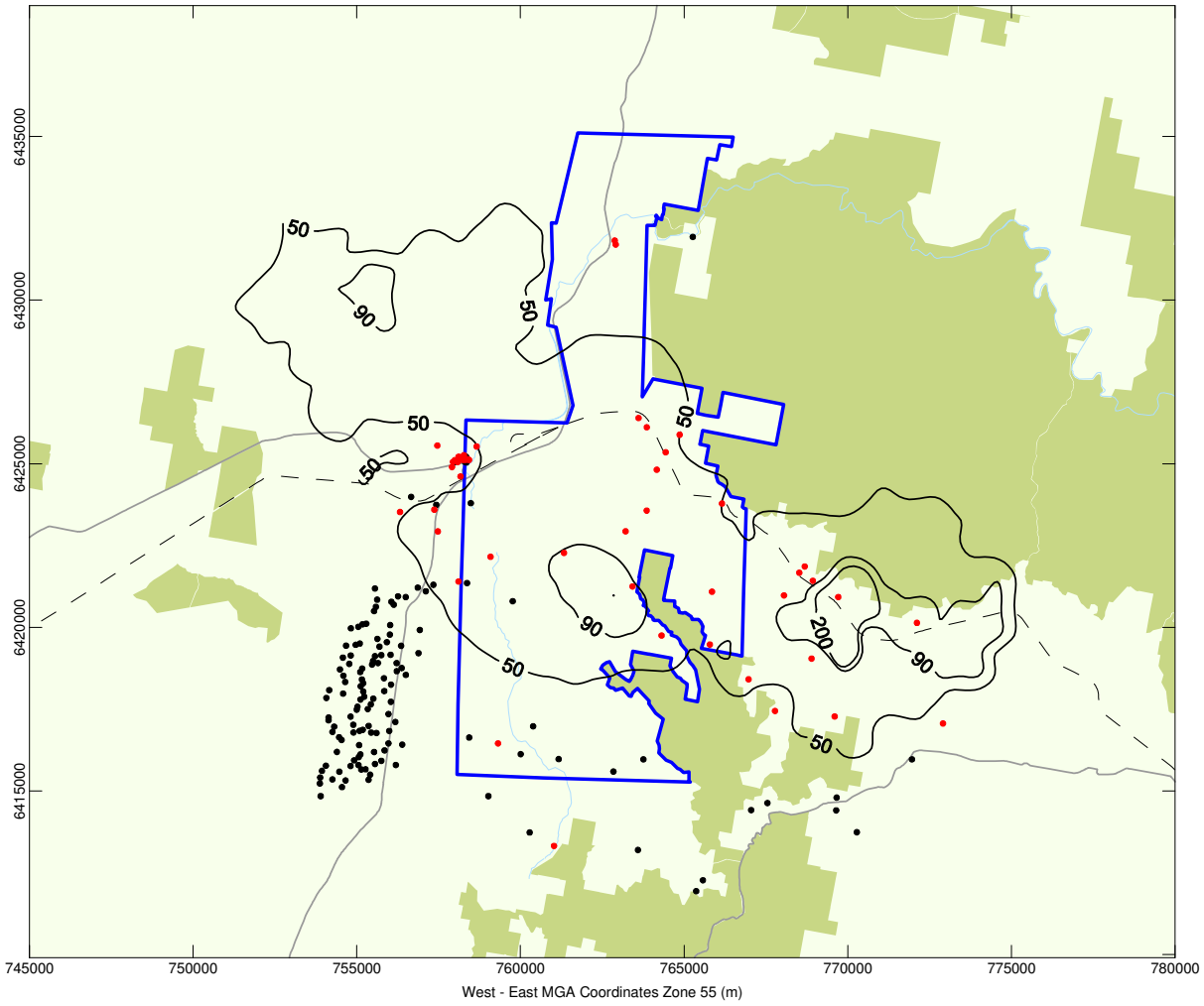

Figure 24: Predicted annual average TSP concentration due to emissions from the Proposal and other sources - Year 7 (µg/m^3)

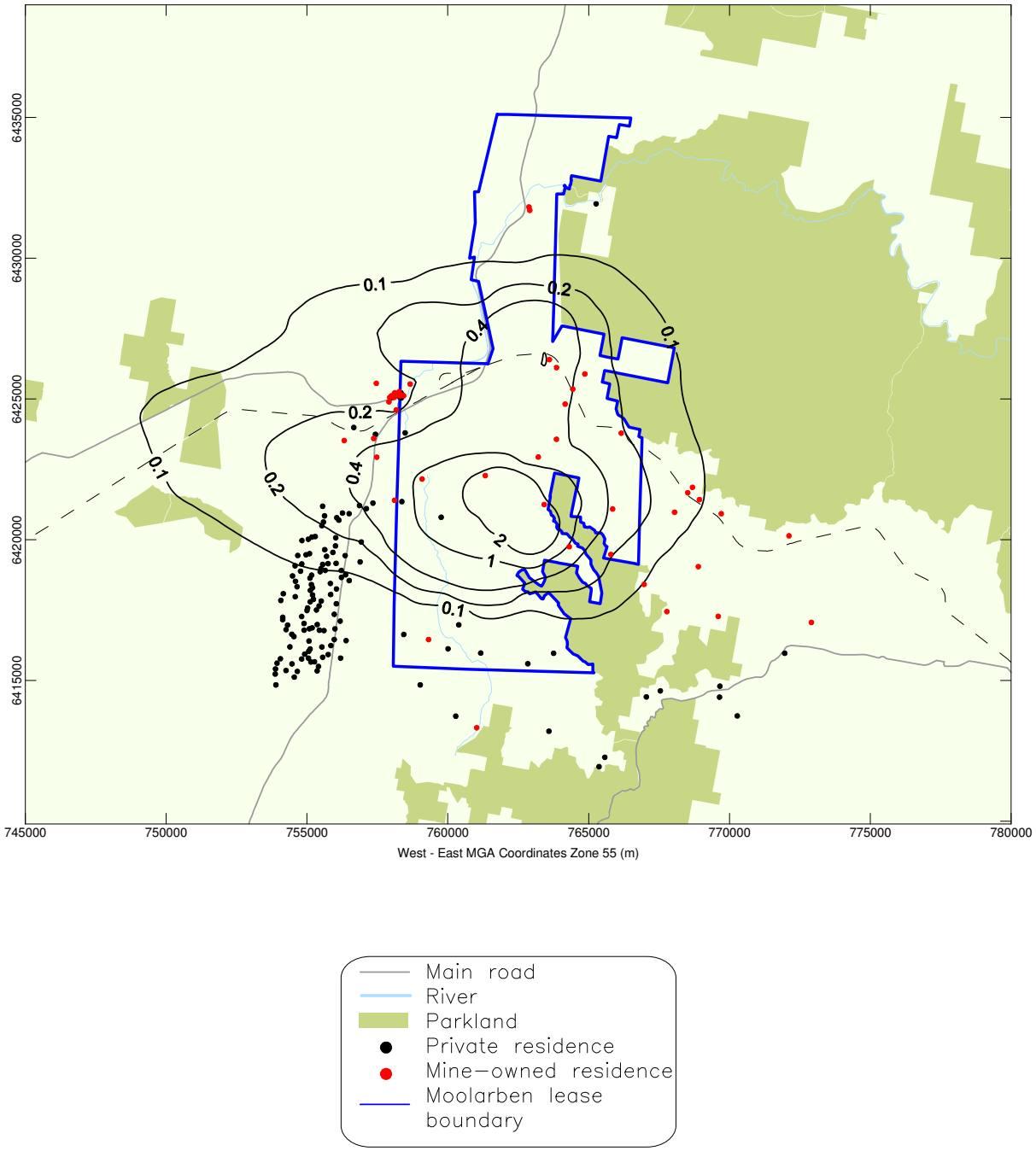

Figure 25: Predicted annual average dust deposition due to emissions from the Proposal - Year 7 (g/m^2/month)

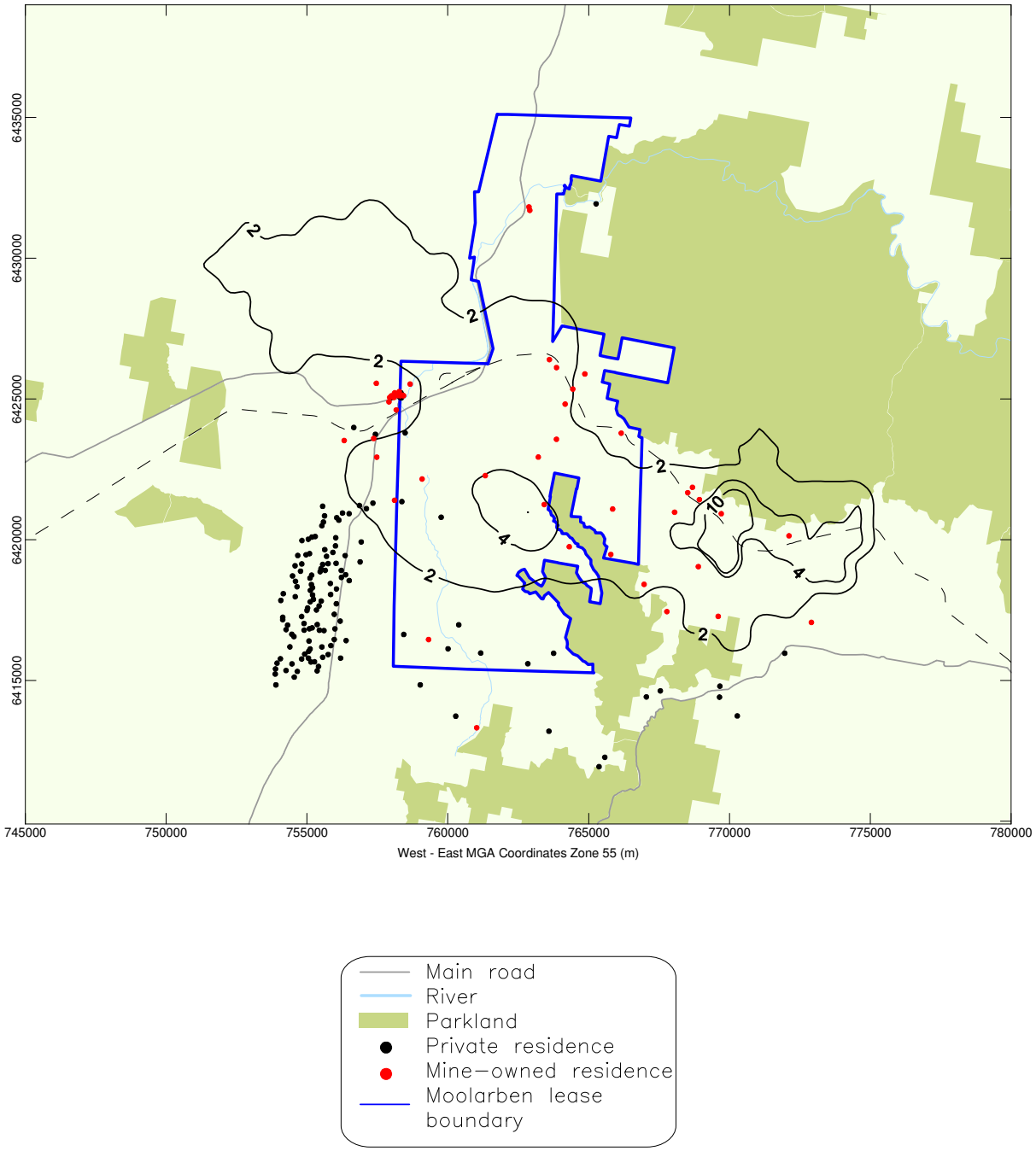

Figure 26: Predicted annual average dust deposition due to emissions from the Proposal and other sources - Year 7 (g/m^2/month)

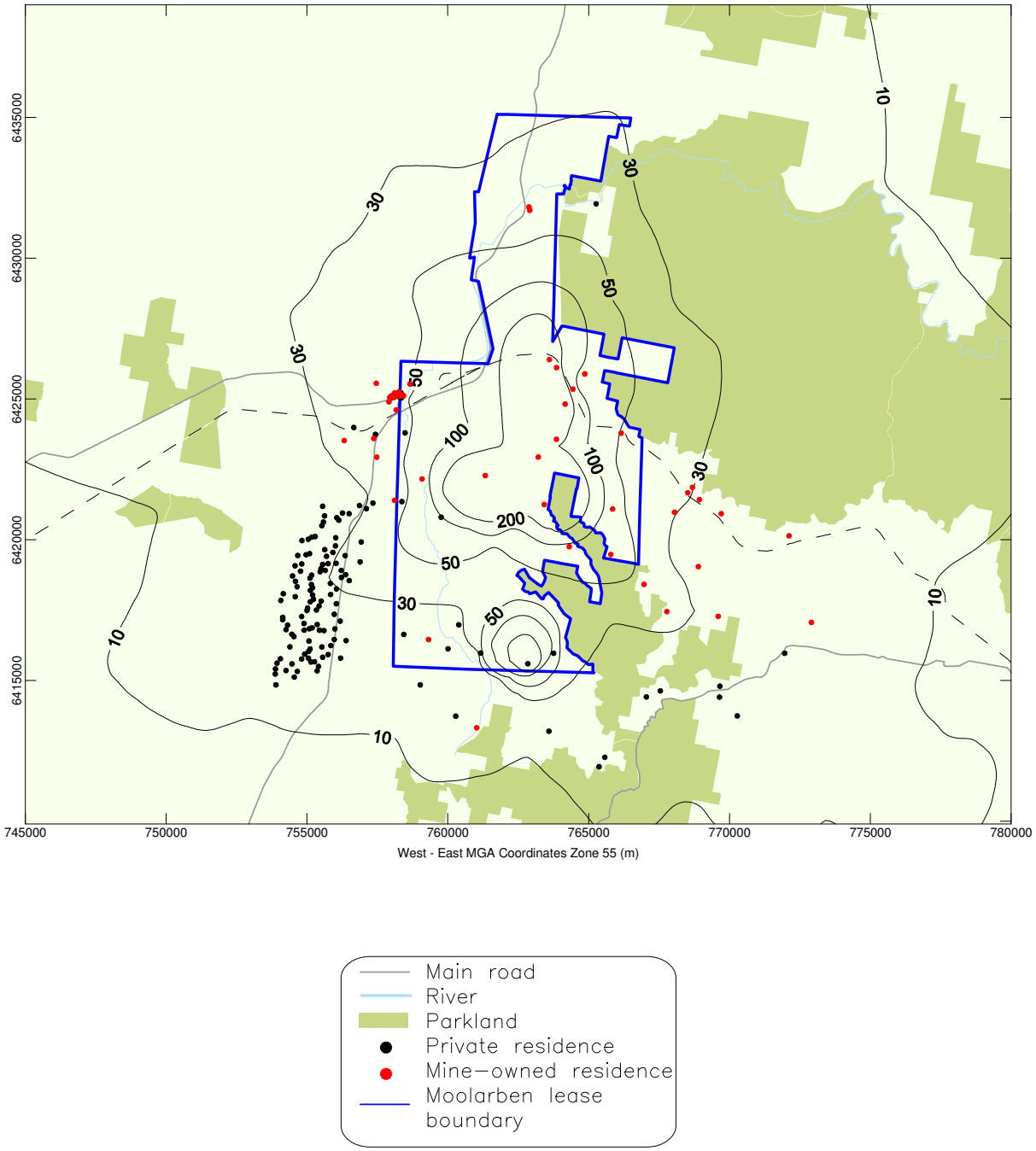

Figure 27: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal - Year 12 ($\mu g/m^3$)

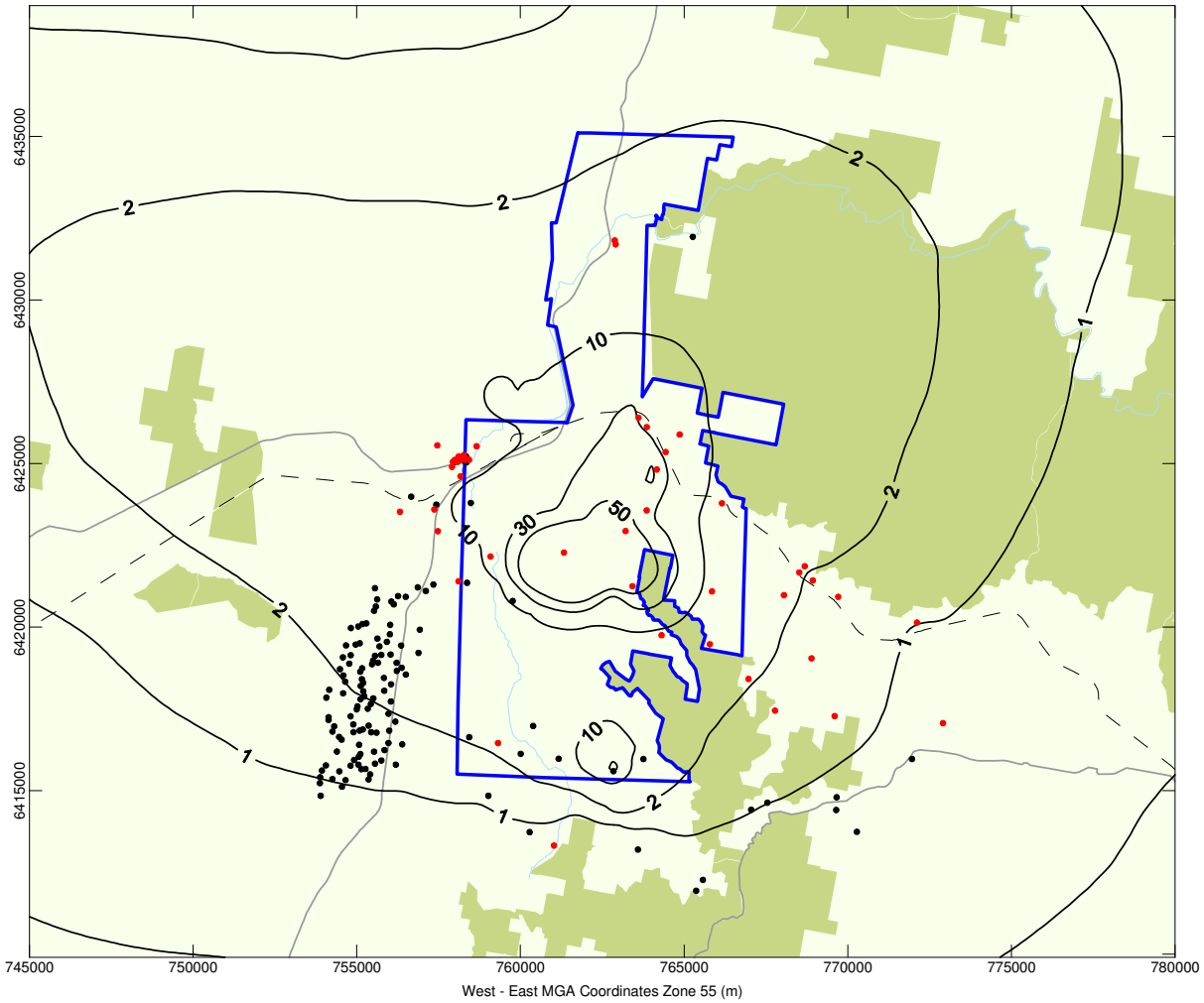

Figure 28: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 12 ($\mu g/m^3$)

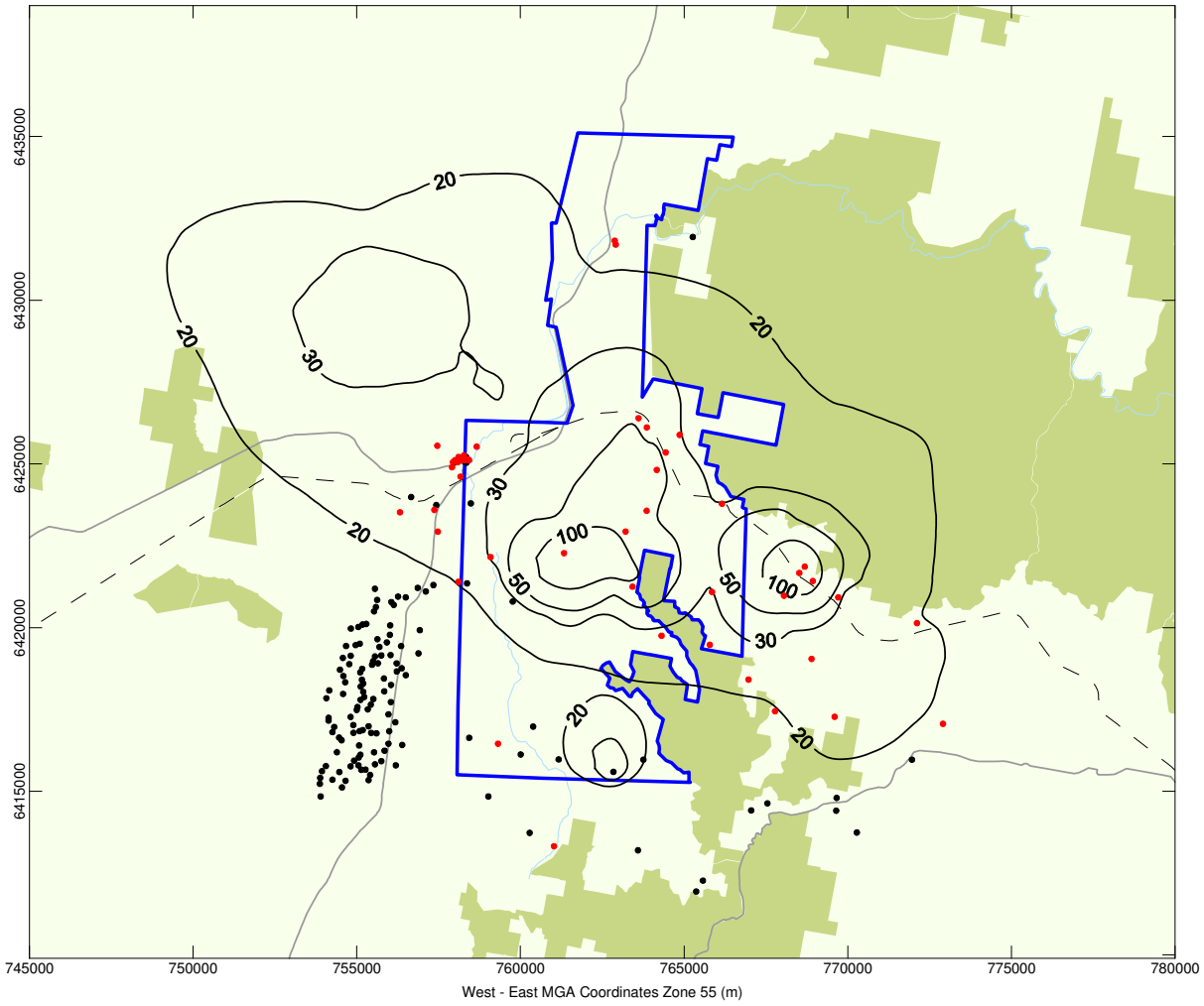

Figure 29: Predicted annual average PM_{10} concentration due to emissions from the Proposal and other sources - Year 12 (µg/m^3)

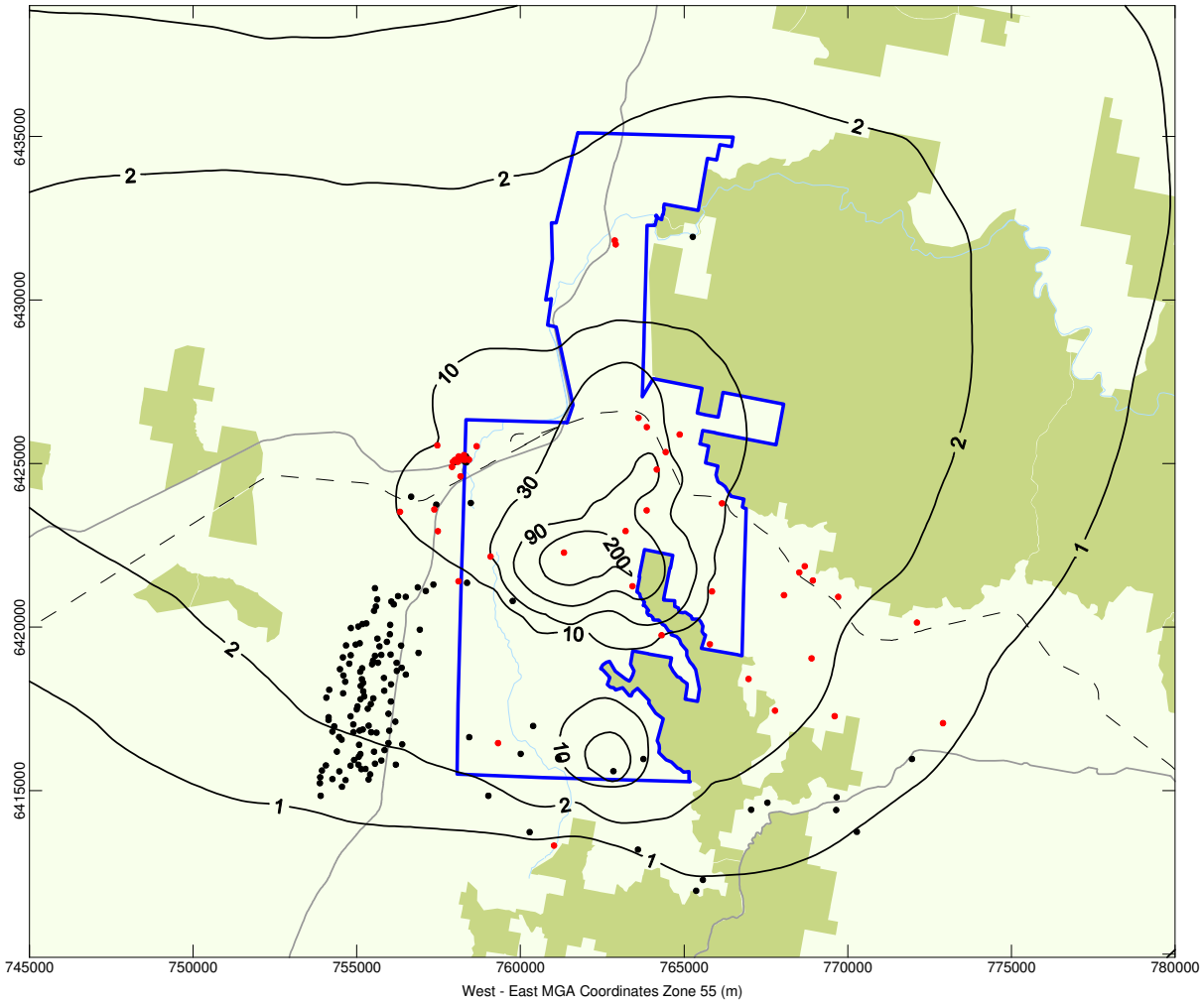

Figure 30: Predicted annual average TSP concentration due to emissions from the Proposal - Year 12 (µg/m^3)

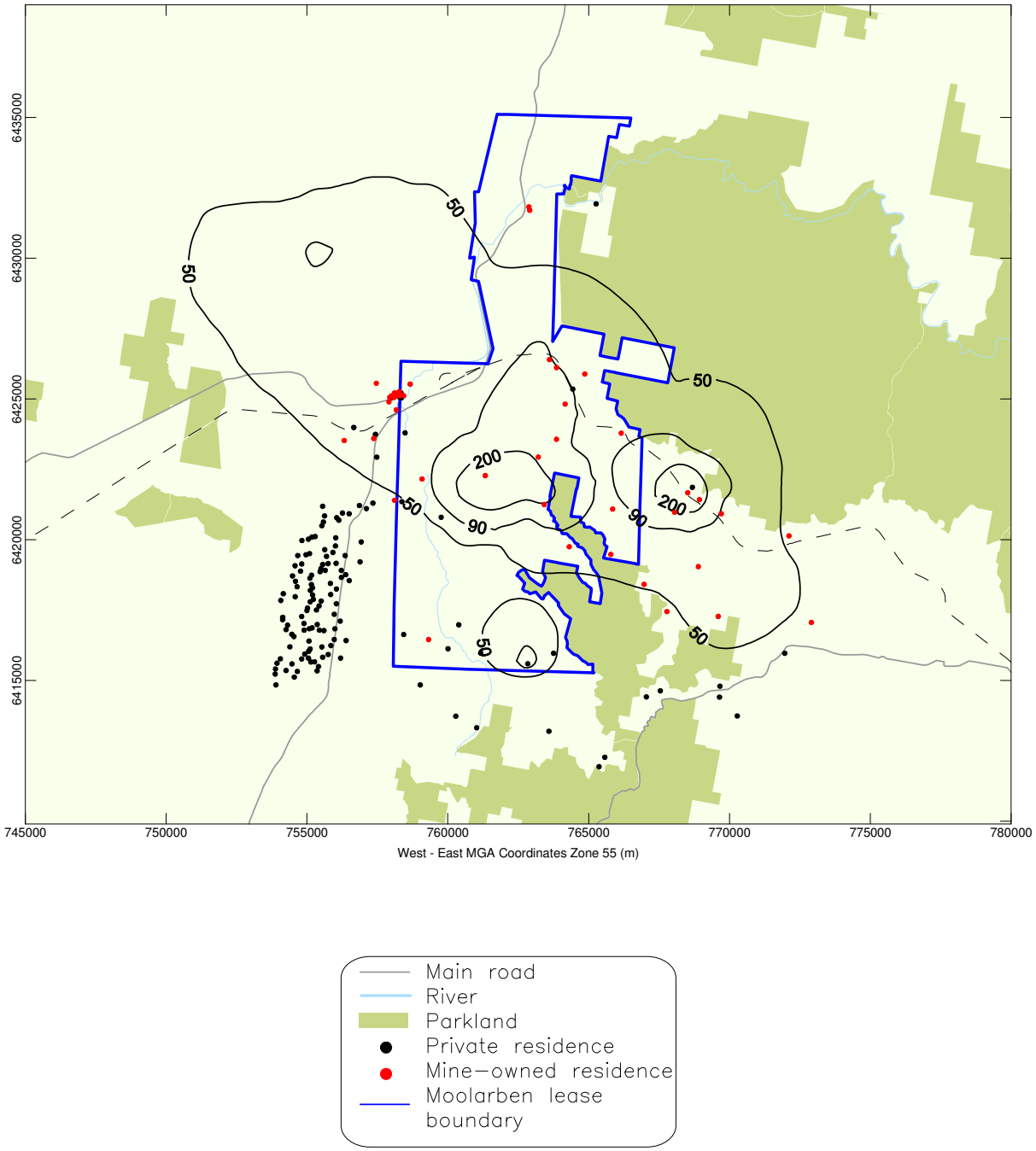

Figure 31: Predicted annual average TSP concentration due to emissions from the Proposal and other sources - Year 12 (µg/m^3)

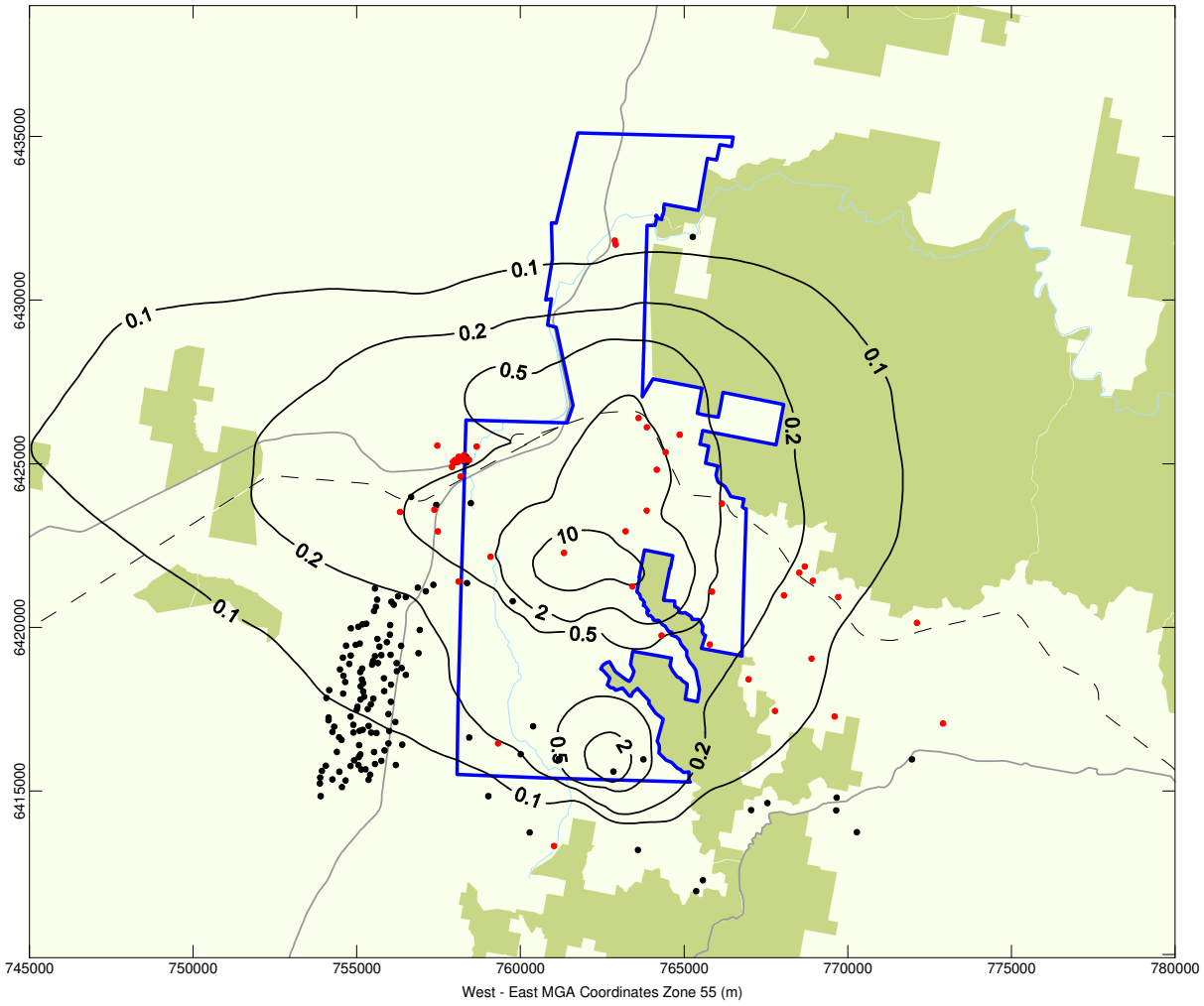

Figure 32: Predicted annual average dust deposition due to emissions from the Proposal - Year 12 (g/m^2/month)

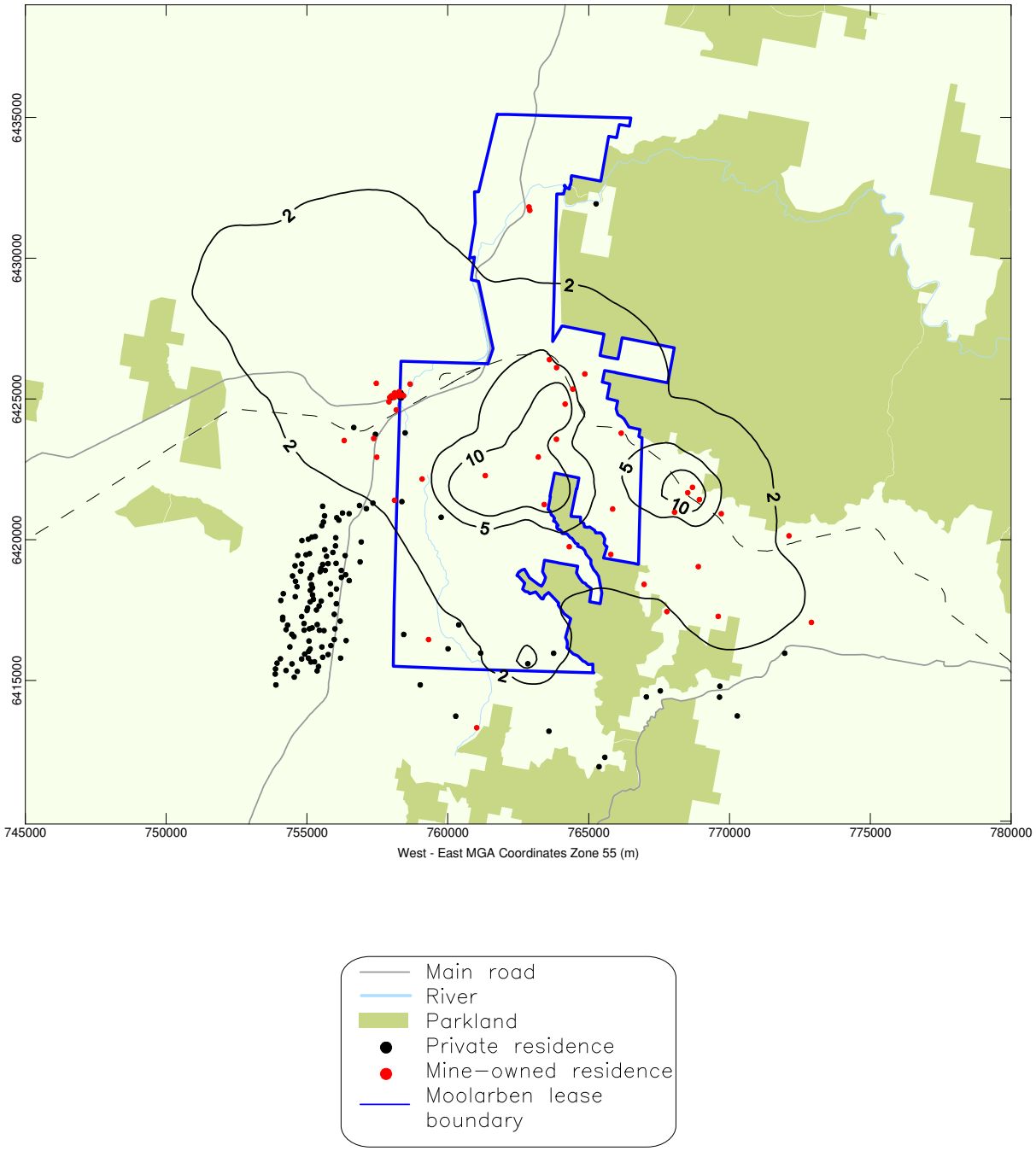

Figure 33: Predicted annual average dust deposition due to emissions from the Proposal and other sources - Year 12 (g/m^2/month)

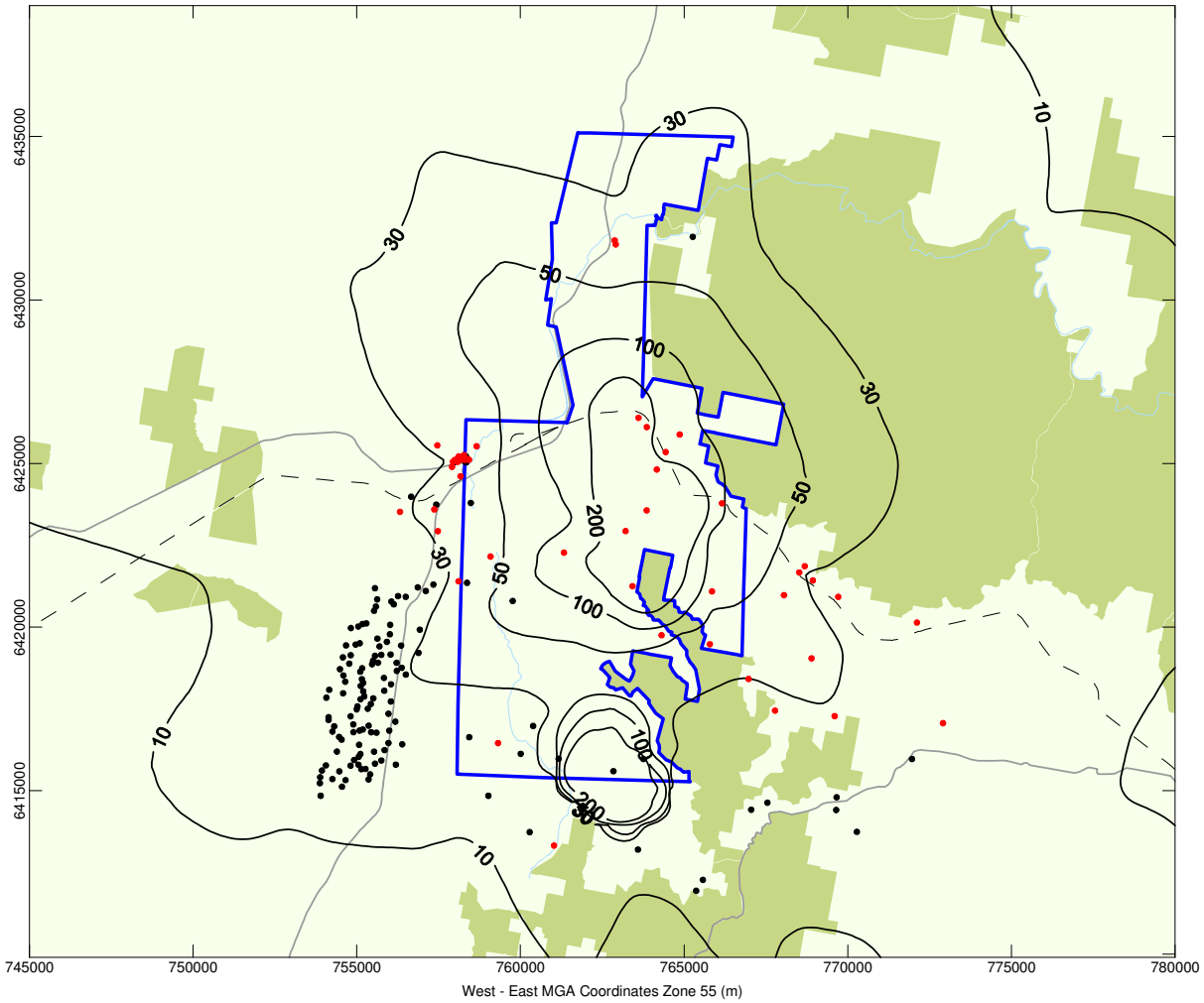

Figure 34: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal - Year 16 ($\mu g/m^3$)

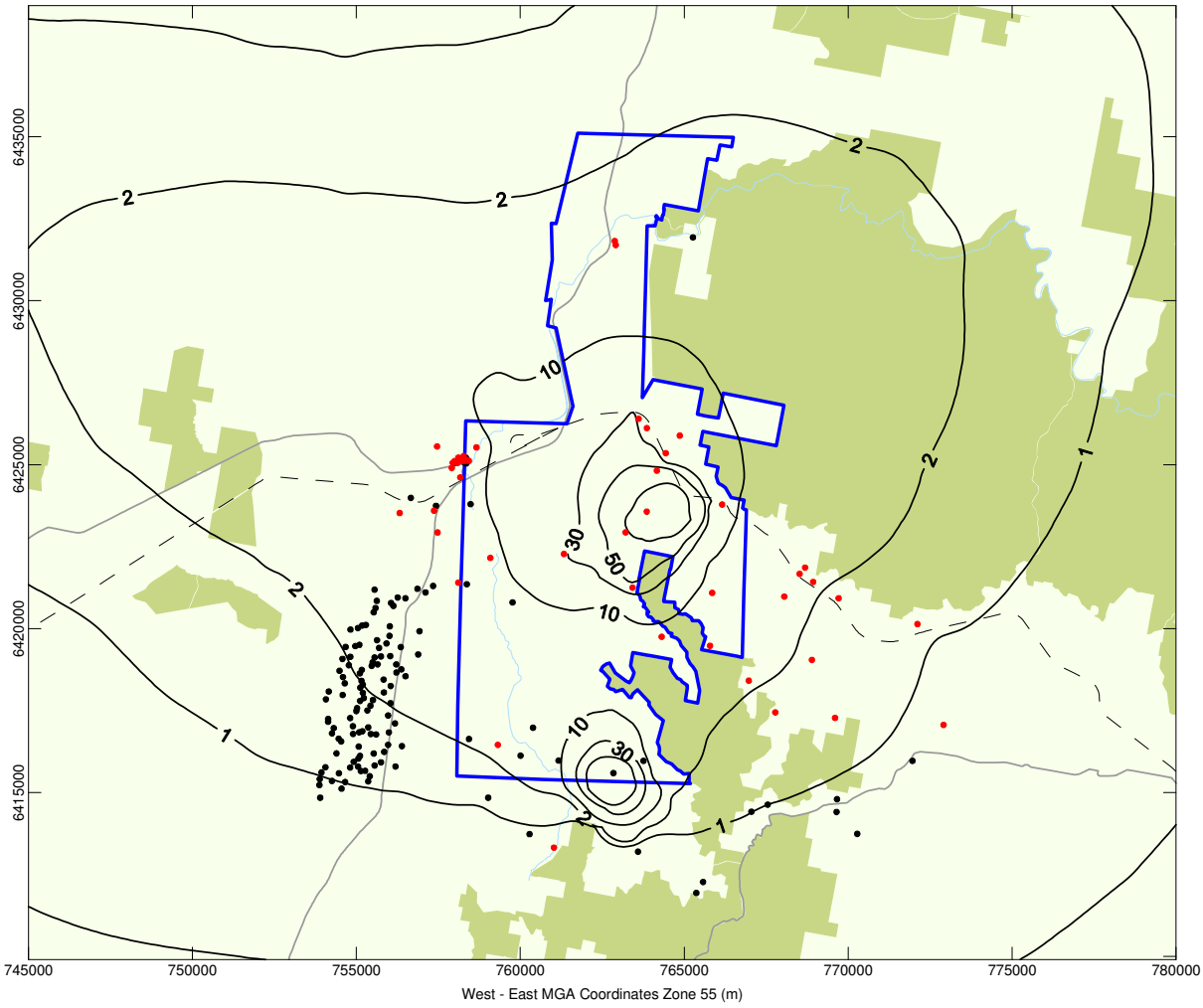

Figure 35: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 16 (µg/m^3)

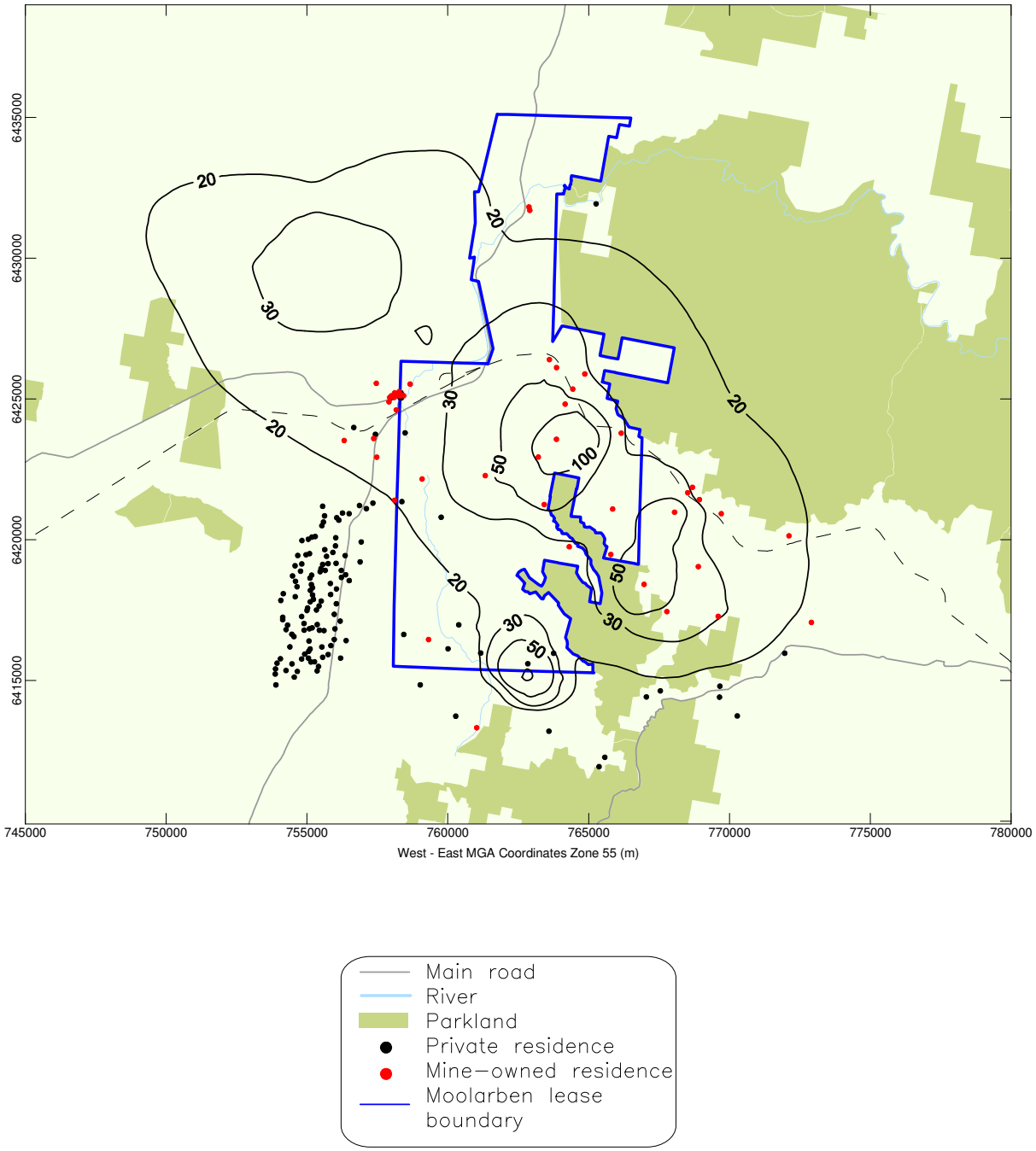

Figure 36: Predicted annual average PM_{10} concentration due to emissions from the Proposal and other sources - Year 16 (µg/m^3)

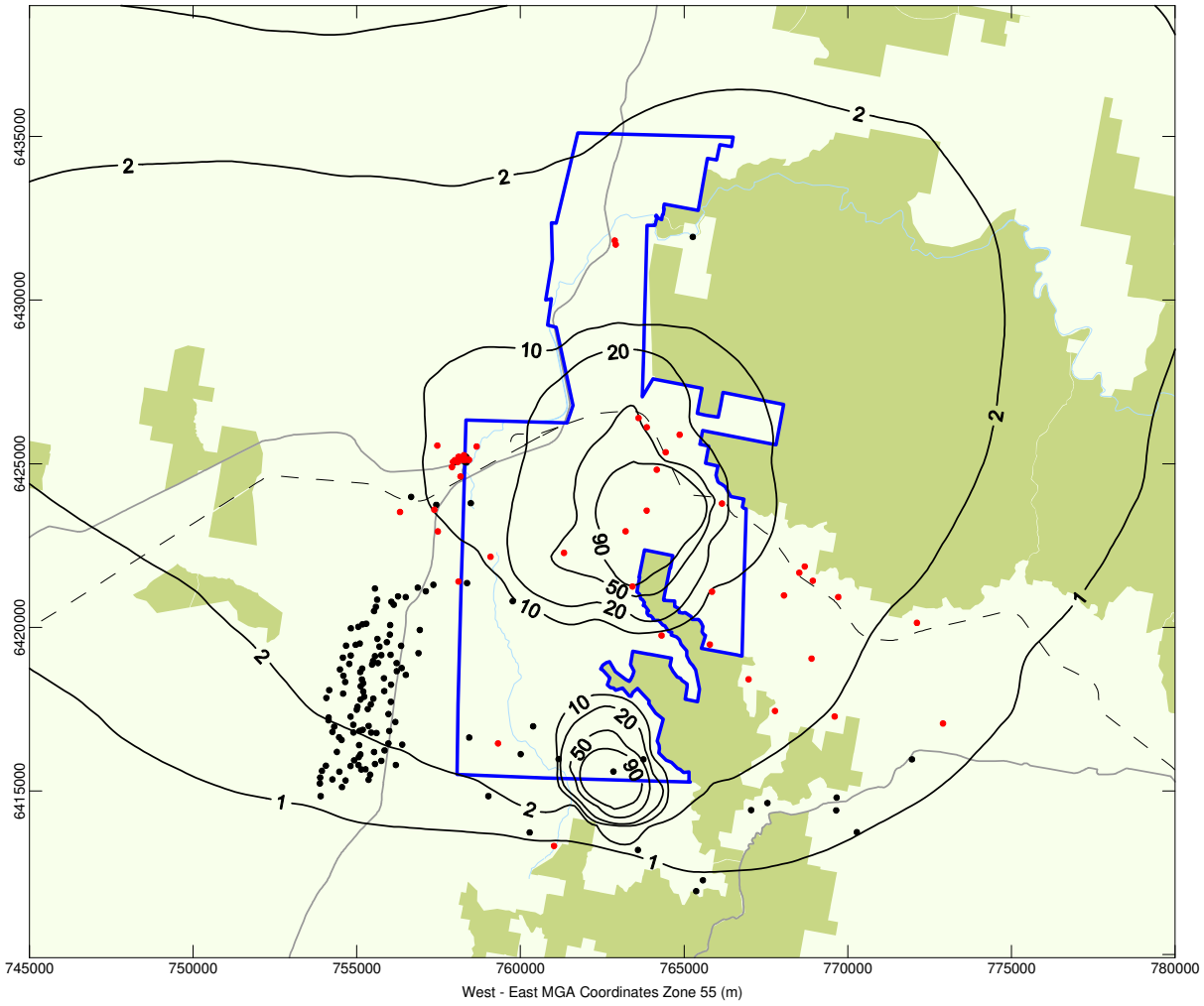

Figure 37: Predicted annual average TSP concentration due to emissions from the Proposal - Year 16 (µg/m^3)

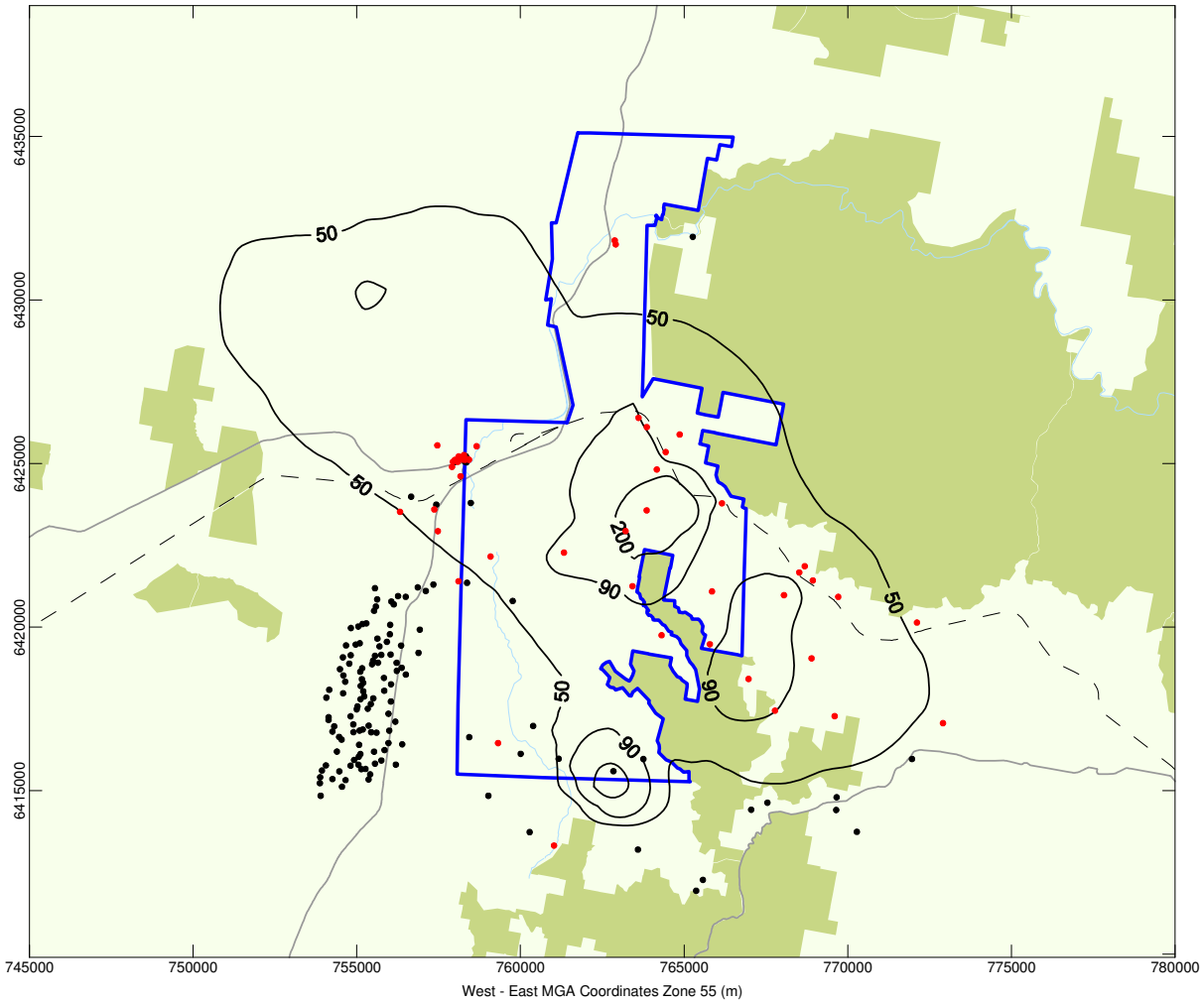

Figure 38: Predicted annual average TSP concentration due to emissions from the Proposal and other sources - Year 16 (µg/m^3)

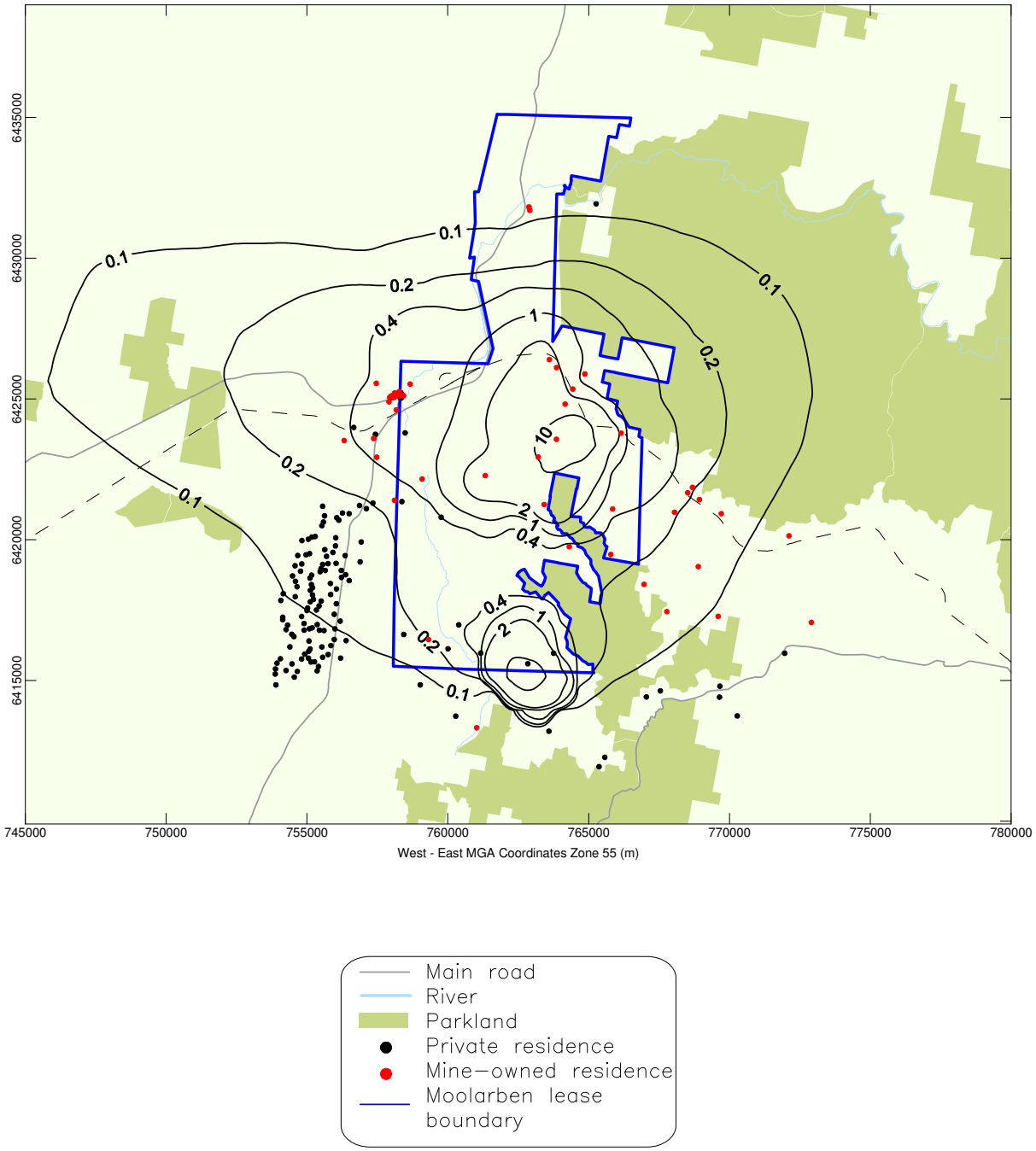

Figure 39: Predicted annual average dust deposition due to emissions from the Proposal - Year 16 (g/m^2/month)

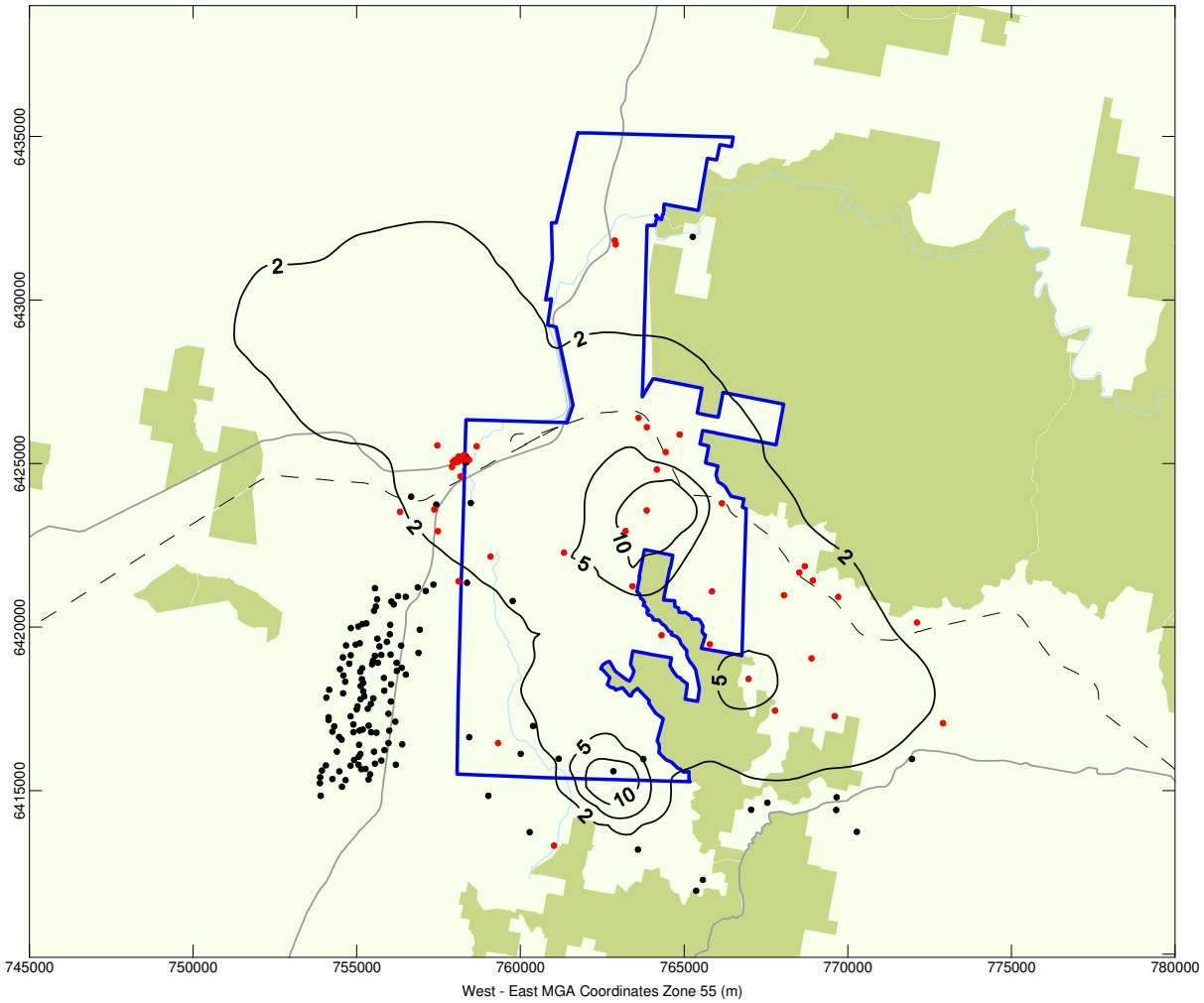

Figure 40: Predicted annual average dust deposition due to emissions from the Proposal and other sources - Year 16 (g/m^2/month)

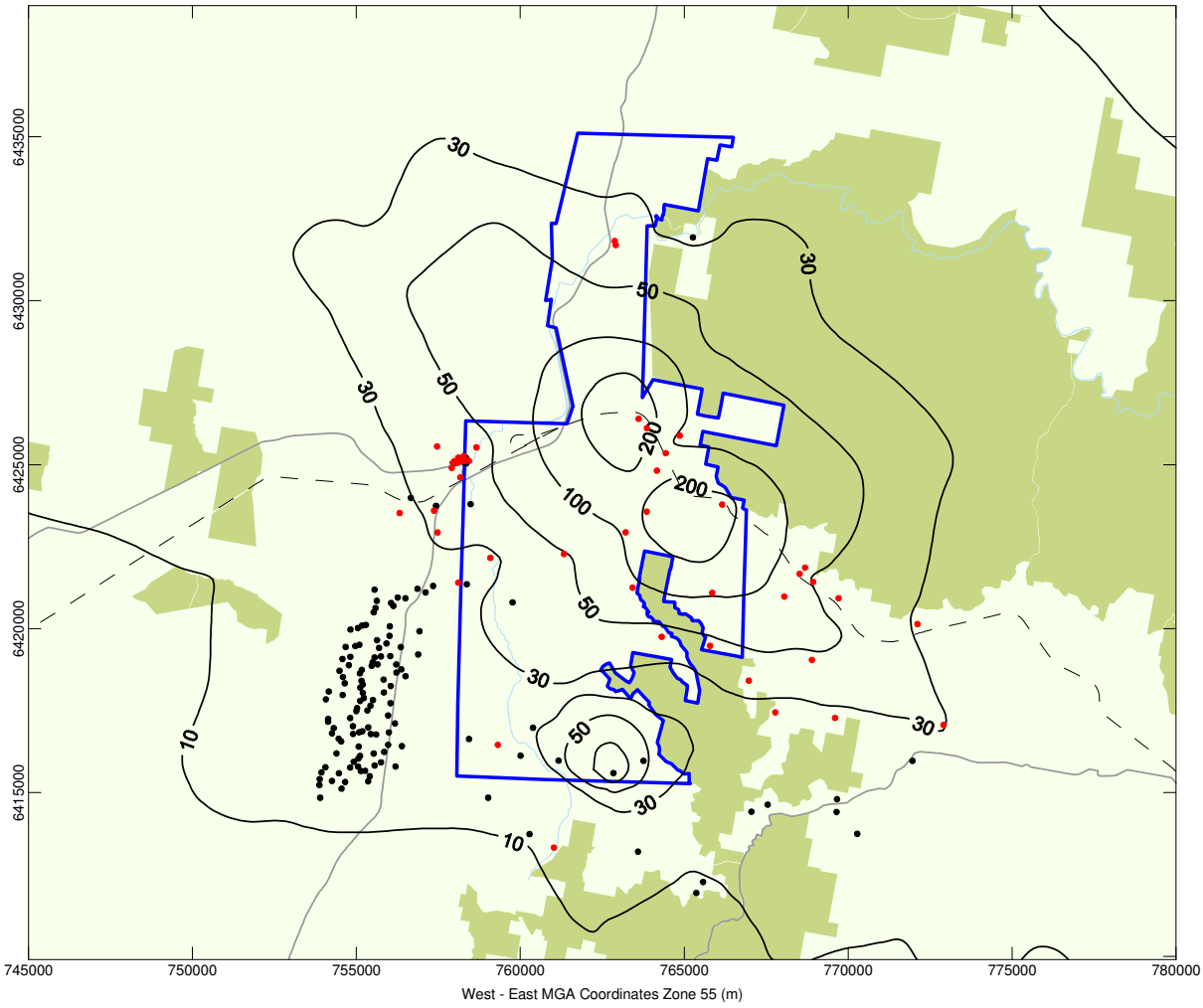

Figure 41: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal - Year 19 ($\mu g/m^3$)

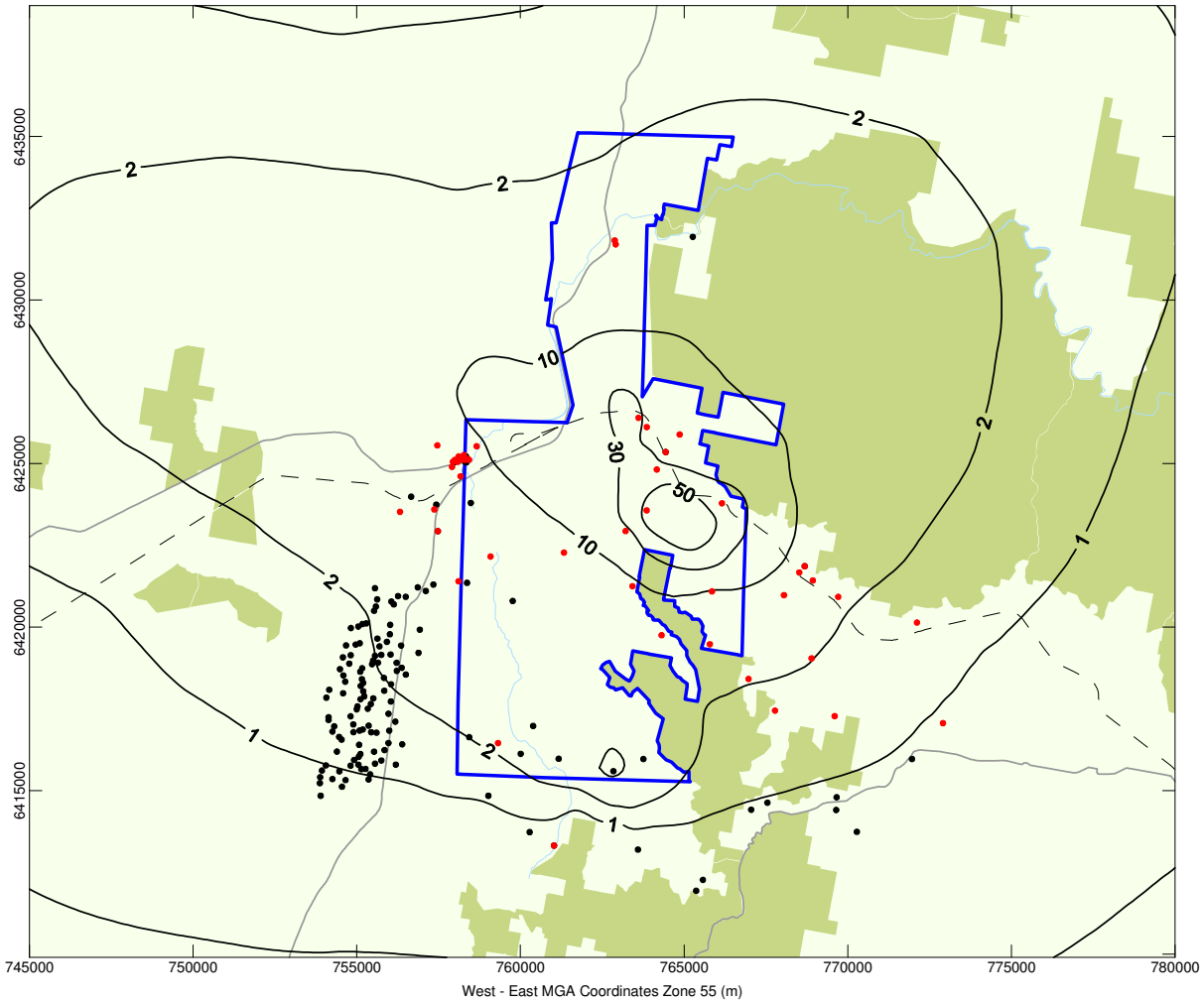

Figure 42: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 19 (µg/m^3)

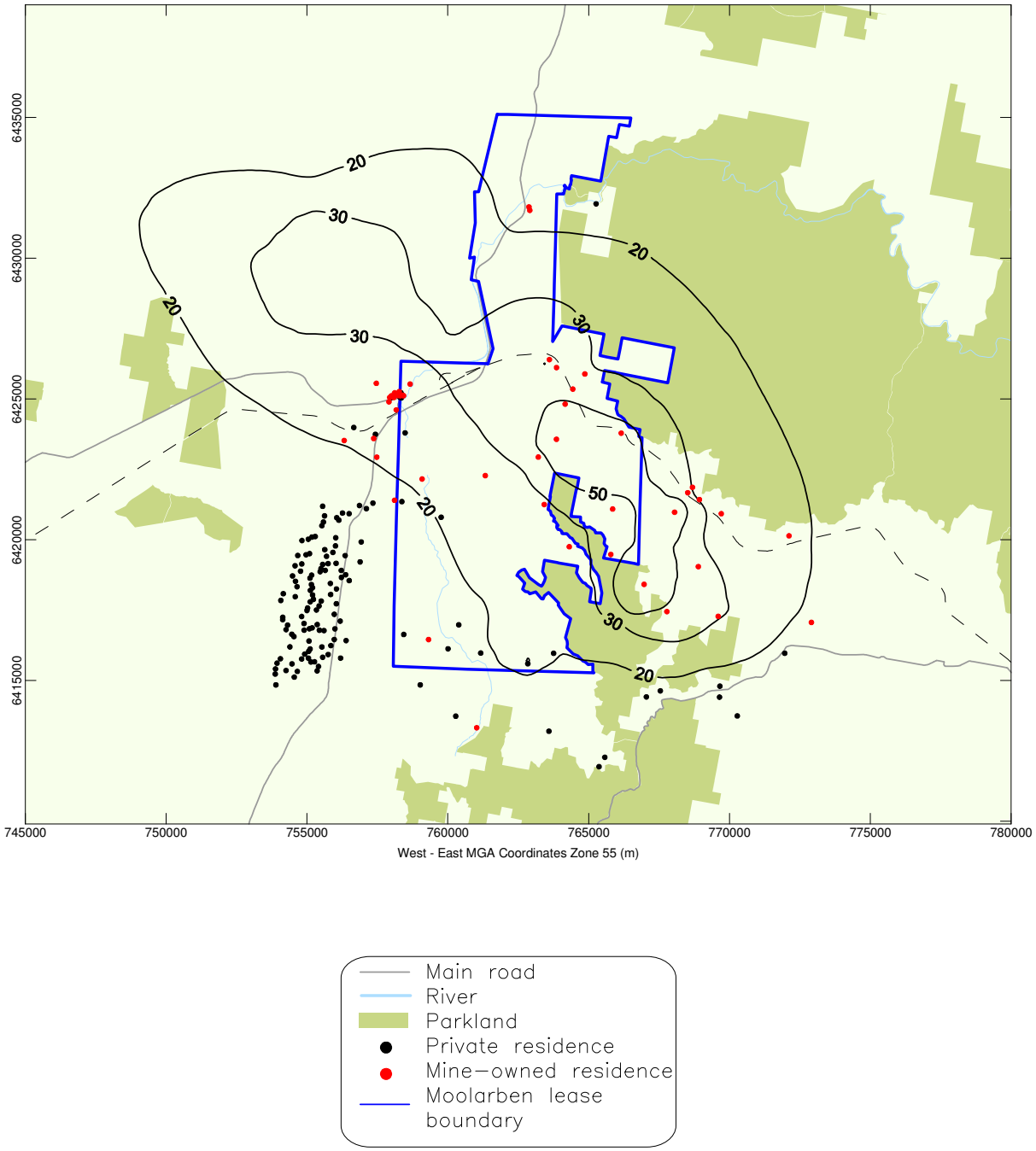

Figure 43: Predicted annual average PM_{10} concentration due to emissions from the Proposal and other sources - Year 19 (µg/m^3)

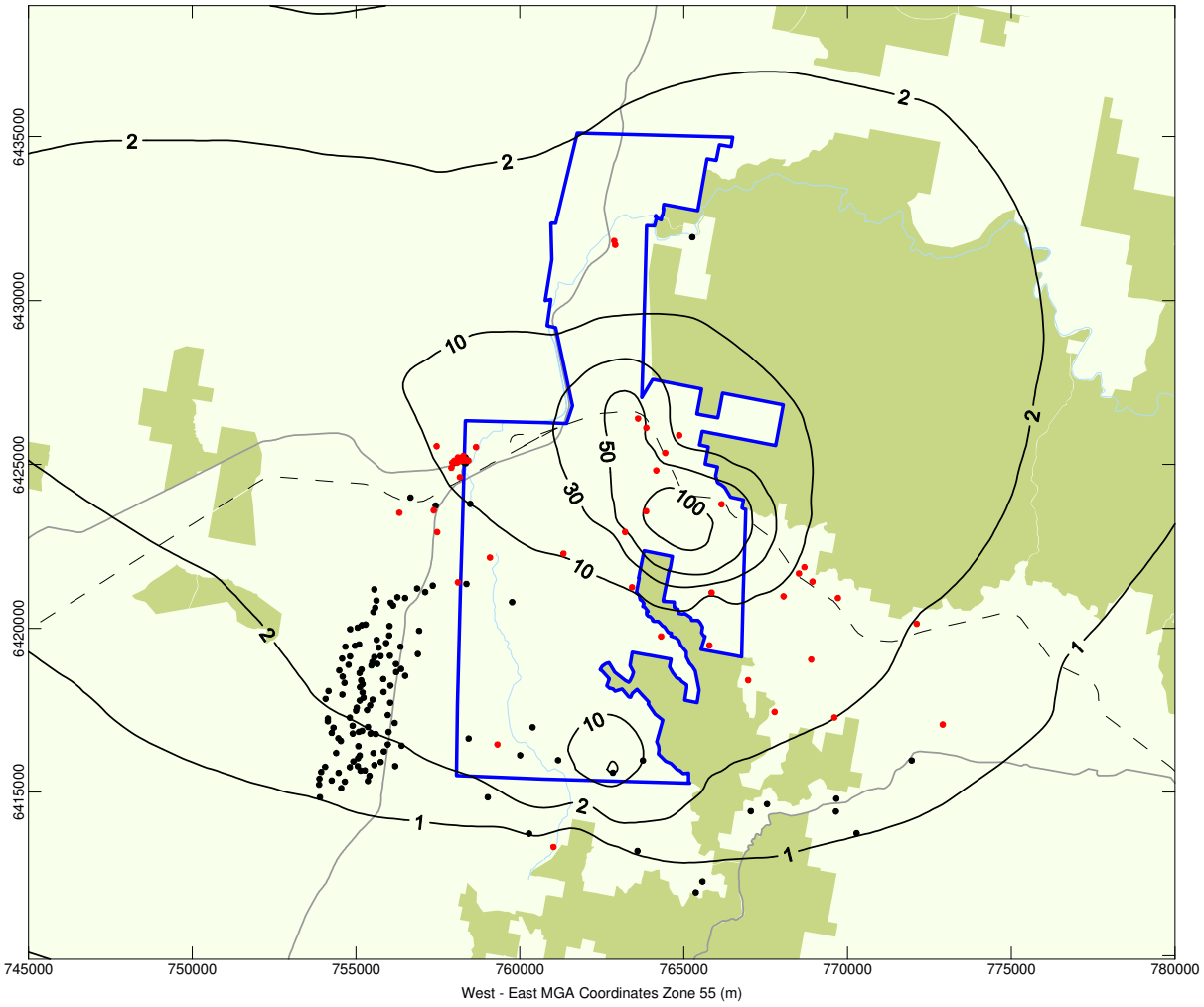

Figure 44: Predicted annual average TSP concentration due to emissions from the Proposal - Year 19 (µg/m^3)

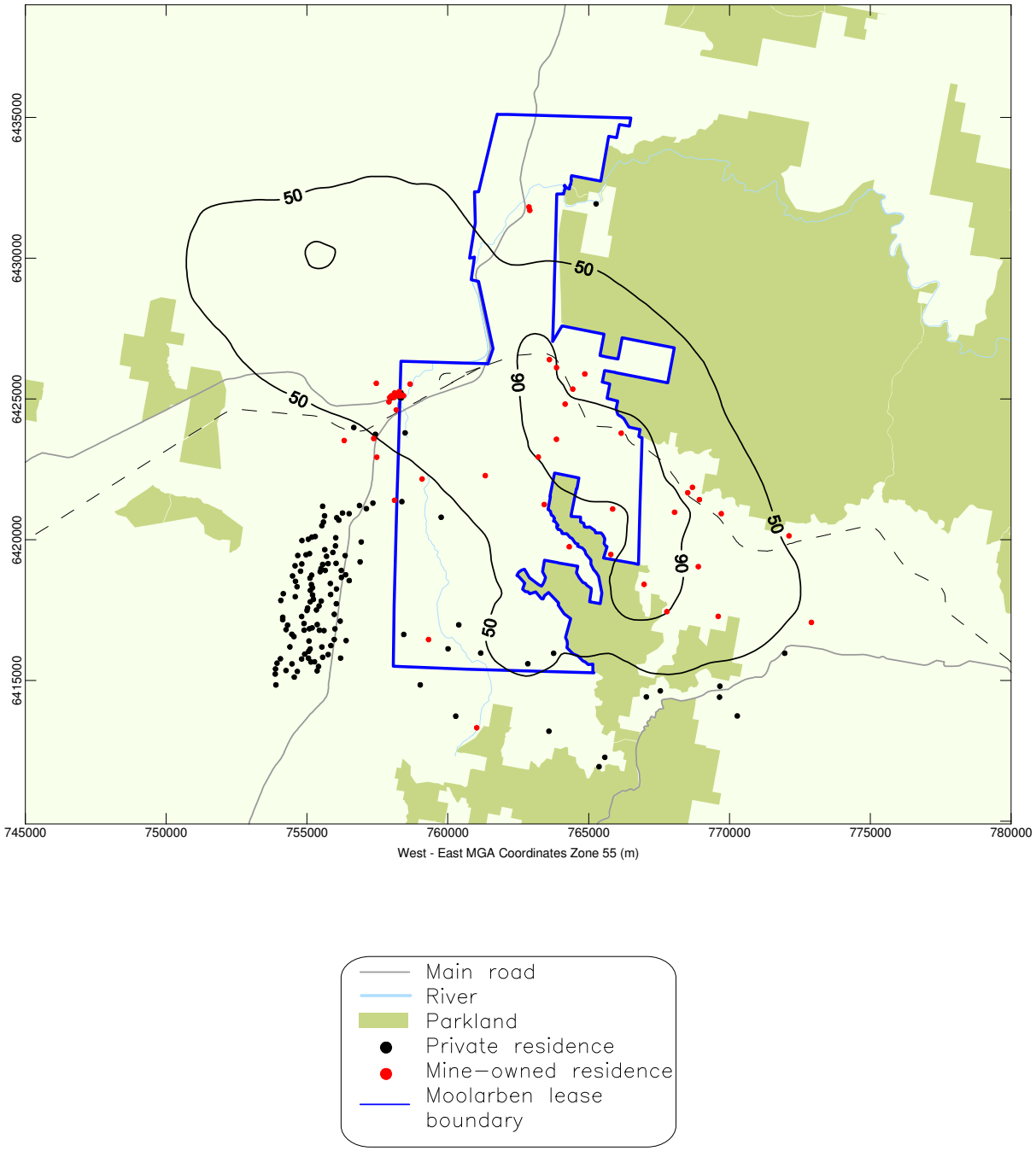

Figure 45: Predicted annual average TSP concentration due to emissions from the Proposal and other sources - Year 19 (µg/m^3)

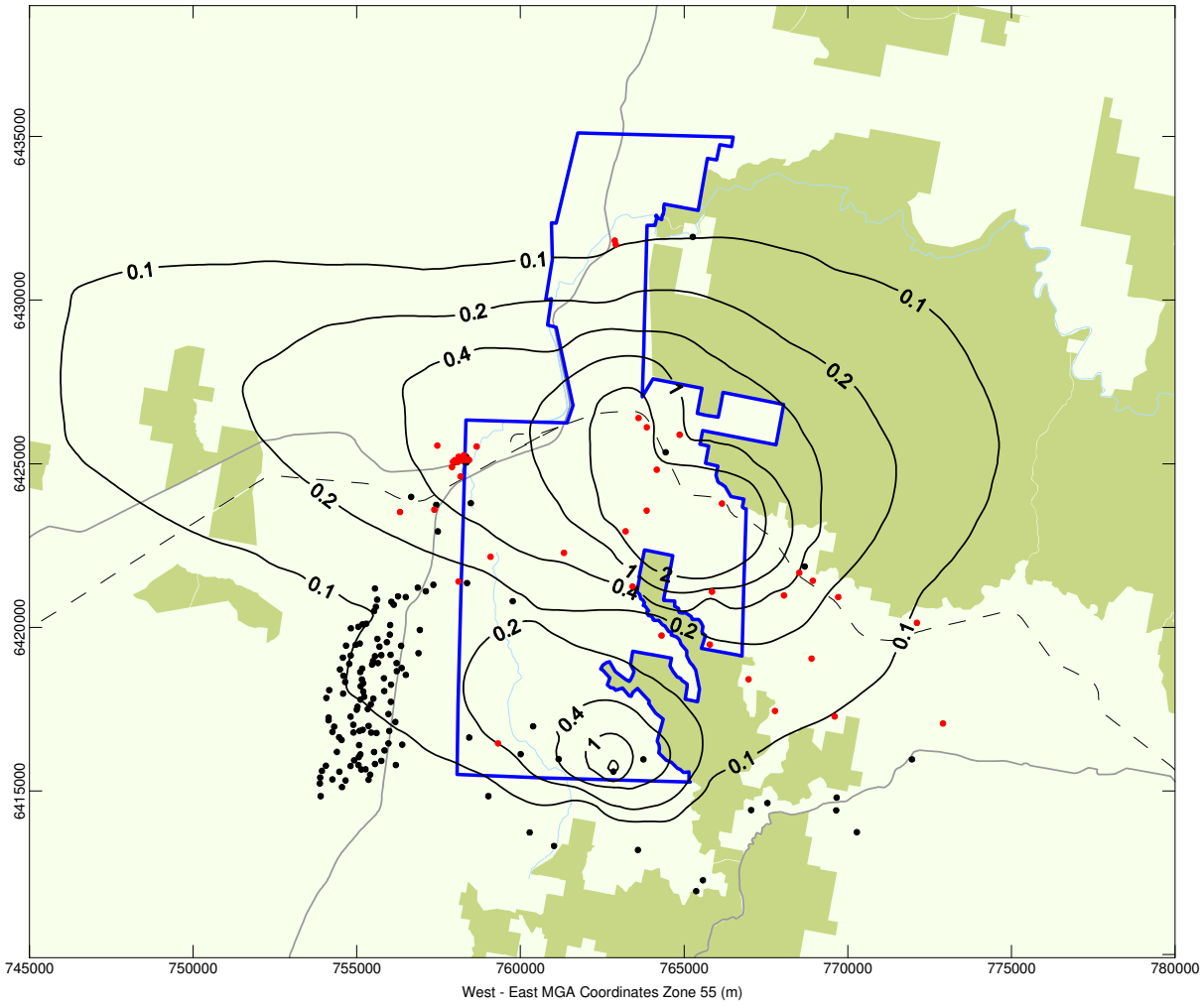

Figure 46: Predicted annual average dust deposition due to emissions from the Proposal - Year 19 (g/m^2/month)

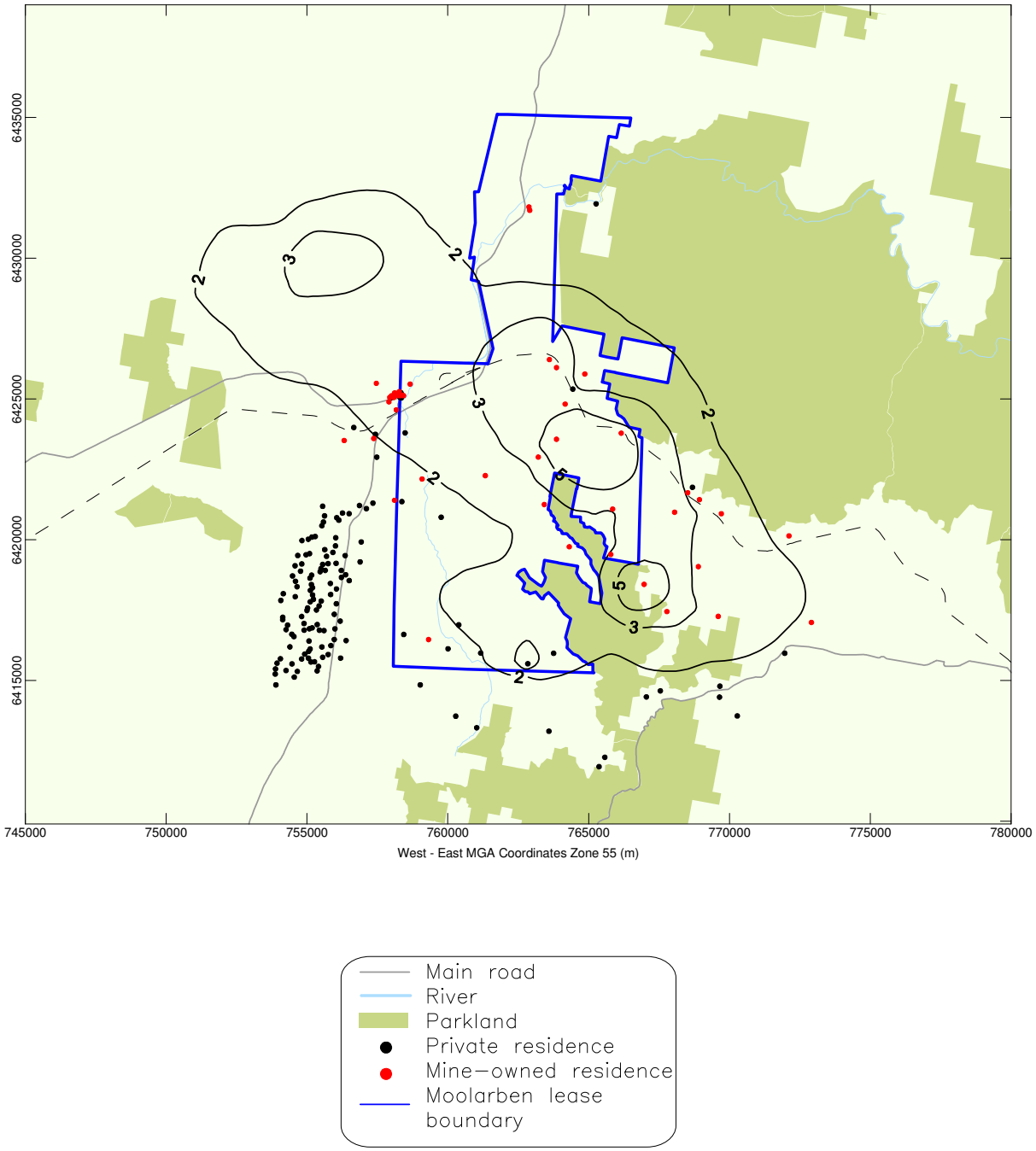

Figure 47: Predicted annual average dust deposition due to emissions from the Proposal and other sources - Year 19 (g/m^2/month)

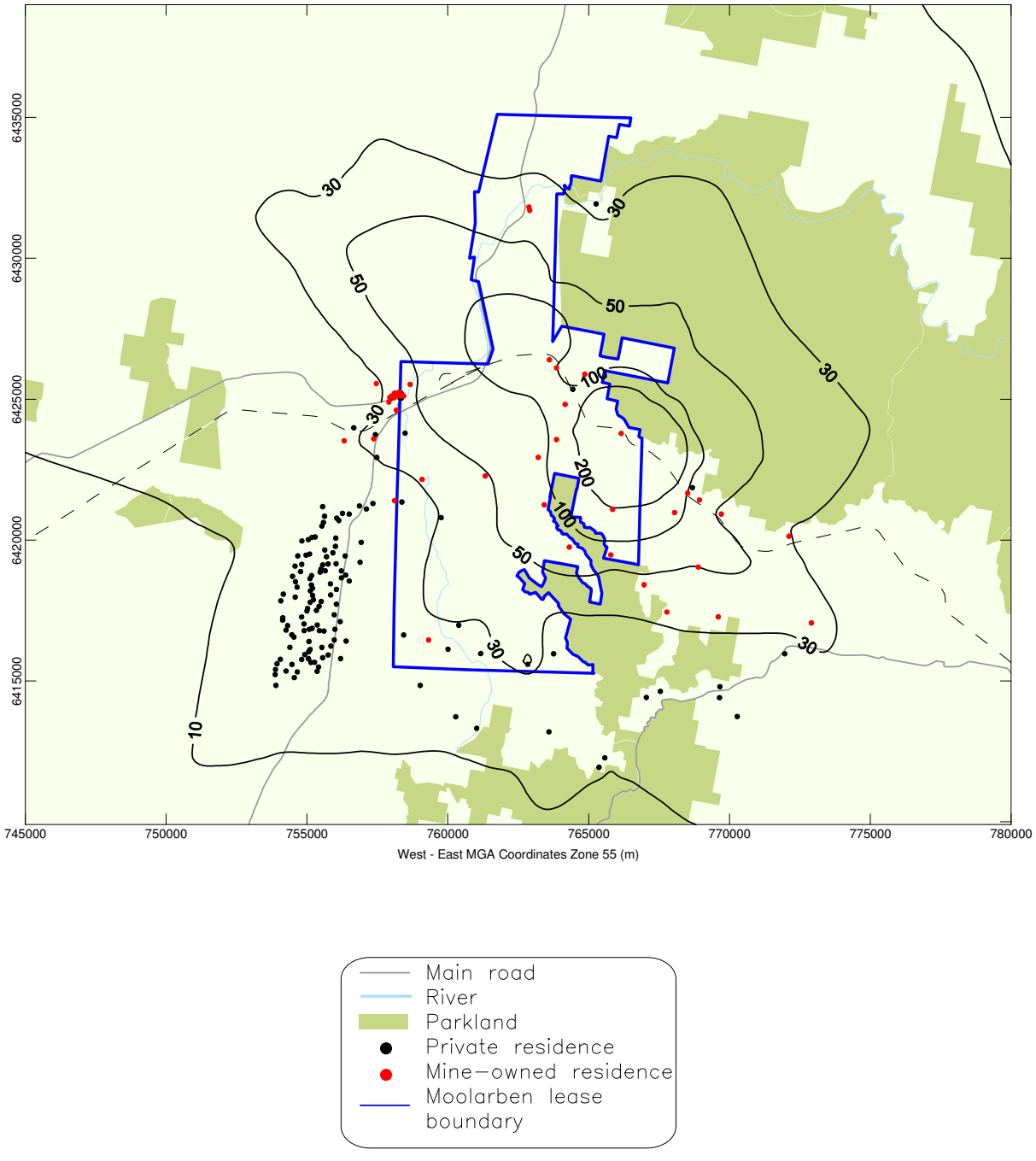

Figure 48: Predicted maximum 24-hour average PM_{10} concentration due to emissions from the Proposal - Year 24 (µg/m^3)

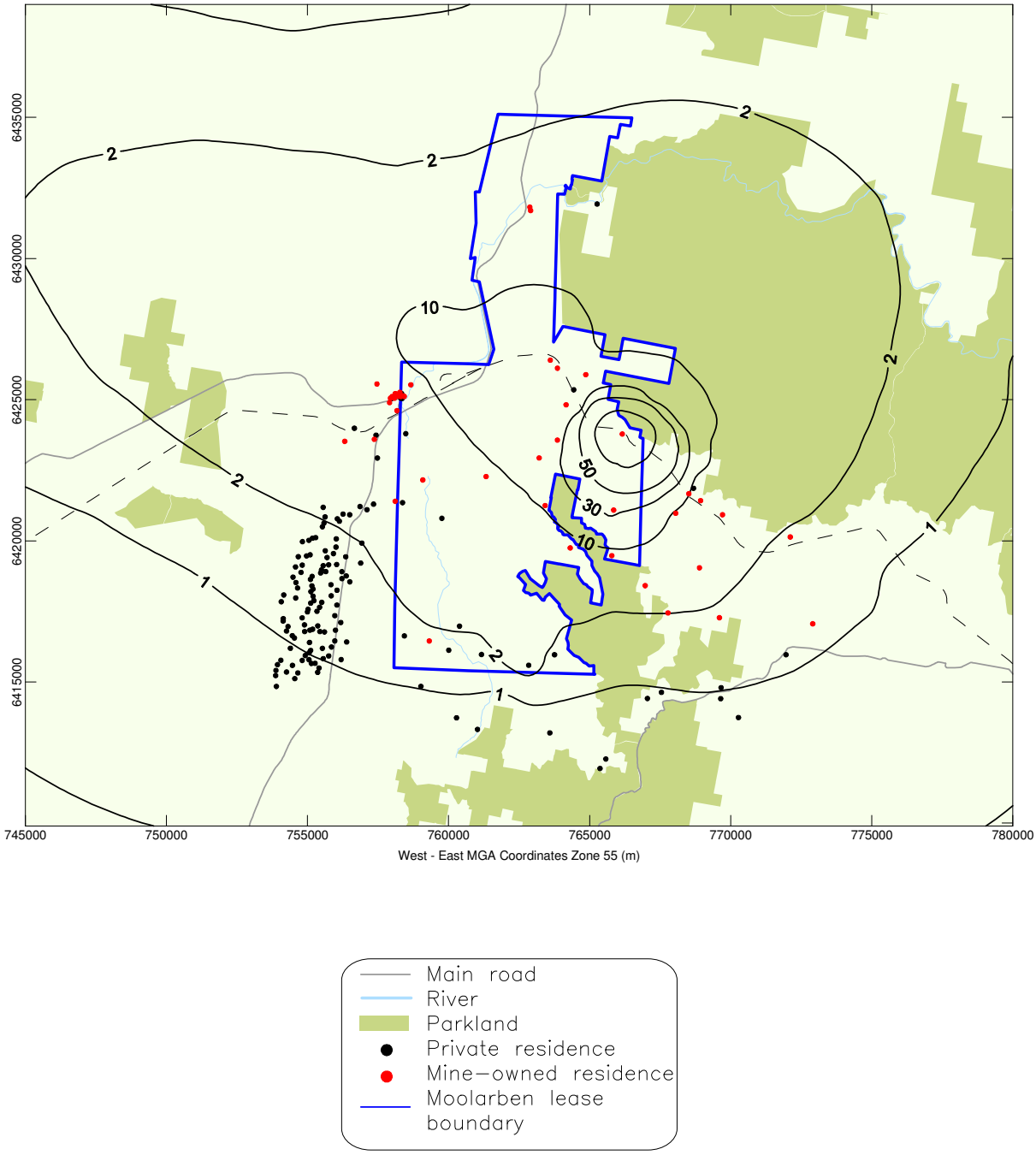

Figure 49: Predicted annual average PM_{10} concentration due to emissions from the Proposal - Year 24 ($\mu g/m^3$)

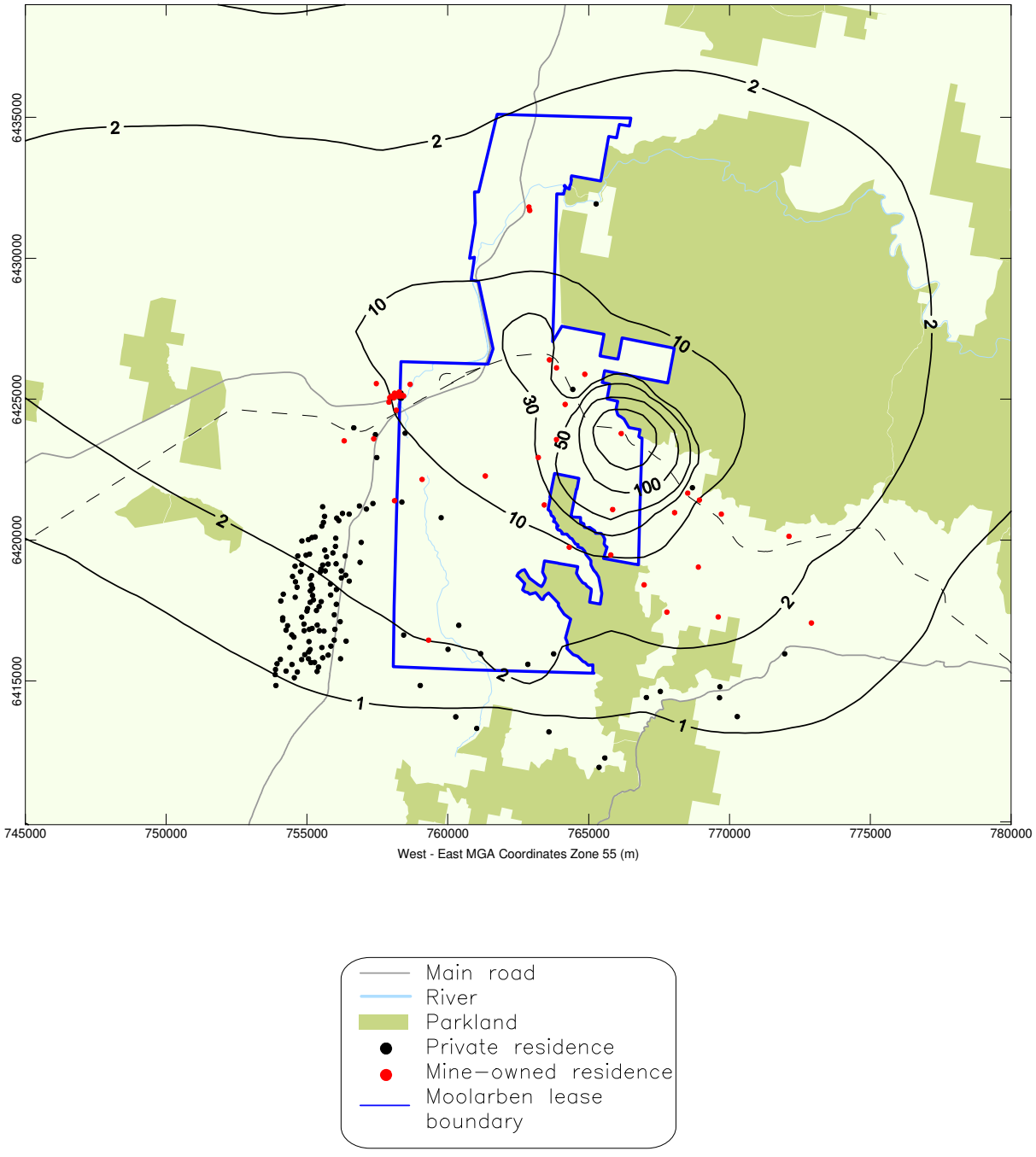

Figure 50: Predicted annual average TSP concentration due to emissions from the Proposal - Year 24 (µg/m^3)

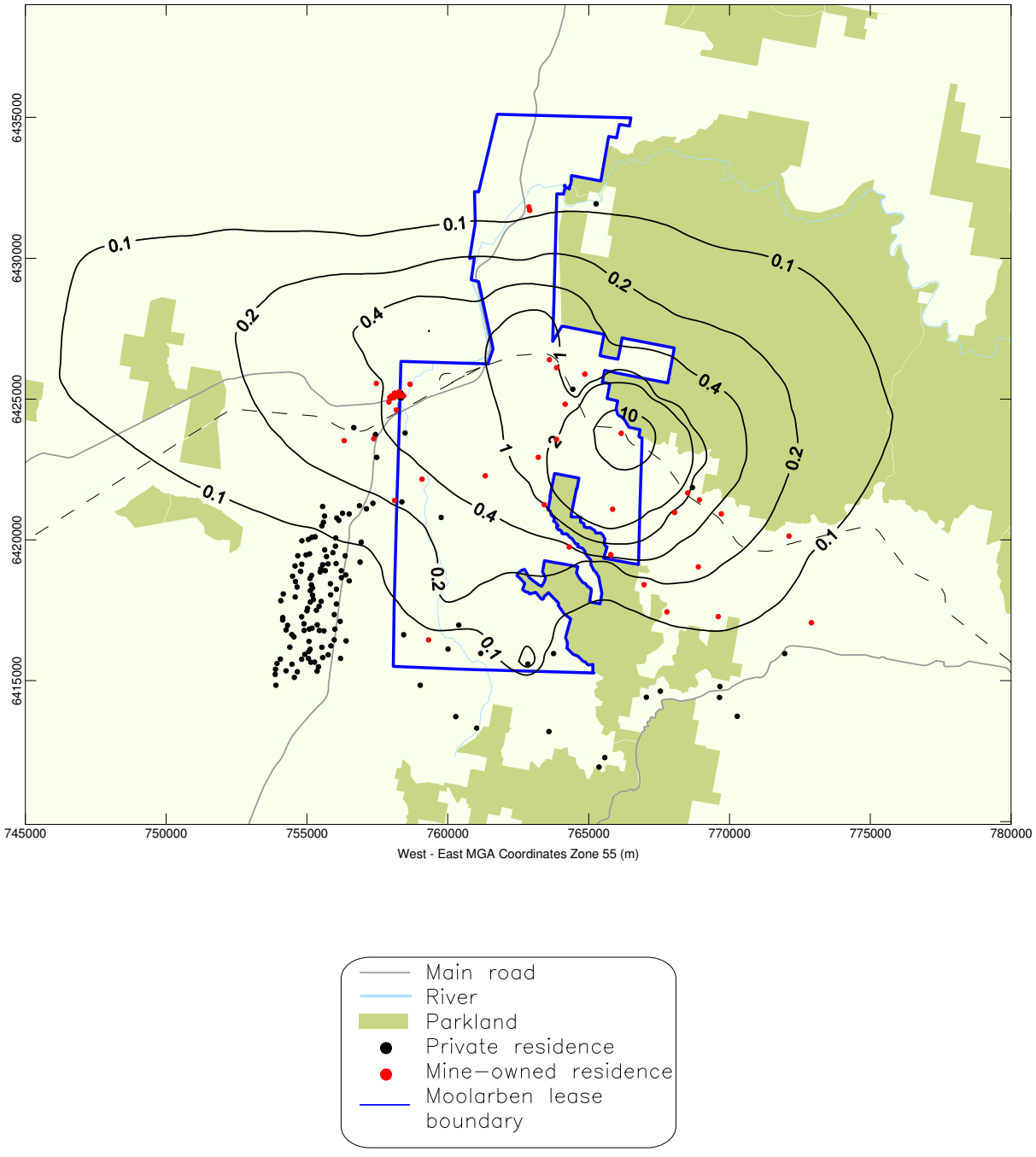

Figure 51: Predicted annual average dust deposition due to emissions from the Proposal - Year 24 (µg/m^3)