Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

23 June 2014

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Senior Environmental Scientist
Hansen Bailey

RE: Drayton South Coal Project – retracted mine plan– quantitative assessment of air quality impacts

Dear Daniel,

This letter provides a quantitative assessment of the potential air quality impacts from the retracted mine plans for the proposed Drayton South Coal Project. These changes to the mine plan have been made in response to the comments made in the Planning Assessment Commission (PAC) Review Report on the Project (**PAC 2013**). This letter follows on from qualitative assessment for the same mine plans provided on the 12th March 2014 (**Pacific Environment 2014**) which was included in the Consequential Environmental Impact Assessment for Retracted Mine Plan as prepared by Hansen Bailey dated March 2014.

1 INTRODUCTION AND BACKGROUND

In summary, the following changes have been incorporated into the retracted mine plan:

- Modifications to the quantity of overburden and ROM removed each year and over the life of the project.
- Removal of the entire Houston mine area.
- Removal of the south east portion of Whynot mine area.
- Removal of the southern section of Redbank mine area.

Figure 1-1 compares the proposed retracted mine plan of the Project with the final footprint of mine plans used for the air quality impact assessment (AQIA) completed for the EA (**PAEHolmes 2012**).

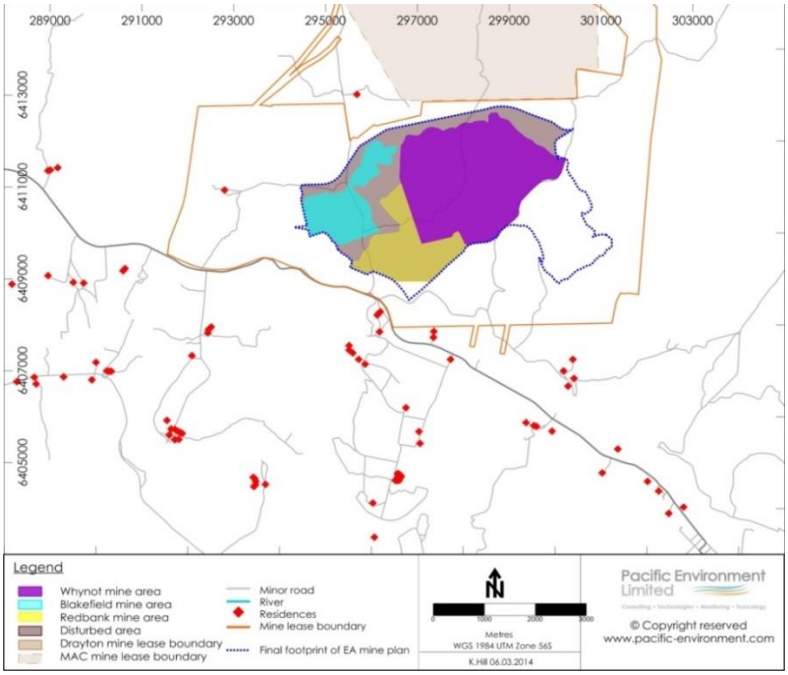


Figure 1-1: Comparison mine footprint for EA and proposed modification

The new mine plans required the remodelling of CALMET to include the revised mine terrain contours, while all other settings remained the same.

This letter provides a summary of the new assumptions, emission estimates and updated modelling results for the Project.

2 EMISSION ESTIMATES

2.1 Retracted Mine Plan

Based on the total amount of material movement per year, Year 5 and Year 10 were considered to be the worst case. **Table 2-1** presents a summary of the material movement for the revised schedule for the retracted mine plan. The proposed layouts for Year 5 and Year 10 are presented in **Figure 2-1**.

Table 2-1: Summary of open cut and highwall ROM coal and waste production schedule

Pit ID	Material removed		Year 3	Year 5	Year 10	Year 15
Whynot	Waste (Mbcm)	Dragline	8.20	10.63	5.93	12.36
		Excavator	14.37	18.00	11.10	21.83
		Partings	0.54	0.75	0.53	0.99
		Total	23.11	29.39	17.56	35.18
	ROM coal (kT)	Total	3,432	3,223	3,172	5,595
Blakefield	Waste (Mbcm)	Dragline	4.32	1.37	2.75	0
		Excavator	1.61	1.50	3.54	0
		Partings	0	0	0	0
		Total	5.94	2.88	6.29	0
	ROM coal (kT)	Total	724	196	457	0
Redbank	Waste (Mbcm)	Dragline	0	0.00	3.70	0
		Excavator	2.27	4.06	3.88	0
		Partings	0.29	0.37	0.37	0
		Total	2.56	4.43	7.95	0
	ROM coal (kT)	Total	855	1,562	2,163	0
Total Waste (Mbcm)			**31.62**	**36.69**	**31.79**	**35.18**
Total ROM (kT)			**5,011**	**4,981**	**5,792**	**5,595**
Total highwall (kT)			0	0	0	0

The assumptions used in this modelling are based primarily on those from the RTS modelling (**Pacific Environment 2013a**):

- Silt and moisture values used are summarised in **Table 2-2** and were based on the values that were included in the response to the PAC (**Pacific Environment 2014a**). These include the use of measured silt and moisture content values from two days of sampling at Drayton Coal mine, as well as sampling taken at a number of other NSW coal mines as part of an on-going ACARP project.
- All out-of-pit haul roads have an 85% control from the application of the dust suppressant Dust-a-Side.
- All in-pit haul roads will have 80% control from watering.
    - Please note that the emissions presented in the RTS modelling (**Pacific Environment 2013a**) and response to the PAC (**Pacific Environment 2014a**) assumed that Redbank in-pit roads would have a control of 85%. In response to concerns raised by the PAC, this has been revised to 80%, and the emissions from the RTS and response to PAC have been recalculated to reflect this in order provide a direct comparison between the inventories.

Table 2-2: Summary of open cut and highwall ROM coal and waste production schedule

Material	Moisture (%)	Silt (%)	Comments
Topsoil	2	10	Original EA assumptions
Overburden	5.8	3.8	Average of all ACARP Hunter data and measurements taken at Drayton
Partings	5.8	3.8	Average of all ACARP Hunter data and measurements taken at Drayton
ROM coal	6.6	1.1	Drayton site specific measurements
Product Coal	5.4	N/A	Drayton site specific measurements
Hauling in-pit	-	4.1	Average of Drayton site specific in-pit haul road measurements
Hauling out-of-pit	-	0.7	Average of Drayton site specific out-of-pit haul road measurements

Summaries of the contribution of emissions to key activities are presented **Figure 2-2** for each year for the retracted mine plan modelling and are provided in more detail in **Appendix A**.

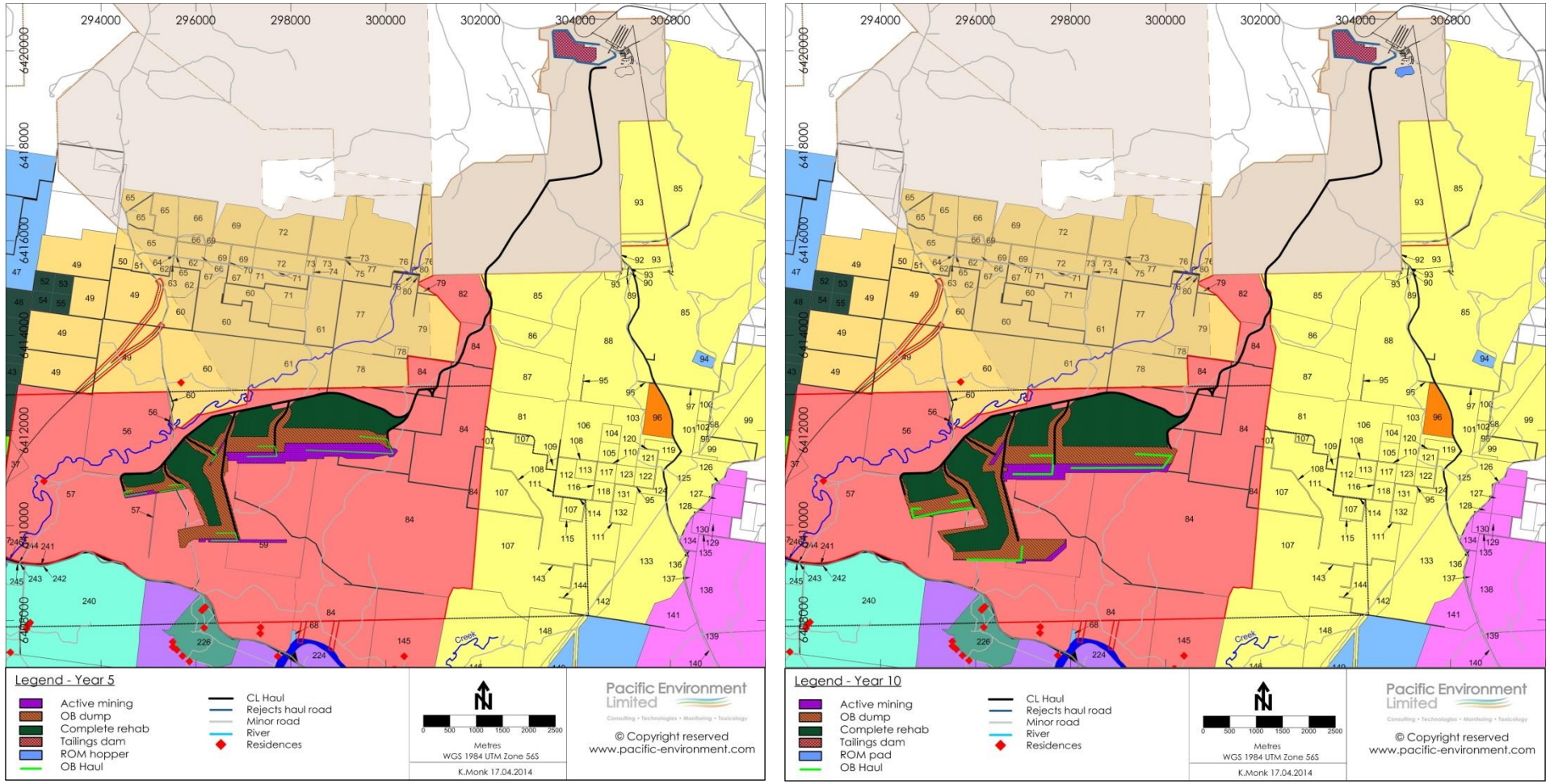


Figure 2-1: Retracted mine plans for proposed Drayton South coal mine for Year 5 and Year 10

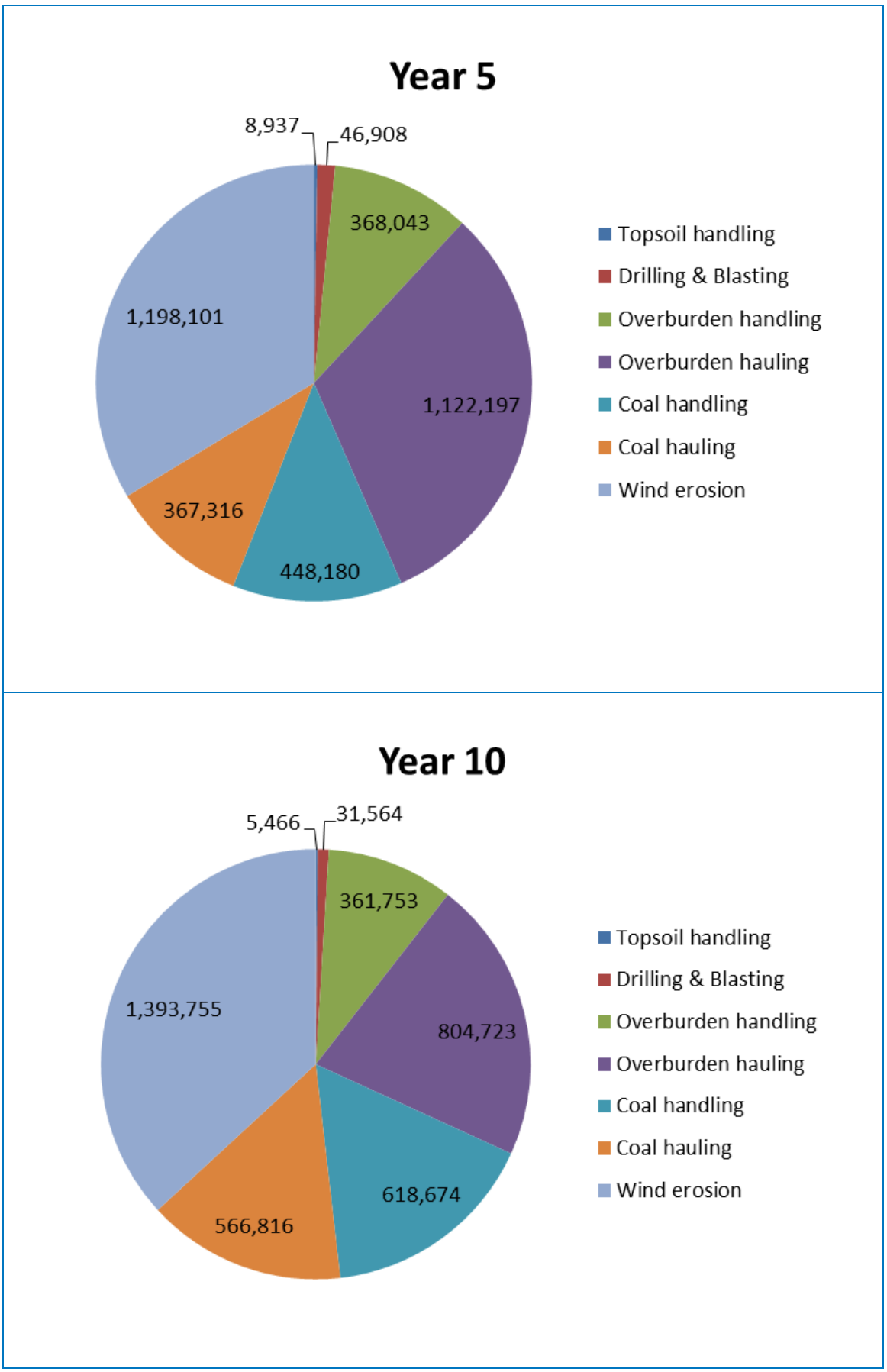


Figure 2-2: Summary of emissions based on the rretracted mine plans for proposed Drayton South coal mine for Year 5 and Year 10

2.2 Comparison with EA and RTS

Table 2-3 compares the total emissions from Year 5 and Year 10. This shows that the emissions from the retracted mine plan are 30% - 40% less than the original EA modelling of these respective years (**PAEHolmes 2012**), and 15 % less than the RTS modelling (**Pacific Environment 2013a**). The emission estimates are also 19% less than the estimates based on the revised assumptions in response to the SKM peer review (**Pacific Environment 2013b**) which has the closest silt and moisture assumptions to this modelling.

Table 2-3: Summary of estimated TSP emissions from the modelling conducted (kg/y)

Operational Year	EA	RTS[a]	SKM review[a]	Retracted Mine plan
5	5,620,149	-	-	3,559,682
10	6,343,931	4,803,762	5,050,330	3,836,630

a) Emissions recalculate to reflect 80% control on Redbank in-pit haul roads

These reductions in emissions are the result of the overall reduction in the total material movements during all years (as discussed in **Pacific Environment 2014b**) in combination with the removal of Houston pit activities. In Redbank pit alone, the overburden (OB) material movement in these retracted plans is 13Mtpa, compared to 22 Mtpa in the modelling completed in response to the SKM review (**Pacific Environment 2013b**). This reduction has come about as the dragline is now planned to be sequenced through the Redbank mining area in conjunction with the Whynot area rather than Redbank being a standalone truck and excavator operation as it was in the EA and RTS.

It is also important to note there is a large reduction in the exposed area of the Redbank Pit in the retracted plans compared with those the EA and RTS are based on. For example, in Year 5 the area is reduced to 11ha compared to 61 ha in previous mine plans. The reduction in exposed area is due to a slower mining rate proposed under the retracted mine plan and increased rehabilitation commitments.

Detailed emission estimates are provided in **Appendix A.**

3 MODELLING RESULTS

The annual average dust concentrations and deposition rates for Years 5 and 10 have been presented as isopleth diagrams showing the following:

- Predicted maximum 24-hour average PM_{10} concentrations from the Project alone and with other sources.
- Predicted annual average PM_{10} concentrations from the Project alone and with other sources.
- Predicted annual average TSP concentrations from the Project alone and with other sources.
- Predicted annual average dust deposition concentrations from the Project alone and with other sources.

Rather than provide a detailed discussion of each isopleth figure, the results have been summarised in tabular form for each year. The nearby residences are listed, with those that are predicted to experience particulate matter deposition or concentration levels above the NSW EPA's assessment criteria highlighted. 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.

Whilst there are currently no impact assessment criteria for $PM_{2.5}$, **Appendix B** provides an assessment compared with the current advisory reporting standard.

3.1 PM_{10} 24-hour average predictions

3.1.1 Project only

Figure 3-1 and **Figure 3-2** present contour plots for the predicted maximum 24-hour average PM_{10} concentrations for the Project-only for Year 5 and Year 10. The isopleth for the 24-hour average assessment criterion of 50 µg/m^3 is shown in red. It is important to note that the EPA impact assessment criterion are applied to the cumulative impacts of the Project and other sources.

The maximum 24-hour average PM_{10} contours presented in **Figure 3-1** and **Figure 3-2** do not represent a single worst case day, but rather represent the potential worst case 24-hour PM_{10} concentration that could be reached at a particular location across the entire modelling year.

A summary of the predicted particulate concentrations at each of the individual residences for the modelling are provided in **Table 3-1**. There are no private residences that are predicted to experience 24-hour average PM_{10} levels above the assessment criterion of 50 µg/m^3 during either year 5 or 10 due to the Project only.

Table 3-1: 24-hour PM_{10} concentrations (µg/m^3) for each modelling year due to Project only

ID	Project Only Maximum 24-hour Average PM_{10} (µg/m^3) *Assessment criteria = N/A*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	4	4
3	4	4
24A	6	6
24B	6	6
25	6	7
172	6	6
207	6	6
209	8	8
211	7	7

ID	Project Only Maximum 24-hour Average PM_{10} ($\mu g/m^3$) *Assessment criteria = N/A*	
	Year 5	Year 10
217A	10	10
217B	7	8
219A	10	9
219B	9	9
219C	10	9
219D	10	9
226A	15	19
226B	16	20
226C	16	20
226D	14	17
227A	8	12
227B	8	12
227C	8	12
227D	9	11
227E	10	12
227F	17	13
228A	8	8
228B	8	8
228C	8	8
228D	8	8
228E	8	9
228F	8	9
228G	8	9
228H	8	9
228I	6	7
228J	8	8
228K	11	11
228L	12	12
228M	12	14
230	5	6
238A	4	5
238B	4	4
238C	4	5
238D	4	5
238E	4	5
238F	4	5
239A	3	4
239B	3	4
239C	3	4
239D	3	4
239E	3	4
239F	3	4
239G	3	4
239H	3	4
239I	4	4
240A	6	6
240B	6	7
240C	6	7
240D	6	7
240E	6	7
250A	8	9
250B	9	9
253	5	6
254A	5	5
254B	5	5
254C	5	5
255	5	5
279	4	4
284	5	5
285	4	4
287	4	4
288	3	4

ID	Project Only Maximum 24-hour Average PM_{10} (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
298A	7	7
298B	7	7
299	6	6
306	5	5
Drayton Mine		
384	3	2
385	4	2
386	4	2
387	7	3
390	9	3
398	8	3
399	6	2
400	5	2
401	5	3
402	6	3
403	6	3
411	12	4
418	14	4
419	12	4
420	10	4
421	7	4
423	6	4
424	5	3
425	5	3
427	5	3
429	4	2
432	4	2
433A	3	2
433B	3	2
435	2	2
438	3	2
440	4	3
441	4	2
443	5	3
444	7	3
446A	7	3
446B	4	3
451	2	2
455	3	2
456	4	2
460	3	3
Mine owned residences		
57	17	16
58A	19	18
58B	18	17
60	**66**	**70**
145A	14	14
145B	15	16
145C	16	15
145D	15	13
388	7	3
389	8	3
404	6	3
410	11	4

[a] 50 µg/m³ refers to the cumulative criterion and should not be applied to Project alone results. This is shown here for reference only.

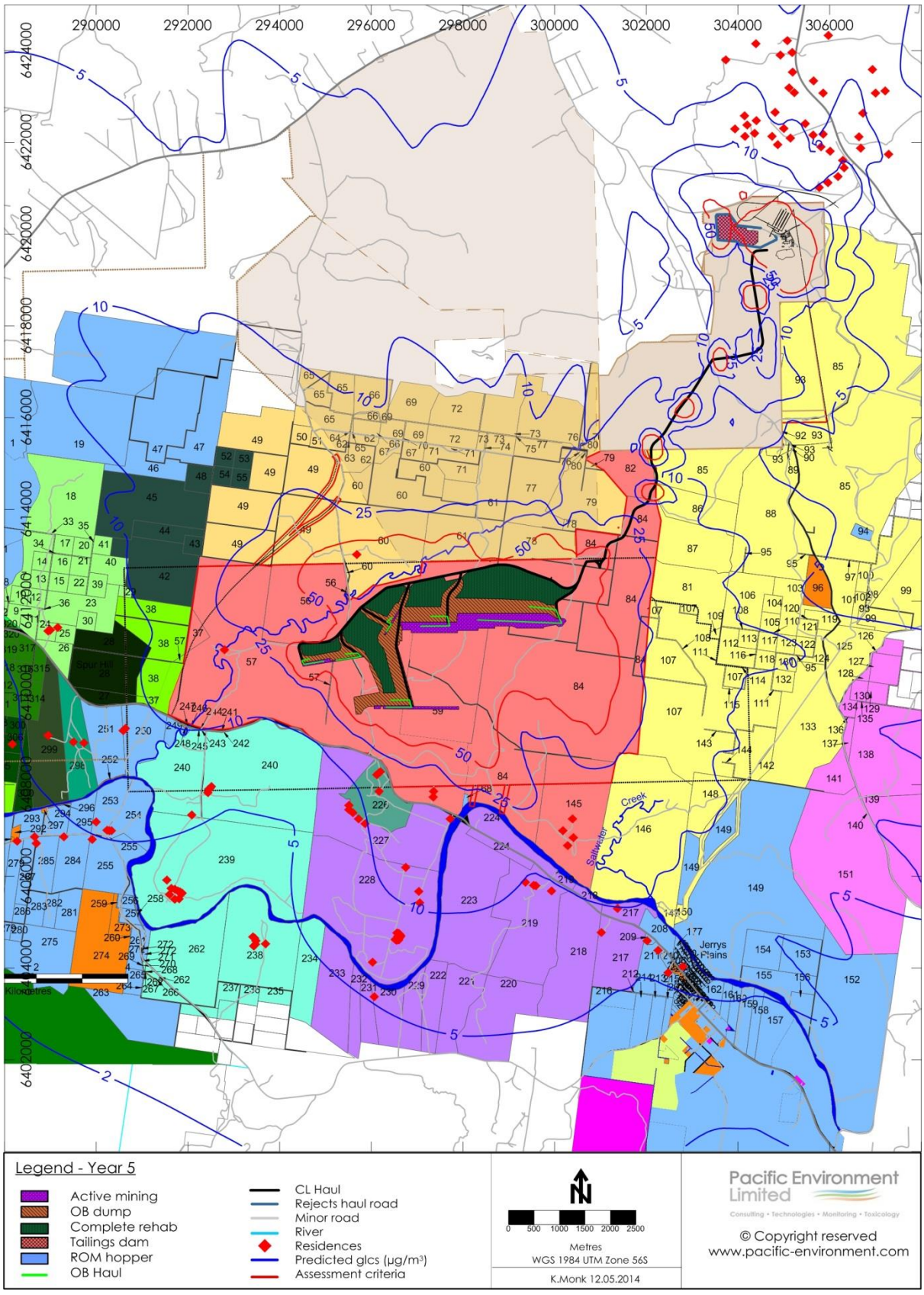


Figure 3-1: Maximum predicted 24-hour average PM_{10} concentrations due to emissions from Drayton South only - Year 5

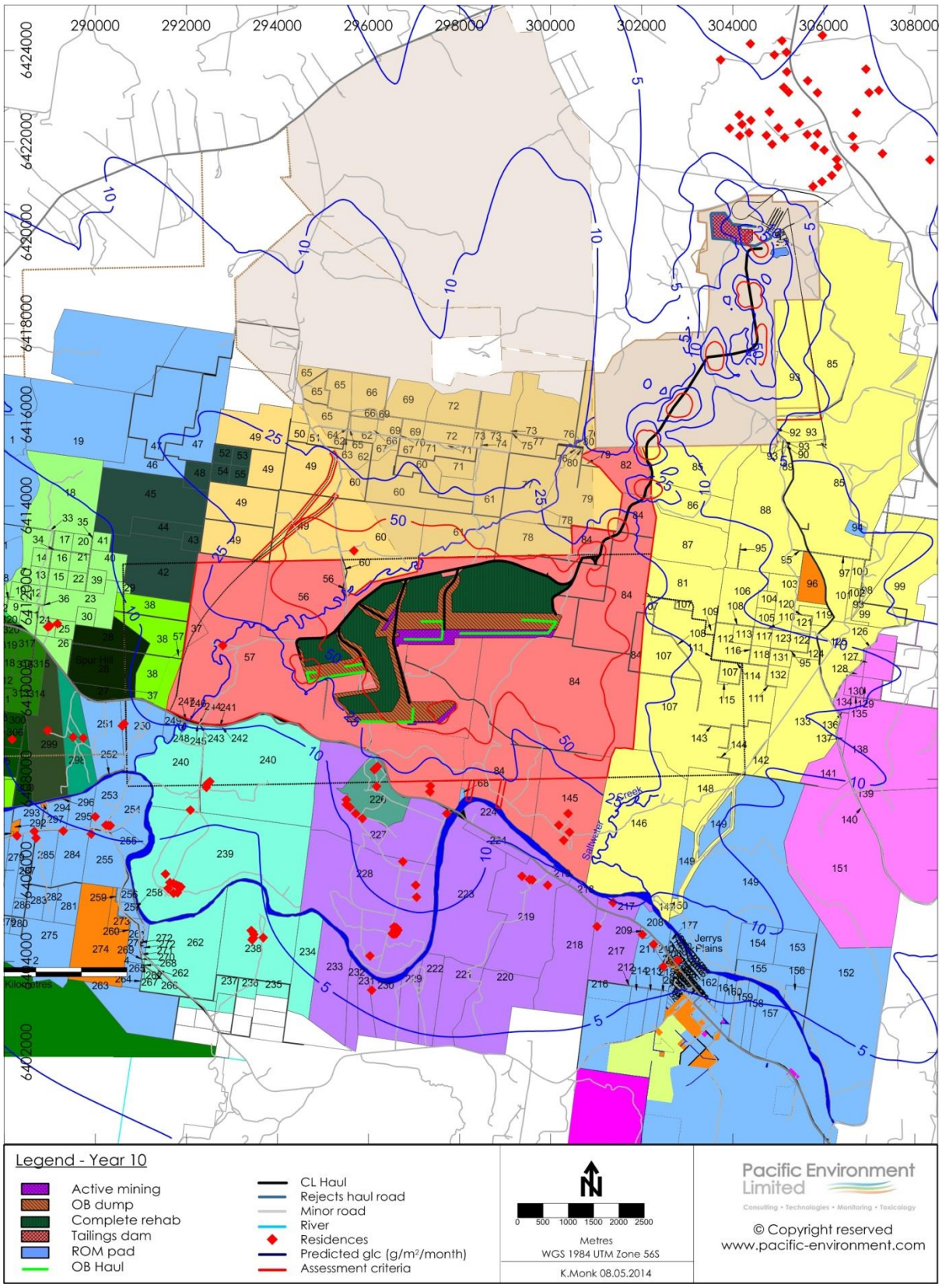


Figure 3-2: Maximum predicted 24-hour average PM_{10} concentrations due to emissions from Drayton South only - Year 10

3.1.2 Cumulative

3.1.3 Introduction

The cumulative assessment of 24-hour average PM_{10} concentrations follows the same statistical approach (Monte Carlo Simulation) as presented in the AQIA (**PAEHolmes, 2012**), to achieve the objectives of a Level 2 cumulative assessment. The cumulative assessment focuses on representative residences in key areas in the vicinity of the Project. Thirteen locations were selected to provide an indication of worst case cumulative 24-hour average PM_{10} concentrations (see **Figure 3-3**) from these key areas:

- South/south-west of Drayton South – residences 57, 58A, 145A, 226B, 226D, 227A, 227F, 240A and 250A
- South-east of proposed Drayton South – residences 209 and 217
- North-east of existing Drayton – residences 410 and 411.

3.1.4 Level 2 assessment based on Monte Carlo simulation

The Monte Carlo Simulation is a statistical modelling approach that combines the frequency distribution of one data set (in this case background 24-hour average PM_{10} concentration) with the frequency distribution of another data set (the Project's modelled impacts at a given point). This is achieved by repeatedly randomly sampling and combining values with the two data sets to create a third, 'cumulative' data set and associated frequency distribution.

As discussed in **Section 4.1** of the AQIA for the EA (**PAEHolmes 2012**) there are a number of ambient monitors measuring PM_{10} operating in the area. **Figure 3-3** shows the location of the monitors deemed to be representative of the key areas selected.

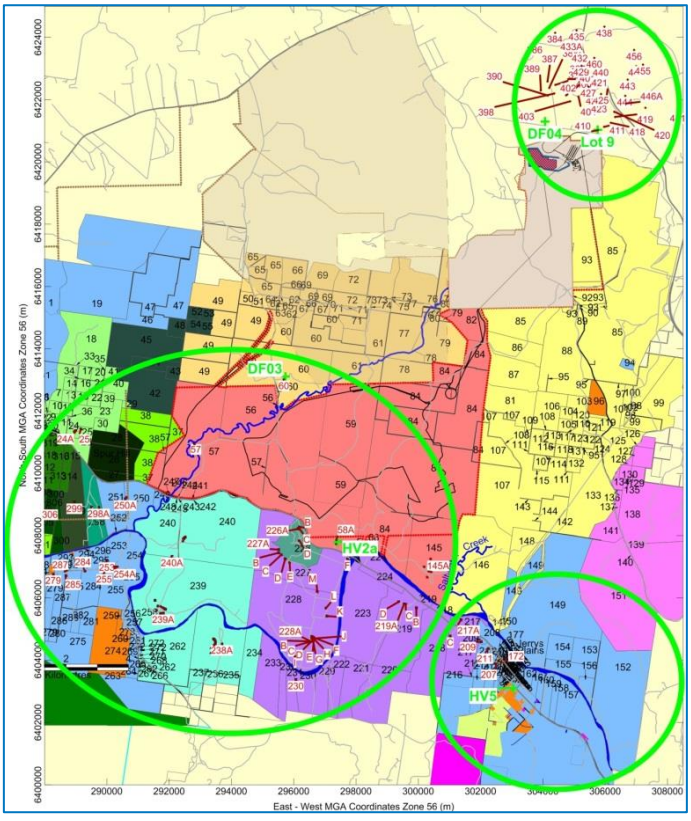


Figure 3-3: Representative residences and monitoring locations – cumulative 24-hour PM_{10} assessment

The results of this analysis are presented graphically in **Figure 3-4** to **Figure 3-6** for groups based on the monitored background used i.e. south/south west and measurements at DF03 and HV2a. The plots

show the number of days that the predicted 24-hour average PM_{10} cumulative concentrations would likely reach a certain ground level concentration. For comparison the number of days that the '*Background Only*' would reach a certain concentration is shown with the '*Mine plus Background*' probability.

The results show varying degrees of impact from the Project emissions depending on the location. At all sites, the statistics indicate some probability of days per year with PM_{10} concentrations above 50 µg/m³. This is the case for both '*Background Only*' (because the background data already has values above this level) and the '*Mine plus Background*'.

Table 3-2 presents a summary of the number of days exceeding the EPA criteria for each of the selected residences for both the project alone and cumulatively for year 5 and year 10.

It is also noted that the actual number of exceedances per year cannot be predicted precisely and will depend on actual Project activities, weather conditions, implementation of real-time controls and predictive meteorological forecasting and background levels in the future. These results are therefore a *probability* of exceedance.

For each grouping, the background alone is predicted to exceed the EPA assessment criteria between 7 to 24 days per year.

The greatest increase above background is expected at residences close to the southern boundary of the Project. Whilst the actual number of exceedances per year cannot be predicted with certainty, the analysis shows that when cumulative impacts are considered, the probability of exceedance beyond the background for the south-south-western residences ranges from approximately less than 1 day to 7 days (see **Table 3-2**).

When locations further south are considered (see 227A and 240A), the predicted number of days with cumulative concentrations greater than 50 µg/m³ decreases to come closer to the '*background only*' estimations. The same applies to residences to the south-east (see **Figure 3-5)** and those to the north of the existing Drayton Mine (see **Figure 3-6)**.

As discussed in the response to the PAC (**Pacific Environment 2014**) the cumulative 24-hour PM_{10} assessment is considered conservative and the number of days is heavily influenced by the number of exceedances in the available background data. Anglo American has implemented a best practice predictive and real-time dust management system at their Drayton site, which includes a daily risk forecast tool for planning and managing day-to-day operations and a real-time dust monitoring system to act and respond to short-term elevated dust. Also, as part of the "dust stop' PRP process, Drayton has identified adverse meteorological conditions for managing visible dust from overburden handling, also used for managing day-to-day operations. These systems would be extended to Drayton South, if approved.

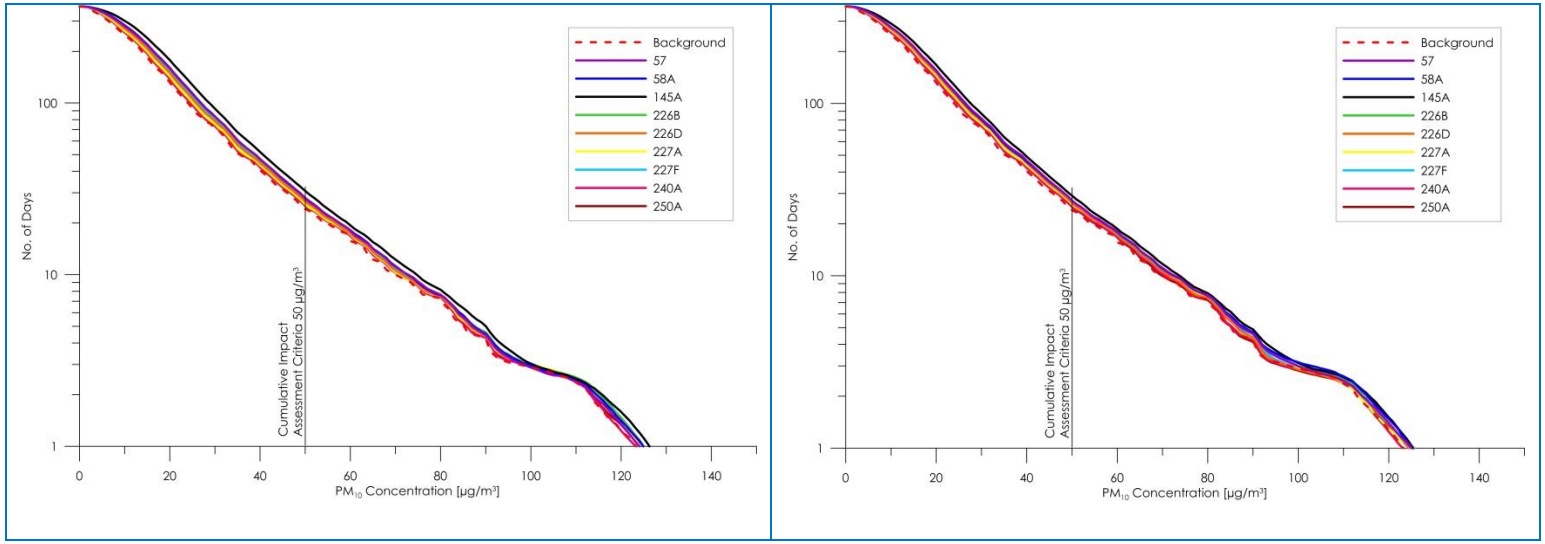


Figure 3-4: Number of days likely to exceed cumulative maximum 24-hr average PM_{10} concentration (50 µg/m³) for south/south-west residences

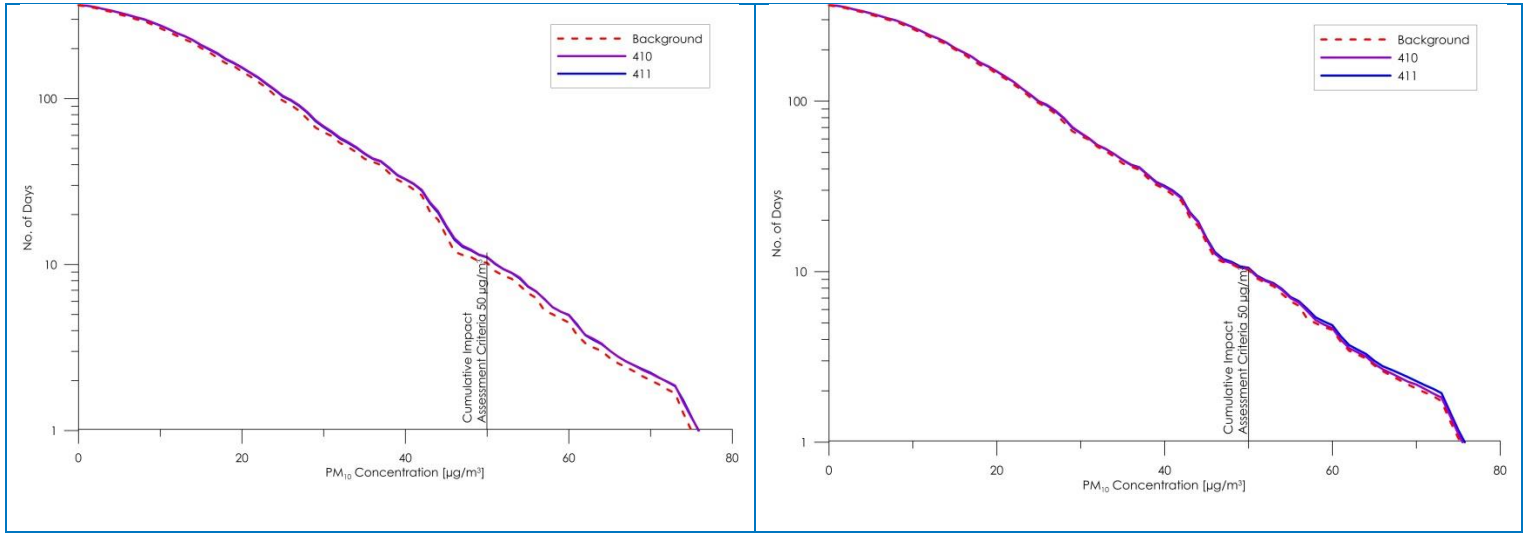


Figure 3-5: Number of days likely to exceed cumulative maximum 24-hr average PM_{10} concentration (50 µg/m³) for residences north east of Drayton Mine

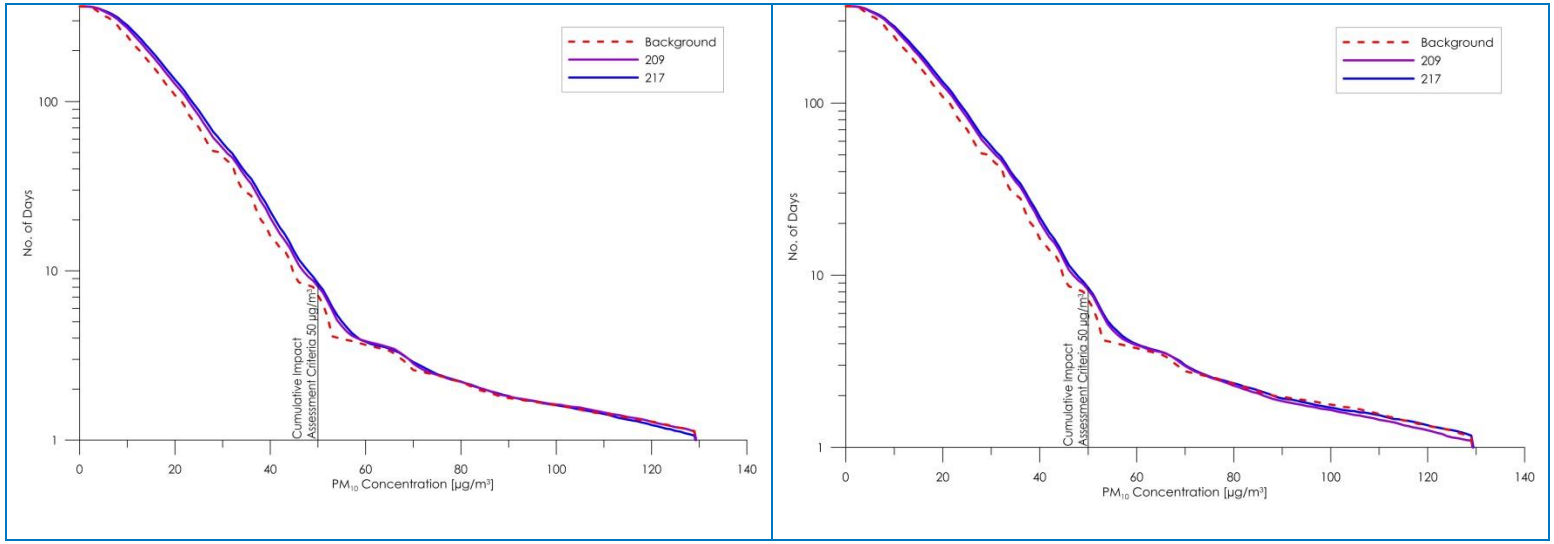


Figure 3-6: Number of days likely to exceed cumulative maximum 24-hr average PM_{10} concentration (50 µg/m^3) for south east residences

Table 3-2: Summary of days exceeding 50 µg/m³ – project alone and cumulative

Receptor ID	Maximum predicted PM_{10} 24-hour concentrations		Predicted number of days exceeding 50 µg/m³ cumulative criteria								Predicted number of days exceeding 150 µg/m³ Acquisition criteria	
	Project Alone				Cumulative		Background		Days more than background		Cumulative	
	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10
Units	µg/m³		Number of days									
Privately owned residences												
226B	16	20	0	0	28	27	24	24	4	3	0	0
226D	14	17	0	0	27	26	24	24	3	2	0	0
227A	8	12	0	0	26	26	24	24	2	2	0	0
227F	17	13	0	0	27	26	24	24	3	2	0	0
240A	6	6	0	0	25	25	24	24	1	1	0	0
250A	8	9	0	0	25	25	24	24	1	1	0	0
209	8	8	0	0	8	8	7	7	1	1	0	0
217A	10	10	0	0	8	8	7	7	1	1	0	0
411	12	4	0	0	11	11	10	11	1	0	0	0
Mine owned residences												
57	17	16	0	0	28	27	24	24	4	3	0	0
58A	19	18	0	0	28	27	24	24	4	3	0	0
145A	14	14	0	0	31	29	24	24	7	5	0	0
410	11	4	0	0	11	10	10	10	1	1	0	0

Note: Totals may differ to the sum of the columns due to rounding and significant figures.

3.2 Annual average predictions

3.2.1 Project only PM_{10}

A summary of the Project-only predicted annual average PM_{10} concentrations at each of the individual residences for the modelling of year 5 and 10 are provided in **Table 3-3** and in **Figure 3-7** and **Figure 3-8**.

There are no privately owned residences during either year that are predicted to experience annual average PM_{10} concentrations above the assessment criteria due to emissions from the Project-only.

Table 3-3: Annual PM_{10} concentrations (µg/m³) at nearby residences for each modelling year – Project Only

ID	Project Only Annual Average PM_{10} (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	1	0
3	1	1
24A	0	0
24B	0	0
25	0	1
172	1	1
207	1	1
209	2	1
211	1	1
217A	2	2
217B	1	1
219A	2	1
219B	2	1
219C	2	1
219D	2	1
226A	2	2
226B	2	2
226C	2	2
226D	1	1
227A	1	1
227B	1	1
227C	1	1
227D	1	1
227E	1	1
227F	2	1
228A	0	0
228B	0	0
228C	0	0
228D	0	0
228E	0	0
228F	0	0
228G	0	0
228H	0	0
228I	0	0
228J	0	0
228K	1	1
228L	1	1
228M	1	1
230	0	0
238A	0	0
238B	0	0
238C	0	0
238D	0	0
238E	0	0
238F	0	0

ID	Project Only Annual Average PM_{10} (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
239A	0	0
239B	0	0
239C	0	0
239D	0	0
239E	0	0
239F	0	0
239G	0	0
239H	0	0
239I	0	0
240A	0	0
240B	0	0
240C	0	0
240D	0	0
240E	0	0
250A	1	1
250B	1	1
253	0	0
254A	0	0
254B	0	0
254C	0	0
255	0	0
279	0	0
284	0	0
285	0	0
287	0	0
288	0	0
298A	0	0
298B	0	0
299	0	0
306	0	0
Drayton Mine		
384	0	0
385	0	0
386	0	0
387	0	0
390	1	0
398	1	0
399	0	0
400	0	0
401	0	0
402	0	0
403	0	0
411	1	0
418	1	0
419	0	0
420	0	0
421	0	0
423	0	0
424	0	0
425	0	0
427	0	0
429	0	0
432	0	0
433A	0	0
433B	0	0
435	0	0
438	0	0
440	0	0
441	0	0
443	0	0
444	0	0
446A	0	0

ID	Project Only Annual Average PM_{10} (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
446B	0	0
451	0	0
455	0	0
456	0	0
460	0	0
Mine owned residences		
57	2	2
58A	2	2
58B	2	2
60	14	16
145A	4	3
145B	4	4
145C	4	3
145D	4	3
388	1	0
389	1	0
404	0	0
410	1	0

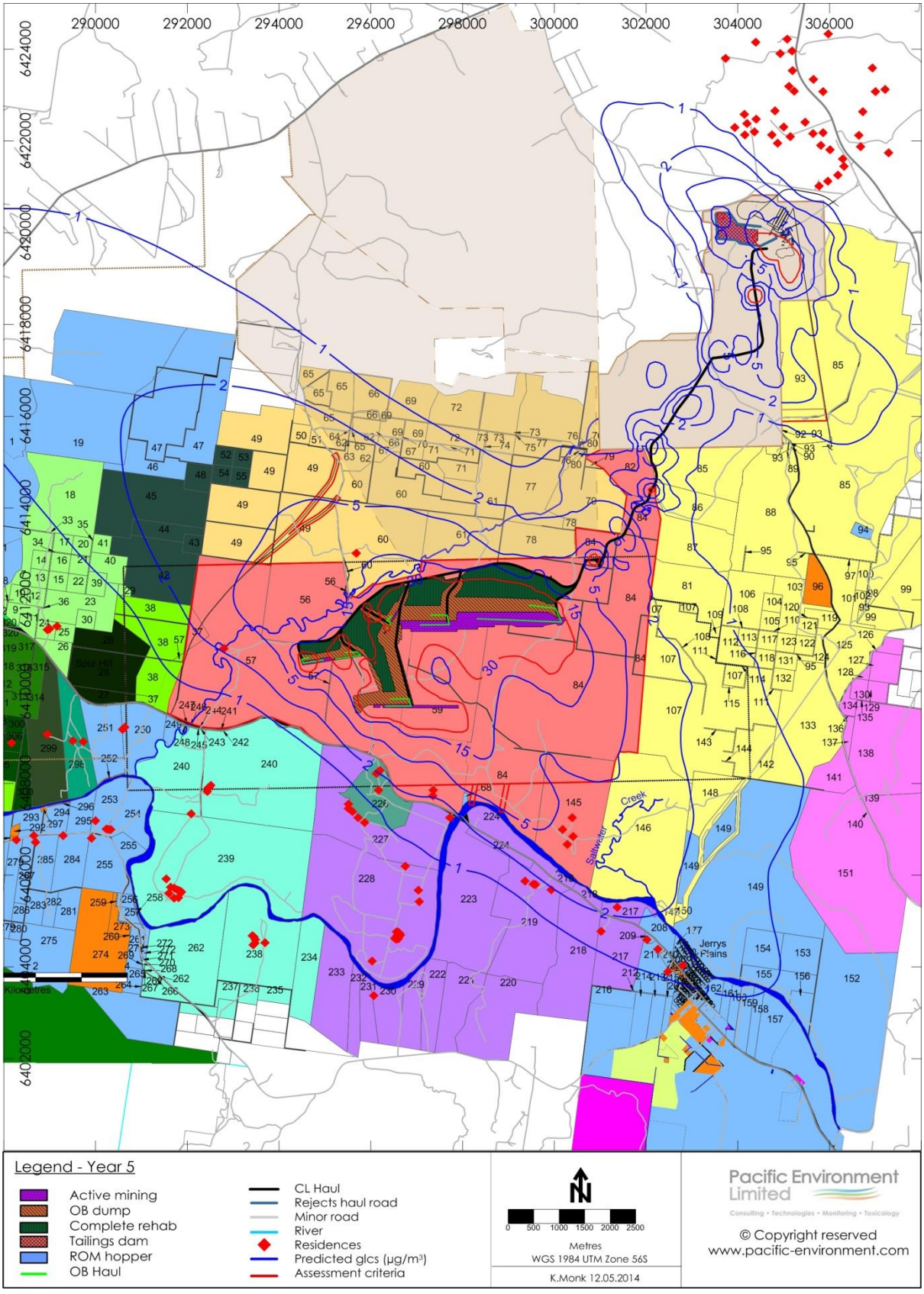


Figure 3-7: Predicted annual average PM_{10} concentrations due to emissions from Drayton South only - Year 5

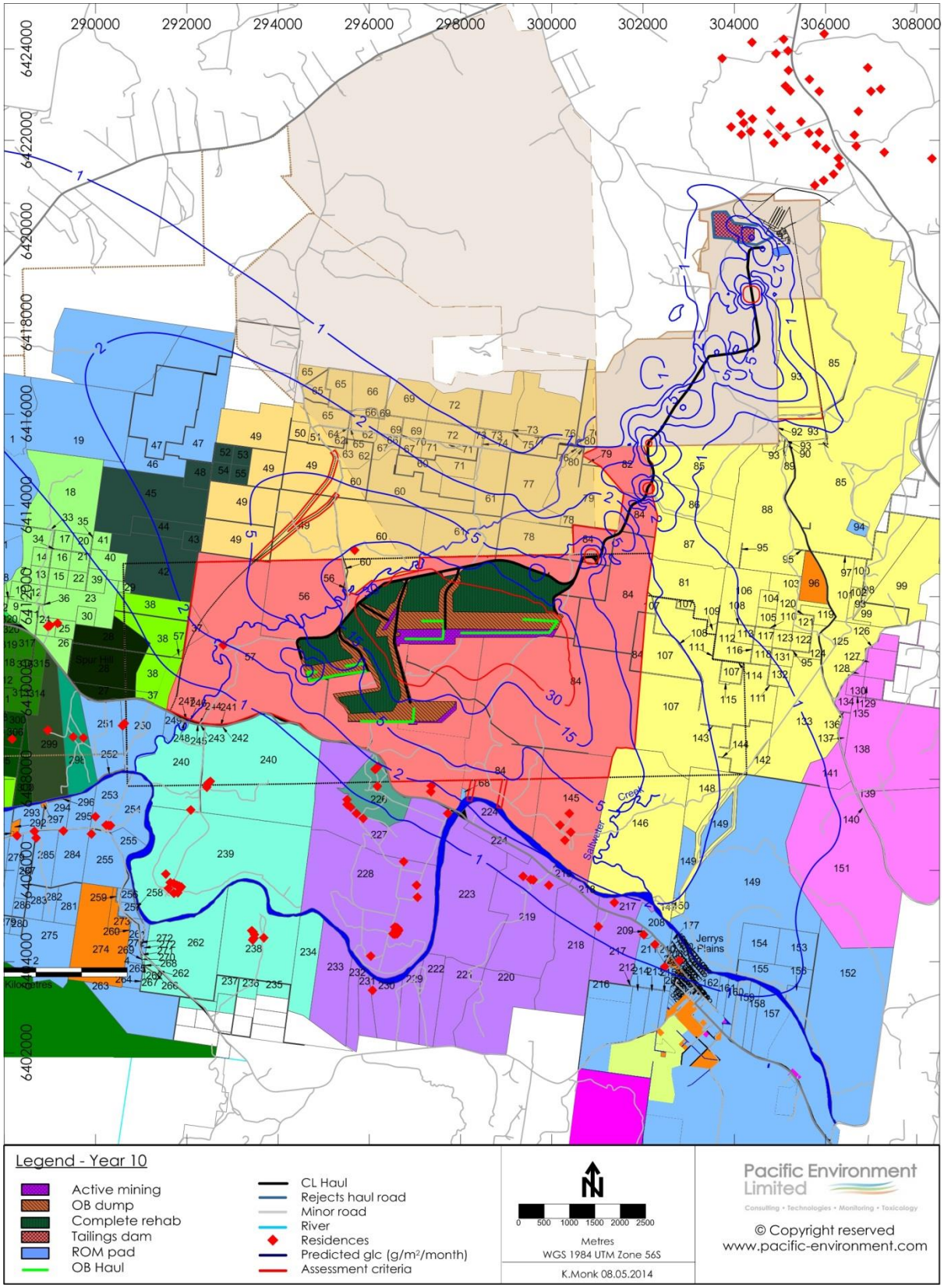


Figure 3-8: Predicted annual average PM_{10} concentrations due to emissions from Drayton South only - Year 10

3.2.2 Cumulative PM_{10}

A summary of the cumulative predicted annual average PM_{10} concentrations at each of the individual residences for modelling for year 5 and 10 are provided in **Table 3-4** and in **Figure 3-9** and **Figure 3-10**.

There are no privately owned residences during either year that are predicted to experience annual average PM_{10} concentrations above the assessment criteria, due to emissions from the Project plus background concentrations or cumulative sources.

Table 3-4: Annual PM_{10} concentrations (µg/m³) at nearby residences for each modelling year – Cumulative

ID	Cumulative	
	Annual Average PM_{10} (µg/m³)	
	Assessment criteria = 30 µg/m³	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	17	17
3	16	17
24A	16	16
24B	16	16
25	16	16
172	18	18
207	17	18
209	19	19
211	18	18
217A	20	20
217B	18	18
219A	18	18
219B	19	18
219C	18	18
219D	18	18
226A	18	18
226B	18	18
226C	18	18
226D	17	17
227A	16	17
227B	16	17
227C	16	17
227D	16	17
227E	16	17
227F	18	18
228A	16	17
228B	16	17
228C	16	17
228D	16	17
228E	16	17
228F	16	17
228G	16	17
228H	16	17
228I	16	17
228J	16	17
228K	16	17
228L	17	17
228M	16	17
230	17	17
238A	16	16
238B	16	16
238C	16	16
238D	16	16
238E	16	16
238F	16	16
239A	16	16
239B	16	16

ID	Cumulative Annual Average PM_{10} ($\mu g/m^3$) *Assessment criteria = 30 $\mu g/m^3$*	
	Year 5	Year 10
239C	16	16
239D	16	16
239E	16	16
239F	16	16
239G	16	16
239H	16	16
239I	16	16
240A	16	16
240B	16	16
240C	16	16
240D	16	16
240E	16	16
250A	16	16
250B	16	16
253	16	16
254A	16	16
254B	16	16
254C	16	16
255	16	16
279	16	17
284	16	16
285	16	17
287	16	17
288	16	17
298A	16	16
298B	16	16
299	16	16
306	16	16
Drayton Mine		
384	14	15
385	14	14
386	16	16
387	16	16
390	16	16
398	15	16
399	15	15
400	14	15
401	14	14
402	15	15
403	15	15
411	14	14
418	14	14
419	15	15
420	14	15
421	14	14
423	14	14
424	14	14
425	14	14
427	14	14
429	14	14
432	14	14
433A	14	15
433B	14	14
435	14	15
438	14	15
440	14	15
441	15	15
443	15	15
444	15	15
446A	15	15
446B	15	16
451	17	17

ID	Cumulative Annual Average PM_{10} (µg/m³) *Assessment criteria = 30 µg/m³*	
	Year 5	Year 10
455	15	15
456	15	15
460	14	15
Mine owned residences		
57	18	19
58A	19	18
58B	18	18
60	**45**	**49**
145A	22	21
145B	23	22
145C	22	21
145D	22	21
388	16	16
389	16	16
404	14	14
410	14	14

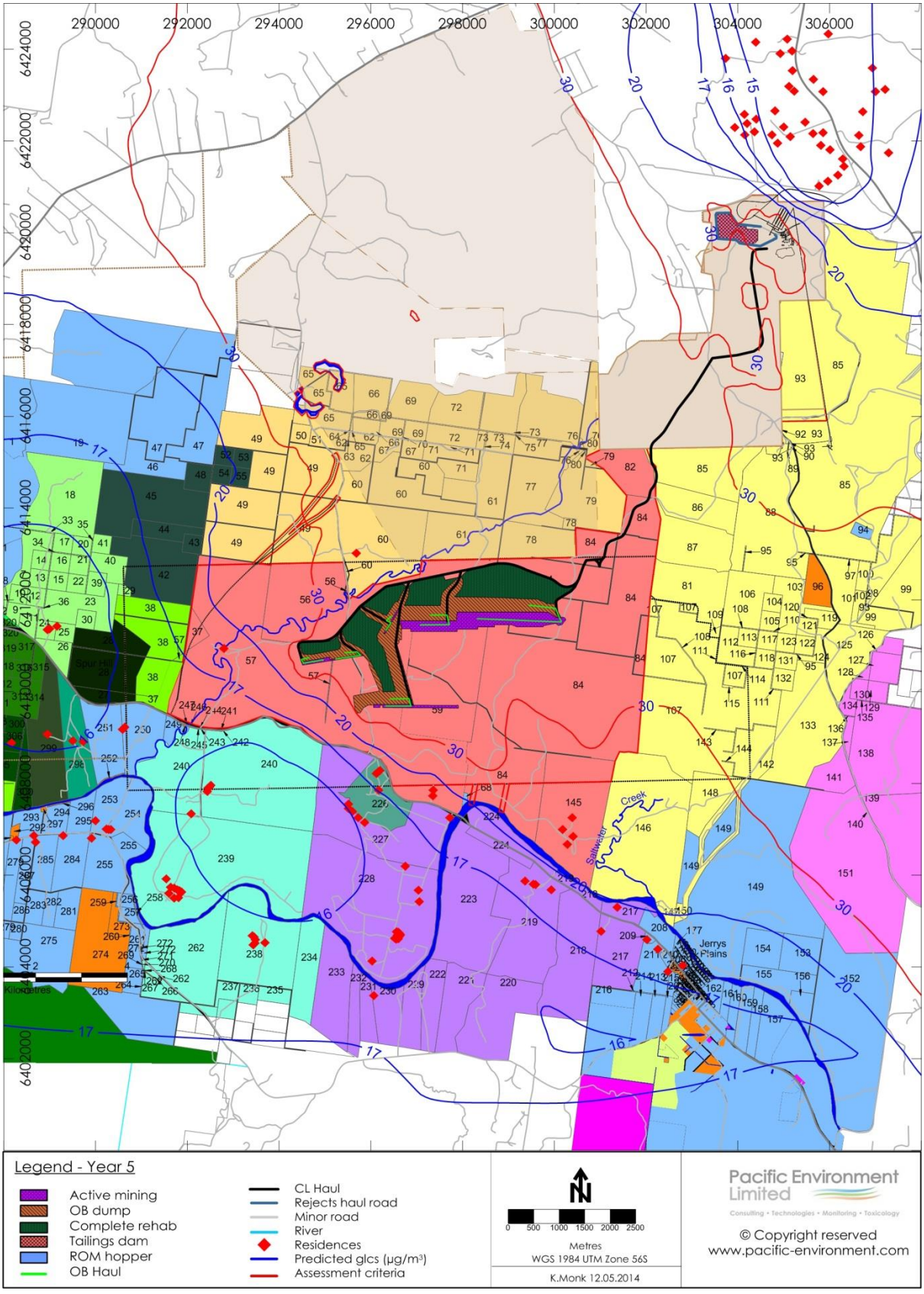


Figure 3-9: Predicted annual average PM_{10} concentrations due to emissions from Drayton South and other sources - Year 5

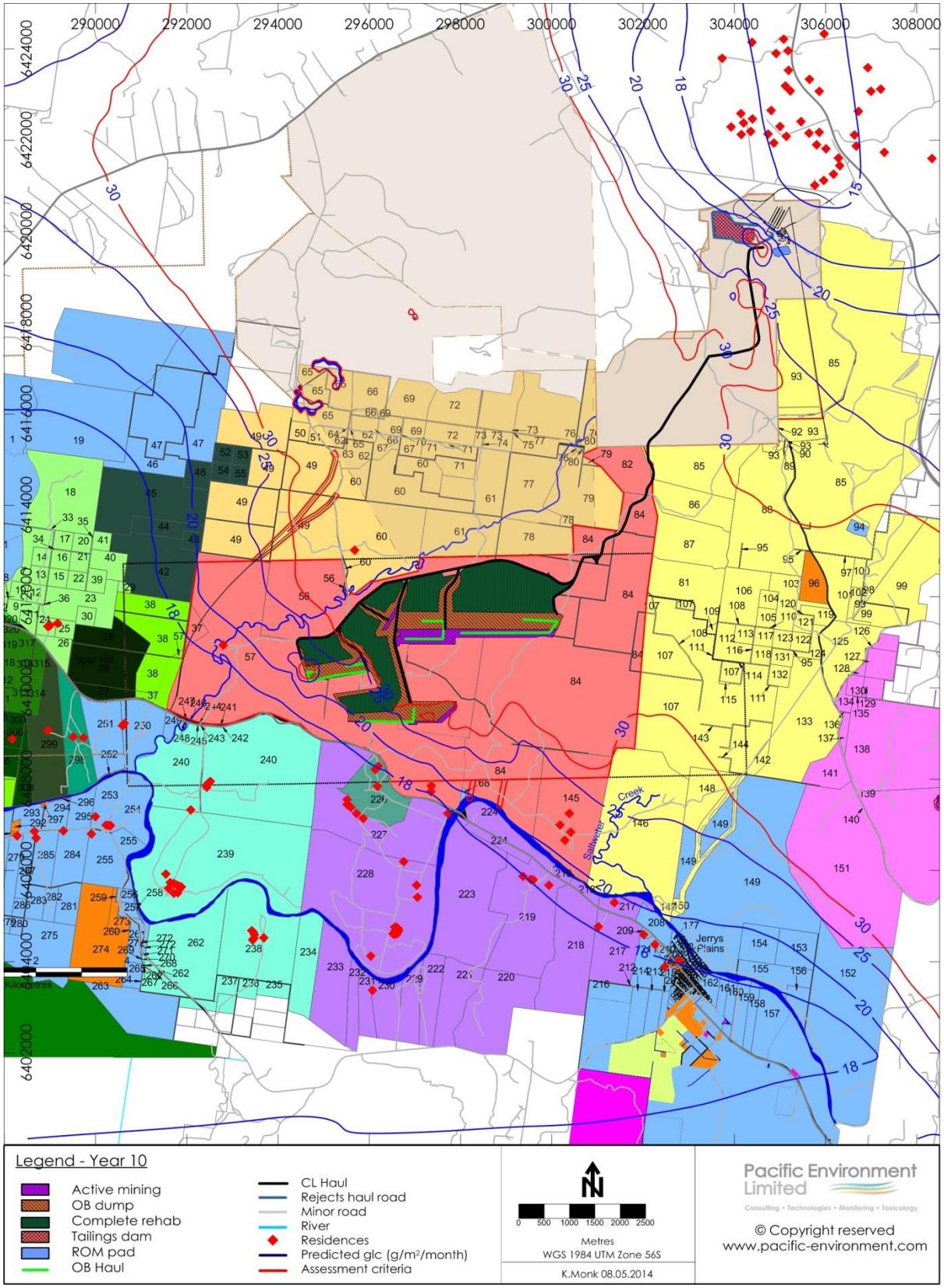


Figure 3-10: Predicted annual average PM_{10} concentrations due to emissions from Drayton South and other sources - Year 10

3.2.3 Project only TSP

A summary of the Project-only predicted annual average TSP concentrations at each of the individual residences for the modelling for year 5 and 10 are provided in **Table 3-5** and in **Figure 3-11** and **Figure 3-12**.

There are no privately owned residences during either year during either year that are predicted to experience annual average TSP concentrations above the assessment criteria, due to emissions from the Project-only.

Table 3-5: Annual TSP concentrations (µg/m³) at nearby residences for each modelling year – Project Only

ID	Project Only Annual Average TSP (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	1	1
3	1	1
24A	1	1
24B	1	1
25	1	1
172	2	2
207	2	2
209	3	2
211	2	2
217A	4	3
217B	2	2
219A	3	2
219B	3	2
219C	3	2
219D	3	2
226A	3	3
226B	4	3
226C	3	3
226D	2	2
227A	1	1
227B	1	1
227C	1	1
227D	1	1
227E	1	1
227F	3	2
228A	1	1
228B	1	1
228C	1	1
228D	1	1
228E	1	1
228F	1	1
228G	1	1
228H	1	1
228I	0	0
228J	1	1
228K	1	1
228L	1	1
228M	1	1
230	0	0
238A	0	0
238B	0	0
238C	0	0
238D	0	0
238E	0	0
238F	0	0
239A	0	0

ID	Project Only Annual Average TSP (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
239B	0	0
239C	0	0
239D	0	0
239E	0	0
239F	0	0
239G	0	0
239H	0	0
239I	0	0
240A	0	1
240B	1	1
240C	1	1
240D	1	1
240E	1	1
250A	1	1
250B	1	1
253	0	0
254A	0	0
254B	0	0
254C	0	0
255	0	0
279	0	0
284	0	0
285	0	0
287	0	0
288	0	0
298A	1	1
298B	1	1
299	0	0
306	0	0
Drayton Mine		
384	0	0
385	0	0
386	0	0
387	1	0
390	1	0
398	1	0
399	1	0
400	0	0
401	0	0
402	1	0
403	1	0
411	1	0
418	1	0
419	1	0
420	1	0
421	1	0
423	0	0
424	0	0
425	0	0
427	0	0
429	0	0
432	0	0
433A	0	0
433B	0	0
435	0	0
438	0	0
440	0	0
441	0	0
443	0	0
444	0	0
446A	0	0
446B	0	0

ID	Project Only Annual Average TSP (µg/m³) *Assessment criteria = N/A*	
	Year 5	Year 10
451	0	0
455	0	0
456	0	0
460	0	0
Mine owned residences		
57	3	3
58A	4	3
58B	4	3
60	25	30
145A	7	5
145B	7	6
145C	7	5
145D	7	5
388	1	0
389	1	0
404	0	0
410	1	0

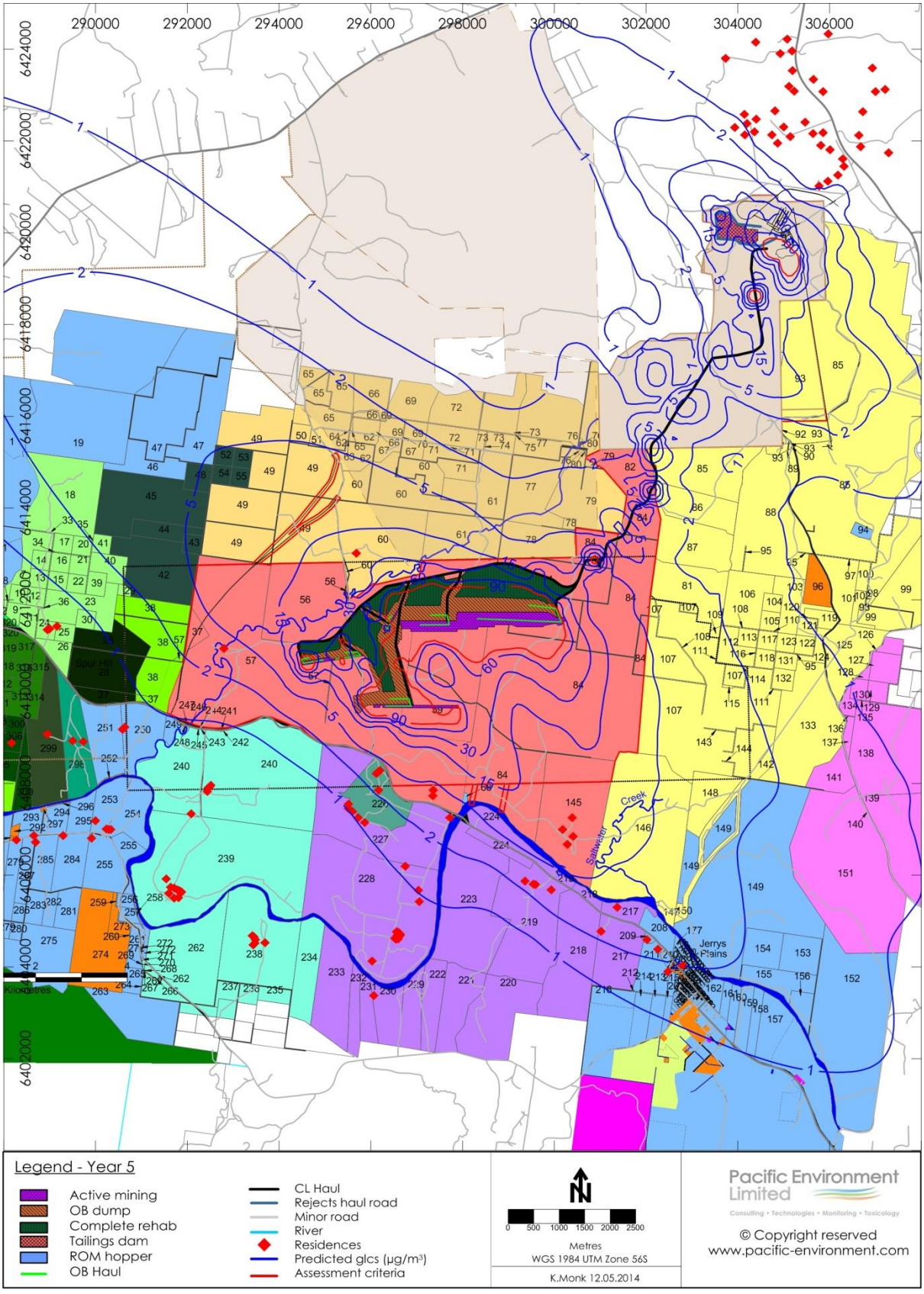


Figure 3-11: Predicted annual average TSP concentrations due to emissions from Drayton South only - Year 5

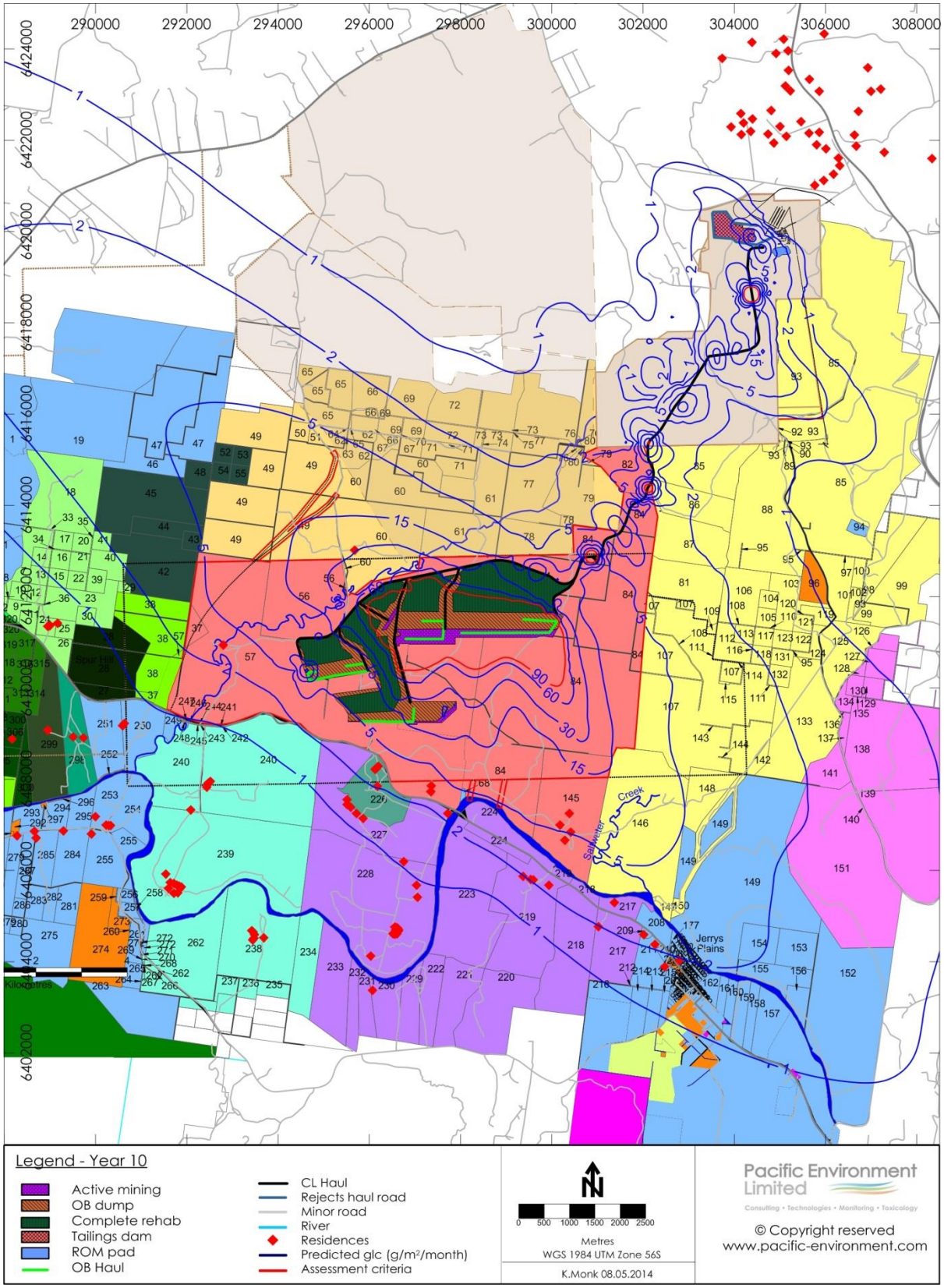


Figure 3-12: Predicted annual average TSP concentrations due to emissions from Drayton South only - Year 10

3.2.4 Cumulative TSP

A summary of the cumulative predicted annual average TSP concentrations at each of the individual residences for the modelling for year 5 and 10 are provided in **Table 3-6** and in **Figure 3-13** and **Figure 3-14**.

There are no privately owned residences during either year that are predicted to experience annual average TSP concentrations above the assessment criteria, due to emissions from the Project plus background concentrations or cumulative sources.

Table 3-6: Annual TSP concentrations (µg/m³) at nearby residences for each modelling year - Cumulative

ID	Cumulative Annual Average TSP (µg/m³) *Assessment criteria = 90 µg/m³*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	46	47
3	45	47
24A	44	46
24B	44	46
25	44	46
172	50	50
207	49	49
209	52	52
211	51	51
217A	55	55
217B	51	51
219A	51	52
219B	53	52
219C	52	52
219D	51	51
226A	51	52
226B	52	52
226C	51	52
226D	50	50
227A	47	48
227B	47	48
227C	47	48
227D	47	48
227E	47	48
227F	52	52
228A	46	47
228B	46	47
228C	46	47
228D	46	47
228E	46	47
228F	46	47
228G	46	47
228H	46	47
228I	45	46
228J	46	47
228K	47	48
228L	48	48
228M	48	48
230	45	46
238A	44	45
238B	44	45
238C	44	45
238D	44	45
238E	44	45
238F	44	45
239A	44	45

ID	Cumulative Annual Average TSP (µg/m³) *Assessment criteria = 90 µg/m³*	
	Year 5	Year 10
239B	44	45
239C	44	45
239D	44	45
239E	44	45
239F	44	45
239G	44	45
239H	44	45
239I	44	45
240A	45	46
240B	45	46
240C	45	46
240D	45	46
240E	45	46
250A	45	46
250B	45	46
253	44	45
254A	44	45
254B	44	45
254C	44	45
255	44	45
279	44	44
284	44	45
285	44	45
287	44	45
288	44	44
298A	45	45
298B	45	45
299	44	45
306	44	45
Drayton Mine		
384	30	31
385	32	33
386	29	31
387	30	31
390	30	31
398	30	31
399	30	31
400	31	32
401	32	33
402	31	32
403	32	33
411	37	38
418	37	38
419	37	38
420	37	37
421	36	36
423	35	36
424	34	35
425	35	35
427	33	34
429	32	33
432	32	33
433A	31	32
433B	31	32
435	31	32
438	33	34
440	34	35
441	37	37
443	36	37
444	37	37
446A	37	38
446B	39	40

ID	Cumulative Annual Average TSP (µg/m³) *Assessment criteria = 90 µg/m³*	
	Year 5	Year 10
451	42	43
455	37	38
456	36	37
460	33	34
Mine owned residences		
57	51	53
58A	54	54
58B	53	53
60	**117**	125
145A	60	60
145B	62	62
145C	61	60
145D	60	58
388	30	31
389	31	31
404	33	33
410	38	38

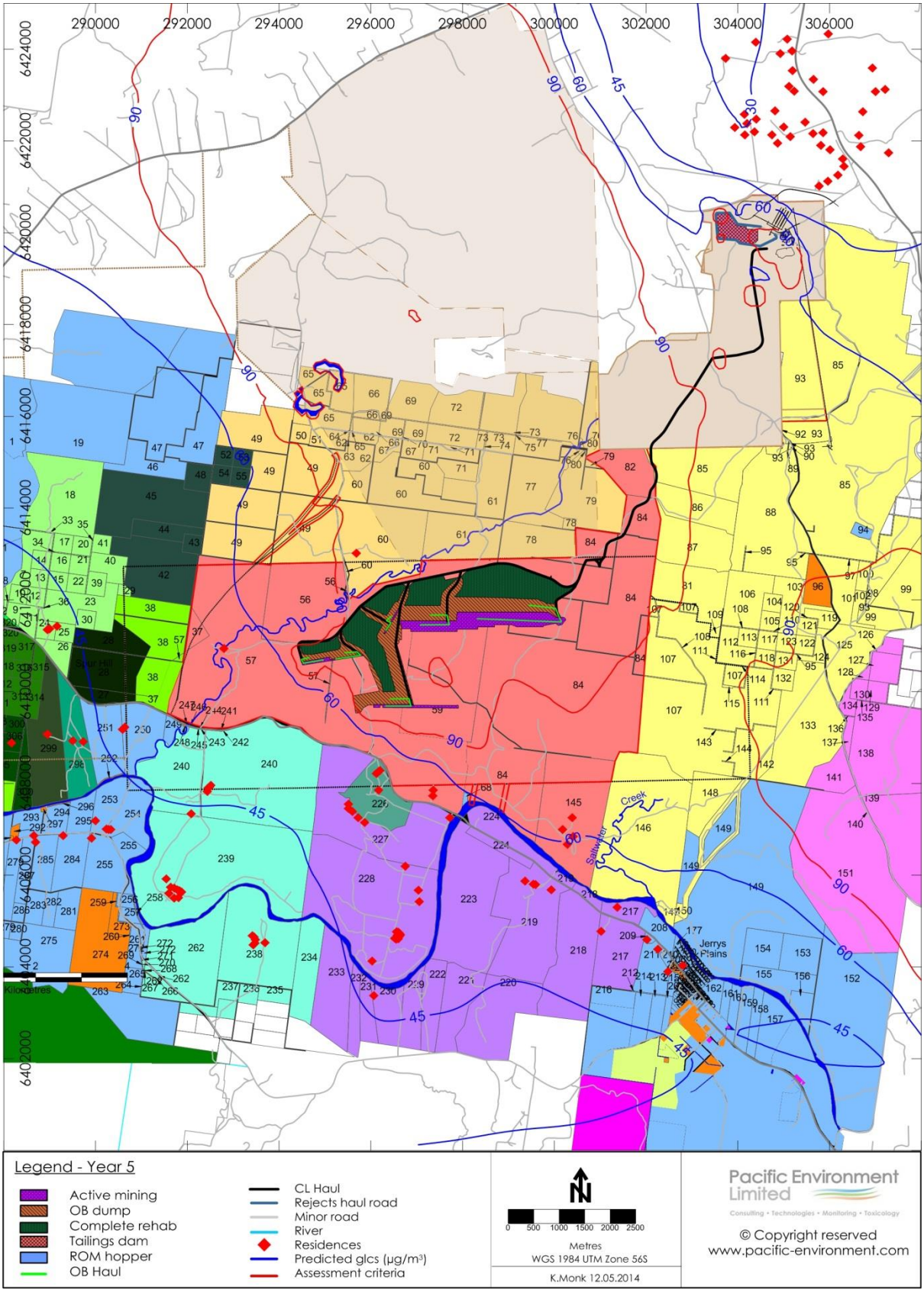


Figure 3-13: Predicted annual average TSP concentrations due to emissions from Drayton South and other sources - Year 5

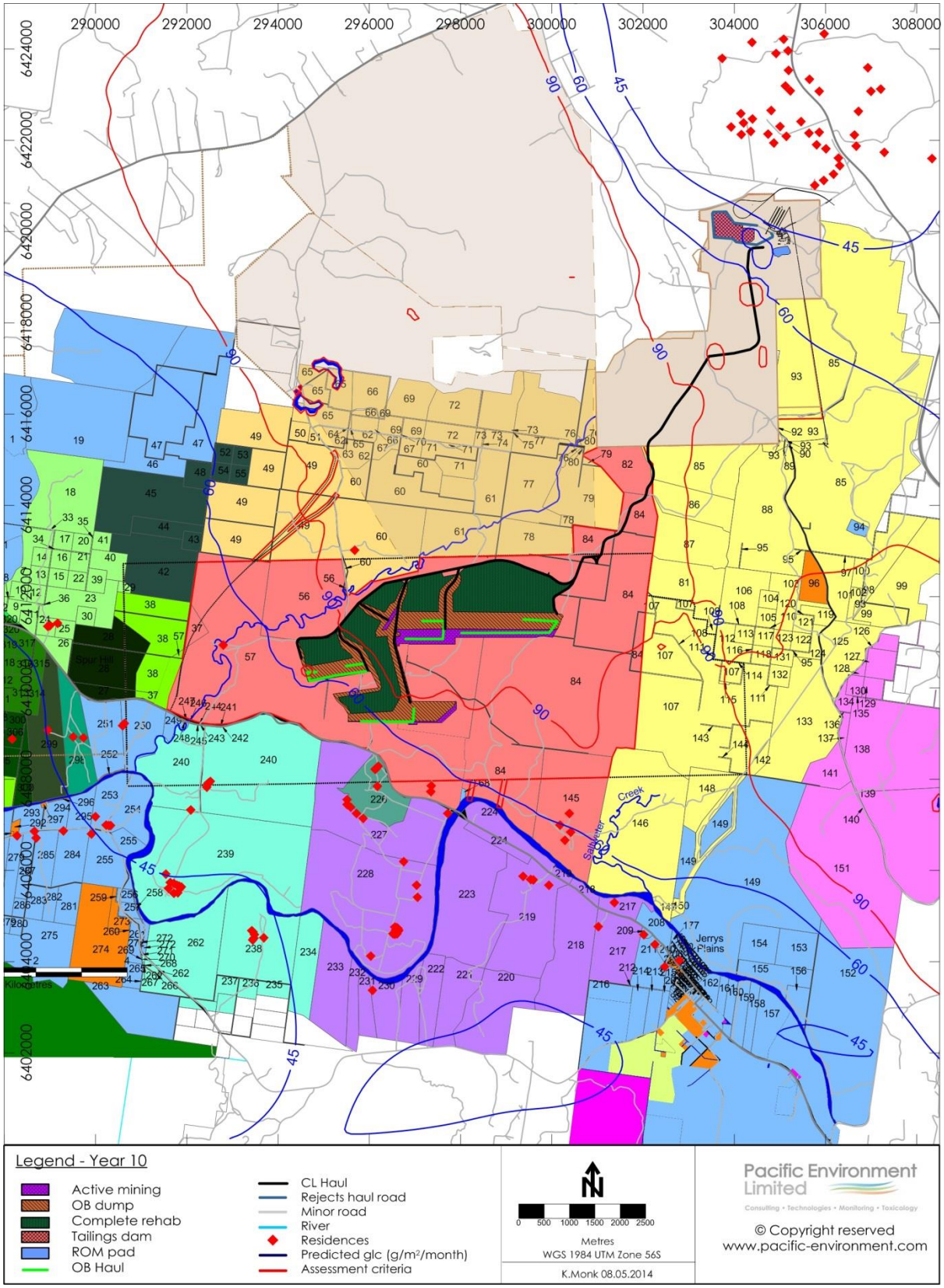


Figure 3-14: Predicted annual average TSP concentrations due to emissions from Drayton South and other sources - Year 10

3.2.5 Project only dust deposition

A summary of the Project-only predicted annual average dust deposition at each of the individual residences for the modelling for year 5 and 10 provided in **Table 3-7** and in **Figure 3-15** and **Figure 3-16**.

There are no privately owned residences during either year that are predicted to experience annual average dust deposition above the assessment criteria, due to emissions from the Project-only.

Table 3-7: Annual dust deposition concentrations (g/m²/month) at nearby residences for each modelling year – Project Only

ID	Project Only Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 2 g/m²/month*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	0.0	0.0
3	0.0	0.0
24A	0.0	0.0
24B	0.0	0.0
25	0.0	0.0
172	0.1	0.1
207	0.1	0.1
209	0.1	0.1
211	0.1	0.1
217A	0.1	0.1
217B	0.1	0.1
219A	0.1	0.0
219B	0.1	0.1
219C	0.1	0.0
219D	0.1	0.0
226A	0.1	0.0
226B	0.1	0.0
226C	0.1	0.0
226D	0.0	0.0
227A	0.0	0.0
227B	0.0	0.0
227C	0.0	0.0
227D	0.0	0.0
227E	0.0	0.0
227F	0.1	0.0
228A	0.0	0.0
228B	0.0	0.0
228C	0.0	0.0
228D	0.0	0.0
228E	0.0	0.0
228F	0.0	0.0
228G	0.0	0.0
228H	0.0	0.0
228I	0.0	0.0
228J	0.0	0.0
228K	0.0	0.0
228L	0.0	0.0
228M	0.0	0.0
230	0.0	0.0
238A	0.0	0.0
238B	0.0	0.0
238C	0.0	0.0
238D	0.0	0.0
238E	0.0	0.0
238F	0.0	0.0
239A	0.0	0.0
239B	0.0	0.0
239C	0.0	0.0

ID	Project Only Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 2 g/m²/month*	
	Year 5	Year 10
239D	0.0	0.0
239E	0.0	0.0
239F	0.0	0.0
239G	0.0	0.0
239H	0.0	0.0
239I	0.0	0.0
240A	0.0	0.0
240B	0.0	0.0
240C	0.0	0.0
240D	0.0	0.0
240E	0.0	0.0
250A	0.0	0.0
250B	0.0	0.0
253	0.0	0.0
254A	0.0	0.0
254B	0.0	0.0
254C	0.0	0.0
255	0.0	0.0
279	0.0	0.0
284	0.0	0.0
285	0.0	0.0
287	0.0	0.0
288	0.0	0.0
298A	0.0	0.0
298B	0.0	0.0
299	0.0	0.0
306	0.0	0.0
Drayton Mine		
384	0.0	0.0
385	0.0	0.0
386	0.0	0.0
387	0.0	0.0
390	0.0	0.0
398	0.0	0.0
399	0.0	0.0
400	0.0	0.0
401	0.0	0.0
402	0.0	0.0
403	0.0	0.0
411	0.0	0.0
418	0.0	0.0
419	0.0	0.0
420	0.0	0.0
421	0.0	0.0
423	0.0	0.0
424	0.0	0.0
425	0.0	0.0
427	0.0	0.0
429	0.0	0.0
432	0.0	0.0
433A	0.0	0.0
433B	0.0	0.0
435	0.0	0.0
438	0.0	0.0
440	0.0	0.0
441	0.0	0.0
443	0.0	0.0
444	0.0	0.0
446A	0.0	0.0
446B	0.0	0.0
451	0.0	0.0
455	0.0	0.0

ID	Project Only Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 2 g/m²/month*	
	Year 5	Year 10
456	0.0	0.0
460	0.0	0.0
Mine owned residences		
57	0.1	0.1
58A	0.1	0.1
58B	0.1	0.1
60	0.9	1.4
145A	0.2	0.2
145B	0.2	0.2
145C	0.2	0.2
145D	0.2	0.1
388	0.0	0.0
389	0.0	0.0
404	0.0	0.0
410	0.0	0.0

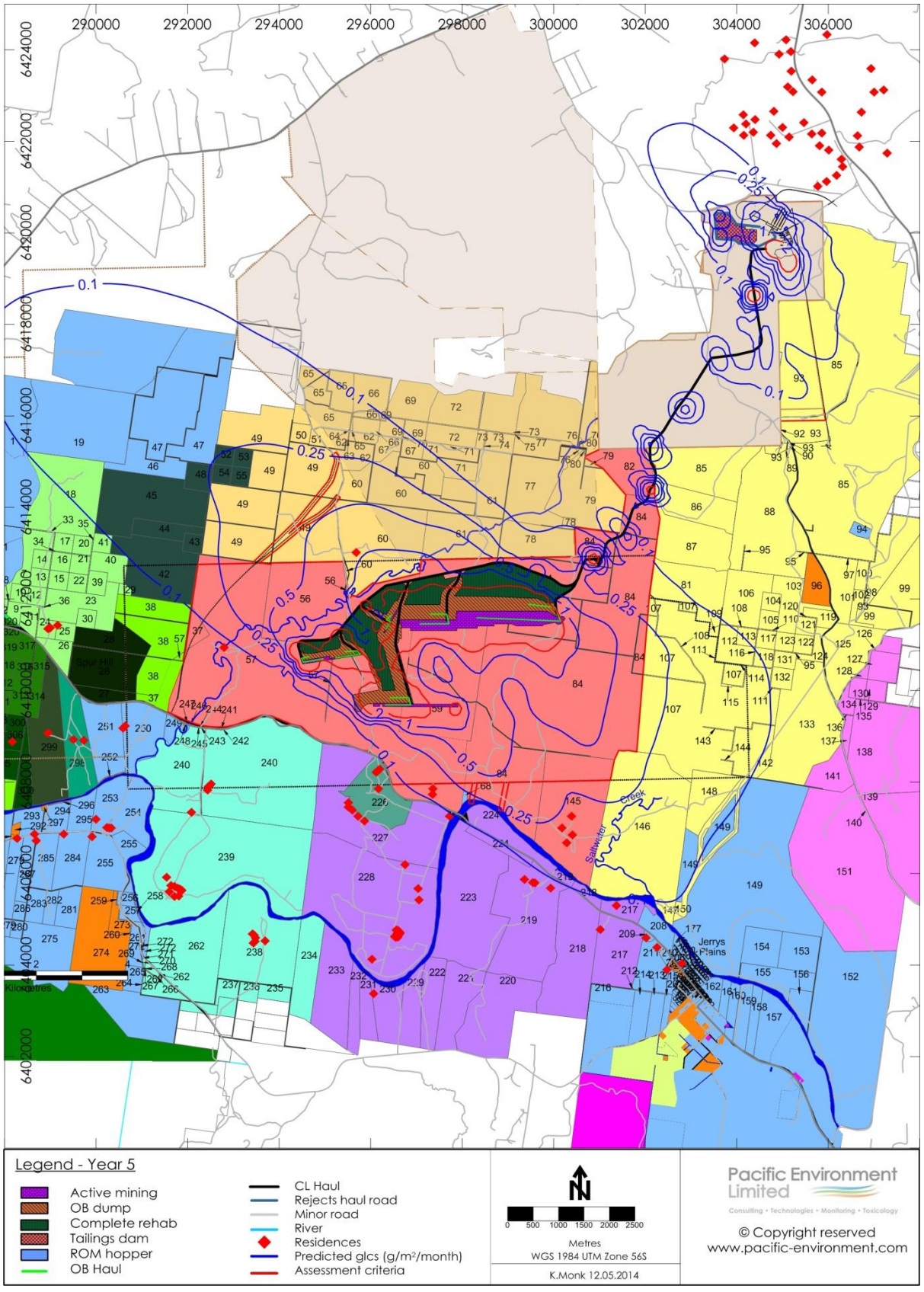


Figure 3-15: Predicted annual average dust deposition concentrations due to emissions from Drayton South only - Year 5

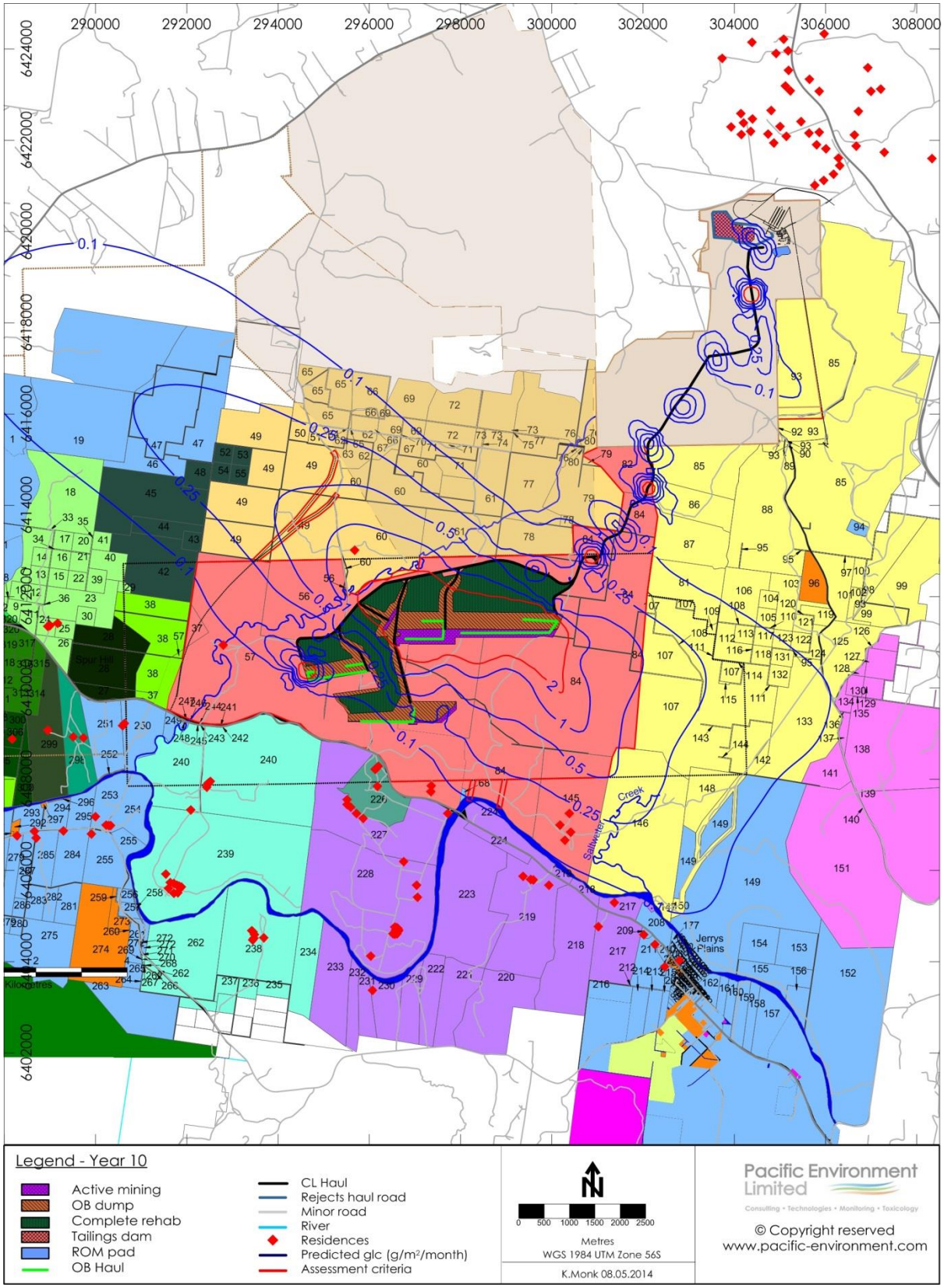


Figure 3-16: Predicted annual average dust deposition concentrations due to emissions from Drayton South only - Year 10

3.2.6 Cumulative dust deposition

A summary of the cumulative predicted dust deposition at each of the individual residences for the modelling for year 5 and 10 are provided in **Table 3-8** and in **Figure 3-17** and **Figure 3-18**.

There are no privately owned residences during either year that are predicted to experience annual average dust deposition above the assessment criteria, due to emissions from the Project plus background or cumulative sources during either operational year.

Table 3-8: Annual Dust Deposition concentrations (g/m²/month) at nearby residences for each modelling year - Cumulative

ID	Cumulative Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 4 g/m²/month*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	1.10	1.10
3	1.11	1.10
24A	1.08	1.06
24B	1.08	1.06
25	1.08	1.08
172	1.19	1.19
207	1.16	1.17
209	1.20	1.20
211	1.19	1.19
217A	1.23	1.23
217B	1.16	1.16
219A	1.16	1.16
219B	1.18	1.18
219C	1.16	1.16
219D	1.16	1.15
226A	1.18	1.13
226B	1.20	1.14
226C	1.19	1.14
226D	1.15	1.12
227A	1.08	1.09
227B	1.08	1.08
227C	1.08	1.08
227D	1.08	1.08
227E	1.08	1.09
227F	1.18	1.16
228A	1.05	1.05
228B	1.05	1.05
228C	1.05	1.05
228D	1.05	1.05
228E	1.05	1.05
228F	1.05	1.05
228G	1.05	1.05
228H	1.05	1.05
228I	1.04	1.04
228J	1.05	1.05
228K	1.07	1.07
228L	1.08	1.08
228M	1.08	1.08
230	1.04	1.04
238A	1.03	1.04
238B	1.03	1.04
238C	1.03	1.04
238D	1.03	1.04
238E	1.03	1.04
238F	1.03	1.04
239A	1.04	1.04
239B	1.04	1.04

ID	Cumulative Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 4 g/m²/month*	
	Year 5	Year 10
239C	1.04	1.04
239D	1.04	1.04
239E	1.04	1.04
239F	1.04	1.04
239G	1.04	1.04
239H	1.04	1.04
239I	1.04	1.04
240A	1.05	1.05
240B	1.06	1.06
240C	1.06	1.06
240D	1.06	1.06
240E	1.06	1.06
250A	1.06	1.07
250B	1.07	1.07
253	1.04	1.04
254A	1.04	1.04
254B	1.04	1.04
254C	1.04	1.04
255	1.04	1.04
279	1.03	1.03
284	1.04	1.04
285	1.03	1.04
287	1.03	1.04
288	1.03	1.03
298A	1.05	1.06
298B	1.05	1.05
299	1.05	1.05
306	1.04	1.05
Drayton Mine		
384	1.14	1.17
385	1.15	1.18
386	1.17	1.20
387	1.22	1.25
390	1.26	1.29
398	1.24	1.26
399	1.22	1.24
400	1.19	1.21
401	1.20	1.22
402	1.22	1.24
403	1.22	1.25
411	1.20	1.22
418	1.19	1.21
419	1.18	1.20
420	1.17	1.19
421	1.17	1.19
423	1.18	1.20
424	1.17	1.19
425	1.16	1.18
427	1.17	1.19
429	1.15	1.18
432	1.14	1.16
433A	1.13	1.16
433B	1.13	1.15
435	1.12	1.15
438	1.10	1.12
440	1.13	1.15
441	1.11	1.12
443	1.12	1.14
444	1.14	1.16
446A	1.15	1.17
446B	1.14	1.16
451	1.12	1.13

ID	Cumulative Annual Average Dust Deposition (g/m²/month) *Assessment criteria = 4 g/m²/month*	
	Year 5	Year 10
455	1.10	1.12
456	1.10	1.12
460	1.13	1.15
Mine owned residences		
57	1.18	1.17
58A	1.22	1.16
58B	1.21	1.16
60	3.05	3.08
145A	1.40	1.38
145B	1.48	1.47
145C	1.40	1.39
145D	1.35	1.34
388	1.24	1.26
389	1.26	1.29
404	1.20	1.22
410	1.21	1.23

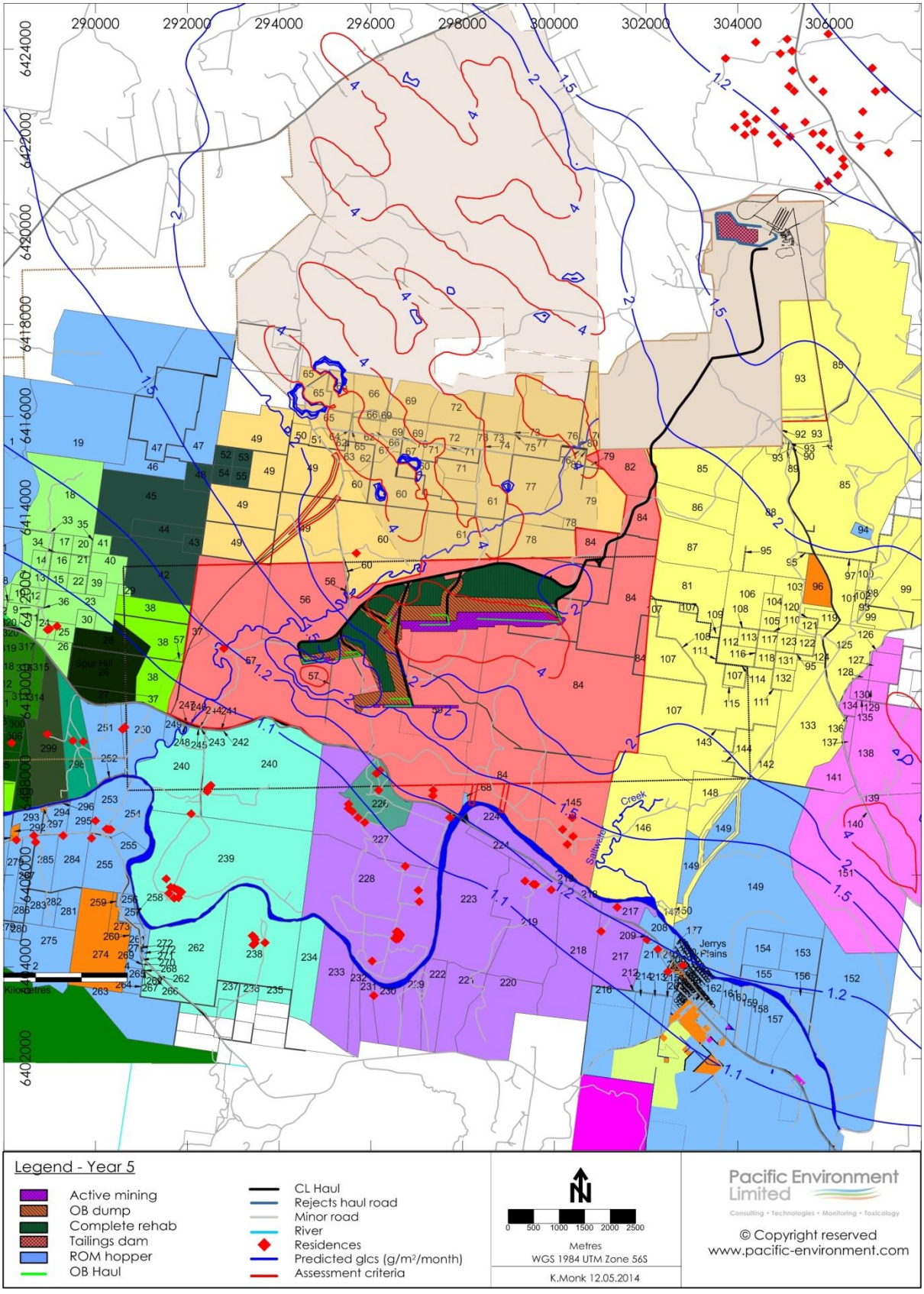


Figure 3-17: Predicted annual average dust deposition concentrations due to emissions from Drayton South and other sources - Year 5

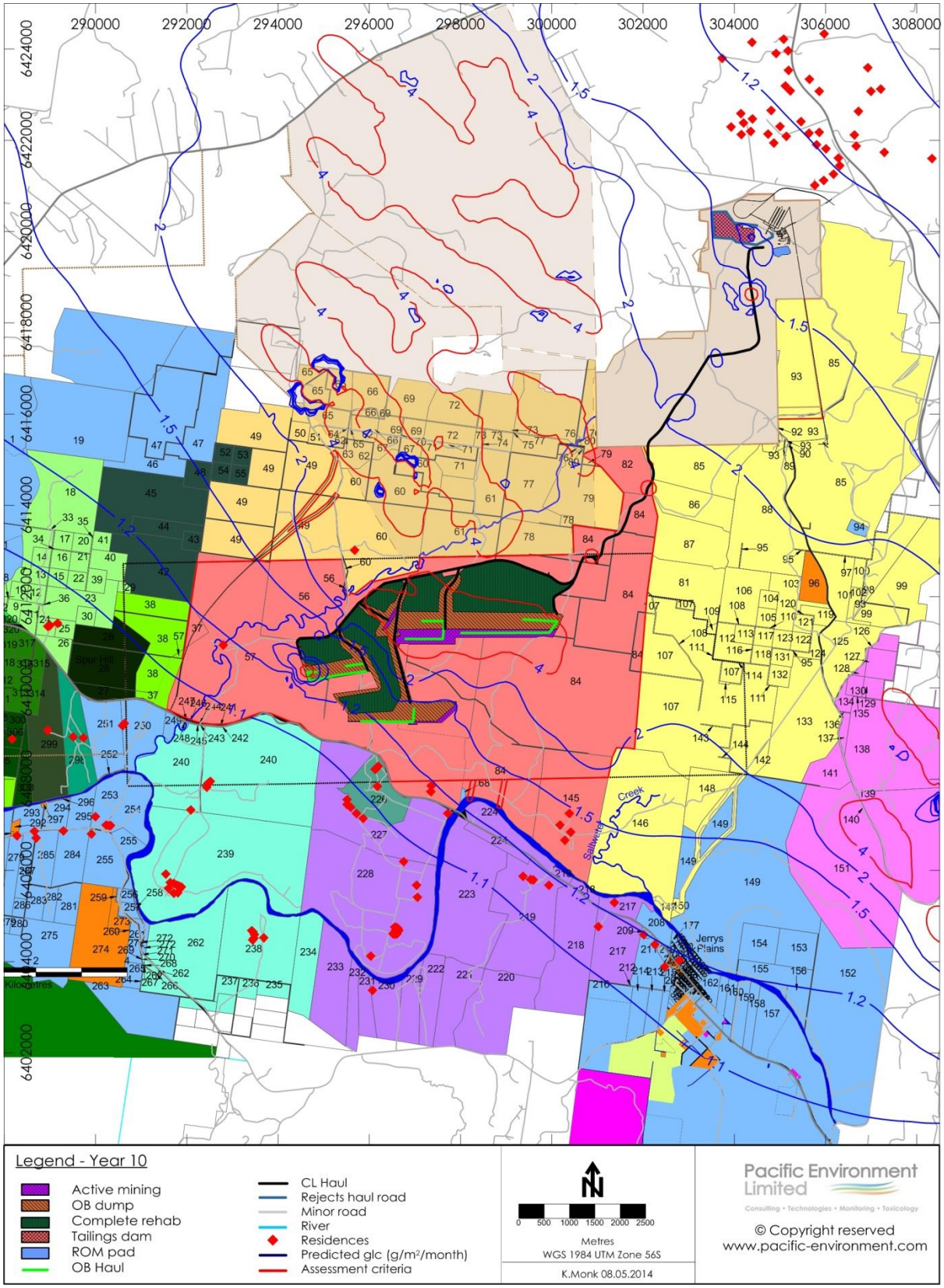


Figure 3-18: Predicted annual average dust deposition concentrations due to emissions from Drayton South and other sources - Year 10

4 CONCLUSIONS

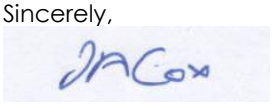
Pacific Environment has assessed the potential impacts of the retracted mine plans for the proposed Drayton South coal mine for two worst case operational years. The results show an overall reduction in predicted ground level concentrations across the entire modelling domain compared with previous modelling based on the EA mine plans.

There are no privately owned residences that are predicted to exceed the relevant annual assessment criteria of particulate matter. There is a probability of a maximum of four days additional exceedances of the cumulative 24-hour average PM_{10} assessment criteria at the private residences assessed. It is important to note that the cumulative assessment is considered highly conservative as the background data contains a high number of exceedances. In addition, Anglo American has implemented a best practice predictive and real-time dust management system at their Drayton site, which includes a daily risk forecast tool for planning and managing day-to-day operations and a real-time dust monitoring system to act and respond to short-term elevated dust. Also, as part of the "dust stop' PRP process, Drayton has identified adverse meteorological conditions for managing visible dust from overburden handling, also used for managing day-to-day operations. These systems would be extended to Drayton South, if approved.

The reduction in potential impact is the result of a combination of the overall reduction in material movement across the Project each year (particularly due to the use of the dragline in Redbank), the removal of Houston mine area and the reduction in Whynot and Redbank mine foot print.

Do not hesitate to contact the undersigned should you have any queries on the above.

Sincerely,



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APPENDIX A. ESTIMATION OF DUST EMISSIONS

Drayton South Mine Project

For each stage of the mine a corresponding emissions inventory has been developed. The modelled scenarios are considered to be representative of worst-case operations; for example where coal and waste material amounts are highest, where extraction or wind erosion areas are largest or where operations are located closest to residences.

Table A.1: Summary of estimated TSP emissions from the Project (kg/y)

ACTIVITY	Year 5 (TSP kg/y)	Year 10 (TSP kg/y)
WHYNOT		
Topsoil removal & Site preparation - Dozers on Whynot	422	165
Topsoil removal - Sh/Ex/FELs loading topsoil - Whynot	184	90
Topsoil removal - Hauling topsoil to emplacement area (east) - Whynot	2,985	1,385
Topsoil removal - Hauling topsoil to emplacement area (west) - Whynot	1,305	746
Topsoil removal - Emplacing topsoil at emplacement area - Whynot	369	180
OB - Drilling - Whynot	6,222	3,019
OB - Blasting - Whynot	27,859	9,537
OB - Dozers on Dragline OB in-pit - Whynot	3,329	1,857
OB - Dragline removal of OB - Whynot	245,391	136,787
OB - Dozers on Excavator OB in-pit - Whynot	5,638	3,477
OB - Excavator loading OB to haul truck - Whynot	17,843	10,898
OB - Hauling excavator OB to emplacement area (east) - Whynot	640,883	371,714
OB - Hauling excavator OB to emplacement area (west) - Whynot	280,116	200,276
OB - Dozers on OB haul roads (east) - Whynot	1,190	729
OB - Dozers on OB haul roads (west) - Whynot	1,190	729
OB- Emplacing excavator OB at emplacement area - Whynot	17,843	10,898
OB - Dozers on OB emplacement area - Whynot	9,066	5,404
OB - Dozers in-pit ancillary tasks - Whynot	2,380	1,458
OB - Dozers ripping/pushing/clean-up Partings - Whynot	98	70
OB - Loading partings to haul trucks - Whynot	748	525
OB - Hauling partings to emplacement area (east) - Whynot	26,865	17,891
OB - Hauling partings to emplacement area (west) - Whynot	11,742	9,640
OB - Emplacing Partings at emplacement area - Whynot	748	525
CL - Drilling coal - Whynot	378	482
CL - Blasting coal - Whynot	37	13
CL - Dozers ripping/pushing/clean-up ROM in-pit - Whynot	2,200	2,166
CL - Sh/Ex/FELs loading open coal to trucks - Whynot	194,210	191,107
CL - Hauling open coal in-pit roads (east) - Whynot	53,283	49,529
CL - Hauling open coal to ROM pad (east) - Whynot	60,090	59,094
CL - Hauling open coal in-pit roads (west) - Whynot	18,508	27,084
CL - Hauling open coal to ROM pad (west) - Whynot	75,933	75,567
CL - Unloading ROM to ROM stockpiles/hopper - Whynot	58,263	57,332
CL- Handle coal at CHPP - Whynot	1,047	1,031
CL - Rehandle ROM coal at stockpiles/hopper - Whynot	19,421	19,111
BLAKEFIELD EAST		
Topsoil removal & Site preparation - Dozers on Blakefield EAST	78	-
Topsoil removal - Sh/Ex/FELs loading topsoil - Blakefield EAST	14	-
Topsoil removal - Hauling topsoil to emplacement area - Blakefield EAST	73	-
Topsoil removal - Emplacing topsoil at emplacement area - Blakefield EAST	28	-
OB - Drilling - Blakefield EAST	83	-
OB - Blasting - Blakefield EAST	345	-
OB - Dozers on Dragline OB in-pit - Blakefield EAST	1,322	-
OB - Dragline removal of OB - Blakefield EAST	31,730	-
OB - Dozers on OB haul roads - Blakefield EAST	573	-
OB - Dozers on OB emplacement area - Blakefield EAST	573	-
OB - Dozers in-pit ancillary tasks - Blakefield EAST	149	-
CL - Drilling coal - Blakefield EAST	6	-
CL - Blasting coal - Blakefield EAST	1	-
CL - Dozers ripping/pushing/clean-up ROM in-pit - Blakefield EAST	85	-
CL - Sh/Ex/FELs loading open coal to trucks - Blakefield EAST	2,451	-
CL - Hauling open coal in-pit roads - Blakefield EAST	140	-
CL - Hauling open coal to ROM pad - Blakefield EAST	2,186	-
CL - Unloading ROM to ROM stockpiles/hopper - Blakefield EAST	735	-
CL- Handle coal at CHPP - Blakefield EAST	13	-
CL - Rehandle ROM coal at stockpiles/hopper - Blakefield EAST	245	-
BLAKEFIELD WEST		
Topsoil removal & Site preparation - Dozers on Blakefield	297	186
Topsoil removal - Sh/Ex/FELs loading topsoil - Blakefield	53	77
Topsoil removal - Hauling topsoil to emplacement area (east) - Blakefield	312	687
Topsoil removal - Hauling topsoil to emplacement area (west) - Blakefield	221	362
Topsoil removal - Emplacing topsoil at emplacement area - Blakefield	107	155
OB - Drilling - Blakefield	319	424
OB - Blasting - Blakefield	1,319	3,923
OB - Dozers on Dragline OB in-pit - Blakefield	-	1,132
OB - Dragline removal of OB - Blakefield	-	63,460

ACTIVITY	Year 5 (TSP kg/y)	Year 10 (TSP kg/y)
OB - Dozers on Excavator OB in-pit - Blakefield	1,444	1,458
OB - Excavator loading OB to haul truck - Blakefield	1,488	3,475
OB - Hauling excavator OB to emplacement area (east) - Blakefield	19,342	68,547
OB - Hauling excavator OB to emplacement area (west) - Blakefield	13,703	36,139
OB - Dozers on OB haul roads (east) - Blakefield	1,097	1,295
OB - Dozers on OB haul roads (west) - Blakefield	1,097	1,295
OB- Emplacing excavator OB at emplacement area - Blakefield	1,488	3,475
OB - Dozers on OB emplacement area - Blakefield	2,194	2,590
OB - Dozers in-pit ancillary tasks - Blakefield	570	671
CL - Drilling coal - Blakefield	24	51
CL - Blasting coal - Blakefield	2	6
CL - Dozers ripping/pushing/clean-up ROM in-pit - Blakefield	327	410
CL - Sh/Ex/FELs loading open coal to trucks - Blakefield	9,384	27,508
CL - Hauling open coal in-pit roads (east) - Blakefield	709	4,058
CL - Hauling open coal to ROM pad (east) - Blakefield	4,348	13,147
CL - Hauling open coal in-pit roads (west) - Blakefield	624	4,473
CL - Hauling open coal to ROM pad (west) - Blakefield	4,516	13,266
CL - Unloading ROM to ROM stockpiles/hopper - Blakefield	2,815	8,252
CL- Handle coal at CHPP - Blakefield	51	148
CL - Rehandle ROM coal at stockpiles/hopper - Blakefield	938	2,751
REDBANK		
Topsoil removal & Site preparation - Dozers on Redbank	616	298
Topsoil removal - Sh/Ex/FELs loading topsoil - Redbank	115	64
Topsoil removal - Hauling topsoil to emplacement area - Redbank	1,527	943
Topsoil removal - Emplacing topsoil at emplacement area - Redbank	230	128
OB - Drilling - Redbank	343	341
OB - Blasting - Redbank	9,446	13,040
OB - Dozers on Dragline OB in-pit - Redbank	-	2,949
OB - Dragline removal of OB - Redbank	-	85,409
OB - Dozers on Excavator OB in-pit - Redbank	3,756	3,095
OB - Excavator loading OB to haul truck - Redbank	4,019	3,814
OB - Hauling excavator OB to emplacement area - Redbank	118,614	124,809
OB - Dozers on OB haul roads - Redbank	1,138	1,727
OB- Emplacing excavator OB at emplacement area - Redbank	4,019	3,814
OB - Dozers on OB emplacement area - Redbank	3,900	6,166
OB - Dozers in-pit ancillary tasks - Redbank	1,138	1,727
OB - Dozers ripping/pushing/clean-up Partings - Redbank	144	122
OB - Loading partings to haul trucks - Redbank	370	362
OB - Hauling partings to emplacement area - Redbank	10,932	11,846
OB - Emplacing Partings at emplacement area - Redbank	370	362
CL - Highwall transfer point - Redbank (Y13)	-	403
CL - Highwall conveyor - Redbank (Y13)	-	17
CL - Drilling coal - Redbank	90	134
CL - Blasting coal - Redbank	433	597
CL - Dozers ripping/pushing/clean-up ROM in-pit - Redbank	3,151	3,758
CL - Sh/Ex/FELs loading open coal to trucks - Redbank	94,093	201,365
CL - Hauling open coal in-pit roads - Redbank	14,648	83,273
CL - Hauling open coal to ROM pad - Redbank	87,777	188,844
CL - Unloading ROM to ROM stockpiles/hopper - Redbank	28,228	60,410
CL - Handle coal at CHPP - Redbank	507	1,086
CL - Rehandle ROM coal at stockpiles/hopper - Redbank	9,409	20,137
ROM/REJECTS HANDLING		
CL - Dozers ROM Coal Handling & Rejects - ROM stockpile	17,712	17,712
CL - Loading rejects	-	-
CL - Transporting rejects	44,555	66,219
CL - Unloading rejects	-	-
PRODUCT COAL		
CL - Loading product stockpile	1,239	1,702
CL - Loading product coal to trains	1,653	2,270
WIND EROSION		
WE - OB dump& disturbed area - Uncontrolled	482,847	653,948
WE - OB dump& disturbed area - Controlled	241,424	326,974
WE - Open mining area - Whynot	342,092	283,184
WE - Open mining area - Blakefield east	6,476	14,102
WE - Open mining area - Blakefield west	24,788	18,010
WE - Open mining area - Redbank	40,557	37,620
WE - ROM stockpiles	7,358	7,358

ACTIVITY	Year 5 (TSP kg/y)	Year 10 (TSP kg/y)
WE - Product stockpiles	52,560	52,560
Total	**3,559,682**	**3,836,630**

Table A.2: Year 5 – Drayton South Emissions Calculations

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
WHYNOT																	
Topsoil removal & Site preparation - Dozers on Whynot	422	50	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Whynot	184	201,258	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area (east) - Whynot	2,985	100,629	t/y	0.14832	kg/t	177	t/load	229.0	Vehicle gross mass (t)	5.5	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Hauling topsoil to emplacement area (west) - Whynot	1,305	100,629	t/y	0.06483	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.4	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Whynot	369	201,258	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Whynot	6,222	35,153	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Whynot	27,859	162	blasts/y	172	kg/blast	8484	Area of blast in square metres									0	% control
OB - Dozers on Dragline OB in-pit - Whynot	3,329	2,535	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dragline removal of OB - Whynot	245,391	10,629,707	bcm/y	0.0231	kg/m3 (loose)	7	drop distance in m	5.8	moisture content in %							0	% control
OB - Dozers on Excavator OB in-pit - Whynot	5,638	4,294	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Whynot	17,843	43,209,951	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area (east) - Whynot	640,883	21,604,975	t/y	0.14832	kg/t	177	t/load	229.0	Vehicle gross mass (t)	5.5	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Hauling excavator OB to emplacement area (west) - Whynot	280,116	21,604,975	t/y	0.06483	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.4	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads (east) - Whynot	1,190	906	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers on OB haul roads (west) - Whynot	1,190	906	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Whynot	17,843	43,209,951	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Whynot	9,066	6,905	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Whynot	2,380	1,813	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers ripping/pushing/clean-up Partings - Whynot	98	75	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Loading partings to haul trucks - Whynot	748	1,811,293	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling partings to emplacement area (east) - Whynot	26,865	905,647	t/y	0.14832	kg/t	177	t/load	229.0	Vehicle gross mass (t)	5.5	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Hauling partings to emplacement area (west) - Whynot	11,742	905,647	t/y	0.06483	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.4	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Emplacing Partings at emplacement area - Whynot	748	1,811,293	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
CL - Drilling coal - Whynot	378	2,138	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Whynot	37	81	blasts/y	0.4579	kg/blast	163	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Whynot	2,200	641	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Whynot	194,210	3,223,268	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads (east) - Whynot	53,283	1,611,634	t/y	0.16531	kg/t	70	t/load	65.0	Vehicle gross mass (t)	4.3	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (east) - Whynot	60,090	1,611,634	t/y	0.24857	kg/t	70	t/load	65.0	Vehicle gross mass (t)	22.1	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Hauling open coal in-pit roads (west) - Whynot	18,508	1,611,634	t/y	0.05742	kg/t	70	t/load	65.0	Vehicle gross mass (t)	1.5	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (west) - Whynot	75,933	1,611,634	t/y	0.31410	kg/t	70	t/load	65.0	Vehicle gross mass (t)	27.9	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Whynot	58,263	3,223,268	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Whynot	1,047	3,223,268	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Whynot	19,421	322,327	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
BLAKEFIELD EAST																	
Topsoil removal & Site preparation - Dozers on Blakefield EAST	78	9	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Blakefield EAST	14	15,205	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area - Blakefield EAST	73	15,205	t/y	0.02395	kg/t	177	t/load	229.0	Vehicle gross mass (t)	0.9	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Blakefield EAST	28	15,205	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Blakefield EAST	83	471	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Blakefield EAST	345	6	blasts/y	55	kg/blast	3985	Area of blast in square metres									0	% control
OB - Dozers on Dragline OB in-pit - Blakefield EAST	1,322	1,007	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dragline removal of OB - Blakefield EAST	31,730	1,374,464	bcm/y	0.0231	kg/m3 (loose)	7	drop distance in m	5.8	moisture content in %							0	% control
OB - Dozers on OB haul roads - Blakefield EAST	573	436	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Blakefield EAST	573	436	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - BlakefieldEAST	149	113	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
CL - Drilling coal - Blakefield EAST	6	36	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Blakefield EAST	1	3	blasts/y	0.1679	kg/blast	84	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Blakefield EAST	85	25	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Blakefield EAST	2,451	40,685	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads - Blakefield EAST	140	40,685	t/y	0.01719	kg/t	70	t/load	65.0	Vehicle gross mass (t)	0.4	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad - Blakefield EAST	2,186	40,685	t/y	0.35820	kg/t	70	t/load	65.0	Vehicle gross mass (t)	31.8	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Blakefield EAST	735	40,685	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Blakefield EAST	13	40,685	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Blakefield EAST	245	4,068	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
BLAKEFIELD WEST																	
Topsoil removal & Site preparation - Dozers on Blakefield	297	36	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Blakefield	53	58,204	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area (east) - Blakefield	312	29,102	t/y	0.05369	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.0	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Hauling topsoil to emplacement area (west) - Blakefield	221	29,102	t/y	0.03803	kg/t	177	t/load	229.0	Vehicle gross mass (t)	1.4	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Blakefield	107	58,204	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Blakefield	319	1,804	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Blakefield	1,319	24	blasts/y	55	kg/blast	3985	Area of blast in square metres									0	% control
OB - Dozers on Excavator OB in-pit - Blakefield	1,444	1,100	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Blakefield	1,488	3,602,919	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area (east) - Blakefield	19,342	1,801,459	t/y	0.05369	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.0	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Hauling excavator OB to emplacement area (west) - Blakefield	13,703	1,801,459	t/y	0.03803	kg/t	177	t/load	229.0	Vehicle gross mass (t)	1.4	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads (east) - Blakefield	1,097	835	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers on OB haul roads (west) - Blakefield	1,097	835	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Blakefield	1,488	3,602,919	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Blakefield	2,194	1,671	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Blakefield	570	434	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
CL - Drilling coal - Blakefield	24	138	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Blakefield	2	12	blasts/y	0.1679	kg/blast	84	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Blakefield	327	95	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Blakefield	9,384	155,737	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads (east) - Blakefield	709	77,868	t/y	0.04551	kg/t	70	t/load	65.0	Vehicle gross mass (t)	1.2	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (east) - Blakefield	4,348	77,868	t/y	0.37223	kg/t	70	t/load	65.0	Vehicle gross mass (t)	33.1	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Hauling open coal in-pit roads (west) - Blakefield	624	77,868	t/y	0.04005	kg/t	70	t/load	65.0	Vehicle gross mass (t)	1.0	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (west) - Blakefield	4,516	77,868	t/y	0.38664	kg/t	70	t/load	65.0	Vehicle gross mass (t)	34.3	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Blakefield	2,815	155,737	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Blakefield	51	155,737	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Blakefield	938	15,574	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
REDBANK																	
Topsoil removal & Site preparation - Dozers on Redbank	616	74	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Redbank	115	125,318	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area - Redbank	1,527	125,318	t/y	0.06093	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.3	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Redbank	230	125,318	t/y	0.00183	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Redbank	343	1,940	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Redbank	9,446	16	blasts/y	594	kg/blast	19400	Area of blast in square metres									0	% control
OB - Dozers on Excavator OB in-pit - Redbank	3,756	2,861	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Redbank	4,019	9,733,257	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area - Redbank	118,614	9,733,257	t/y	0.06093	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.3	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads - Redbank	1,138	867	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Redbank	4,019	9,733,257	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Redbank	3,900	2,970	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Redbank	1,138	867	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers ripping/pushing/clean-up Partings - Redbank	144	110	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Loading partings to haul trucks - Redbank	370	897,059	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling partings to emplacement area - Redbank	10,932	897,059	t/y	0.06093	kg/t	177	t/load	229.0	Vehicle gross mass (t)	2.3	km/return trip	4.79	kg/VKT	4.1	% silt content	80	% control
OB - Emplacing Partings at emplacement area - Redbank	370	897,059	t/y	0.00041	kg/t	1.55	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
CL - Drilling coal - Redbank	90	509	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Redbank	433	8	blasts/y	54.4582	kg/blast	3942	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Redbank	3,151	918	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Redbank	94,093	1,561,647	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads - Redbank	14,648	1,561,647	t/y	0.04690	kg/t	70	t/load	65.0	Vehicle gross mass (t)	1.2	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad - Redbank	87,777	1,561,647	t/y	0.37472	kg/t	70	t/load	65.0	Vehicle gross mass (t)	33.3	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Redbank	28,228	1,561,647	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL - Handle coal at CHPP - Redbank	507	1,561,647	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Redbank	9,409	156,165	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
ROM/REJECTS HANDLING																	
CL - Dozers ROM Coal Handling & Rejects - ROM stockpile	17,712	5,159	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Loading rejects	-	912,796	t/y	Rejects very wet therefore no dust												0	% control
CL - Transporting rejects	44,555	912,796	t/y	0.2441	kg/t	91	t/load	117.9	Vehicle gross mass (t)	6.2	km/return trip	3.55	kg/VKT	4.1	% silt content	80	% control
CL - Unloading rejects	-	912,796	t/y	Rejects very wet therefore no dust												0	% control
PRODUCT COAL																	
CL - Loading product stockpile	1,239	3,840,342	t/y	0.0004	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	5.4	moisture content in %							25	% control
CL - Loading product coal to trains	1,653	3,840,342	t/y	0.0004	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	5.4	moisture content in %							0	% control
WIND EROSION																	
WE - OB dump& disturbed area - Uncontrolled	482,847	138	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - OB dump& disturbed area - Controlled	241,424	138	ha	0.4	kg/ha/h	8760	h/y									50	% control
WE - Open mining area - Whynot	342,092	98	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Blakefield east	6,476	2	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Blakefield west	24,788	7	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Redbank	40,557	12	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - ROM stockpiles	7,358	6	ha	0.4	kg/ha/h	8760	h/y									65	% control
WE - Product stockpiles	52,560	15	ha	0.4	kg/ha/h	8760	h/y									0	% control
Total	**3,559,682**																

Table A.3: Year 10 – Drayton South Emissions Calculations

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
WHYNOT																	
Topsoil removal & Site preparation - Dozers on Whynot	165	20	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Whynot	90	99,189	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area (east) - Whynot	1,385	49,595	t/y	0.13959	kg/t	222	t/load	275.0	Vehicle gross mass (t)	6.0	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Hauling topsoil to emplacement area (west) - Whynot	746	49,595	t/y	0.07521	kg/t	222	t/load	275.0	Vehicle gross mass (t)	3.2	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Whynot	180	99,189	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Whynot	3,019	17,056	holes/y	0.59	kg/hole											70	% control
OB - Blasting (including cast blasts) - Whynot	9,537	125	blasts/y	76	kg/blast	4937	Area of blast in square metres									0	% control
OB - Dozers on Dragline OB in-pit - Whynot	1,857	1,414	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dragline removal of OB - Whynot	136,787	5,925,271	bcm/y	0.0231	kg/m3 (loose)	7	drop distance in m	5.8	moisture content in %							0	% control
OB - Dozers on Excavator OB in-pit - Whynot	3,477	2,649	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Whynot	10,898	26,629,649	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area (east) - Whynot	371,714	13,314,825	t/y	0.13959	kg/t	222	t/load	275.0	Vehicle gross mass (t)	6.0	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Hauling excavator OB to emplacement area (west) - Whynot	200,276	13,314,825	t/y	0.07521	kg/t	222	t/load	275.0	Vehicle gross mass (t)	3.2	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads (east) - Whynot	729	555	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers on OB haul roads (west) - Whynot	729	555	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Whynot	10,898	26,629,649	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Whynot	5,404	4,116	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Whynot	1,458	1,110	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers ripping/pushing/clean-up Partings - Whynot	70	53	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Loading partings to haul trucks - Whynot	525	1,281,730	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling partings to emplacement area (east) - Whynot	17,891	640,865	t/y	0.13959	kg/t	222	t/load	275.0	Vehicle gross mass (t)	6.0	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Hauling partings to emplacement area (west) - Whynot	9,640	640,865	t/y	0.07521	kg/t	222	t/load	275.0	Vehicle gross mass (t)	3.2	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Emplacing Partings at emplacement area - Whynot	525	1,281,730	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
CL - Drilling coal - Whynot	482	2,722	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Whynot	13	62	blasts/y	0.2032	kg/blast	95	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Whynot	2,166	631	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Whynot	191,107	3,171,759	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads (east) - Whynot	49,529	1,585,880	t/y	0.15616	kg/t	70	t/load	65.0	Vehicle gross mass (t)	4.0	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (east) - Whynot	59,094	1,585,880	t/y	0.24842	kg/t	70	t/load	65.0	Vehicle gross mass (t)	22.1	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Hauling open coal in-pit roads (west) - Whynot	27,084	1,585,880	t/y	0.08539	kg/t	70	t/load	65.0	Vehicle gross mass (t)	2.2	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (west) - Whynot	75,567	1,585,880	t/y	0.31766	kg/t	70	t/load	65.0	Vehicle gross mass (t)	28.2	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Whynot	57,332	3,171,759	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Whynot	1,031	3,171,759	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Whynot	19,111	317,176	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
BLAKEFIELD																	
Topsoil removal & Site preparation - Dozers on Blakefield	186	22	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Blakefield	77	85,072	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area (east) - Blakefield	687	42,536	t/y	0.08073	kg/t	222	t/load	275.0	Vehicle gross mass (t)	3.4	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Hauling topsoil to emplacement area (west) - Blakefield	362	42,536	t/y	0.04256	kg/t	222	t/load	275.0	Vehicle gross mass (t)	1.8	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Blakefield	155	85,072	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Blakefield	424	2,393	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Blakefield	3,923	58	blasts/y	68	kg/blast	4578	Area of blast in square metres									0	% control
OB - Dozers on Dragline OB in-pit - Blakefield	1,132	863	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dragline removal of OB - Blakefield	63,460	2,748,917	bcm/y	0.0231	kg/m3 (loose)	7	drop distance in m	5.8	moisture content in %							0	% control
OB - Dozers on Excavator OB in-pit - Blakefield	1,458	1,110	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Blakefield	3,475	8,491,077	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area (east) - Blakefield	68,547	4,245,539	t/y	0.08073	kg/t	222	t/load	275.0	Vehicle gross mass (t)	3.4	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Hauling excavator OB to emplacement area (west) - Blakefield	36,139	4,245,539	t/y	0.04256	kg/t	222	t/load	275.0	Vehicle gross mass (t)	1.8	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads (east) - Blakefield	1,295	986	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers on OB haul roads (west) - Blakefield	1,295	986	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Blakefield	3,475	8,491,077	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Blakefield	2,590	1,973	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Blakefield	671	511	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
CL - Drilling coal - Blakefield	51	286	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Blakefield	6	29	blasts/y	0.2067	kg/blast	96	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Blakefield	410	119	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Blakefield	27,508	456,541	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads (east) - Blakefield	4,058	228,270	t/y	0.08889	kg/t	70	t/load	65.0	Vehicle gross mass (t)	2.3	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (east) - Blakefield	13,147	228,270	t/y	0.38396	kg/t	70	t/load	65.0	Vehicle gross mass (t)	34.1	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Hauling open coal in-pit roads (west) - Blakefield	4,473	228,270	t/y	0.09799	kg/t	70	t/load	65.0	Vehicle gross mass (t)	2.5	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad (west) - Blakefield	13,266	228,270	t/y	0.38745	kg/t	70	t/load	65.0	Vehicle gross mass (t)	34.4	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Blakefield	8,252	456,541	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Blakefield	148	456,541	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Blakefield	2,751	45,654	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control

ACTIVITY	TSP emissions (kg/y)	Intensity	units	Emission factor	units	Variable 1	units	Variable 2	units	Variable 3	units	Variable 4	Units	Variable 5	Units	Variable 6	Units
REDBANK																	
Topsoil removal & Site preparation - Dozers on Redbank	298	36	h/y	16.7	kg/h	10	silt content in %	2	moisture content in %							50	% control
Topsoil removal - Sh/Ex/FELs loading topsoil - Redbank	64	70,441	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							50	% control
Topsoil removal - Hauling topsoil to emplacement area - Redbank	943	70,441	t/y	0.06697	kg/t	222	t/load	275.0	Vehicle gross mass (t)	2.9	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
Topsoil removal - Emplacing topsoil at emplacement area - Redbank	128	70,441	t/y	0.00182	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	2	moisture content in %							0	% control
OB - Drilling - Redbank	341	1,925	holes/y	0.59	kg/hole											70	% control
OB - Blasting - Redbank	13,040	25	blasts/y	512	kg/blast	17562	Area of blast in square metres									0	% control
OB - Dozers on Dragline OB in-pit - Redbank	2,949	2,246	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dragline removal of OB - Redbank	85,409	3,699,690	bcm/y	0.0231	kg/m3 (loose)	7	drop distance in m	5.8	moisture content in %							0	% control
OB - Dozers on Excavator OB in-pit - Redbank	3,095	2,357	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Excavator loading OB to haul truck - Redbank	3,814	9,318,578	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling excavator OB to emplacement area - Redbank	124,809	9,318,578	t/y	0.06697	kg/t	222	t/load	275.0	Vehicle gross mass (t)	2.9	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Dozers on OB haul roads - Redbank	1,727	1,315	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB- Emplacing excavator OB at emplacement area - Redbank	3,814	9,318,578	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Dozers on OB emplacement area - Redbank	6,166	4,696	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers in-pit ancillary tasks - Redbank	1,727	1,315	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Dozers ripping/pushing/clean-up Partings - Redbank	122	93	h/y	1.31	kg/h	3.8	silt content in %	5.8	moisture content in %							0	% control
OB - Loading partings to haul trucks - Redbank	362	884,459	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
OB - Hauling partings to emplacement area - Redbank	11,846	884,459	t/y	0.06697	kg/t	222	t/load	275.0	Vehicle gross mass (t)	2.9	km/return trip	5.20	kg/VKT	4.1	% silt content	80	% control
OB - Emplacing Partings at emplacement area - Redbank	362	884,459	t/y	0.00041	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	5.8	moisture content in %							0	% control
CL - Highwall transfer point - Redbank (Y13)	403	1,178,602	t/y	0.0003	kg/t	1.53	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Highwall conveyor - Redbank (Y13)	17	0.0048	ha	0.4	kg/ha/h	8760	h/y									0	% control
CL - Drilling coal - Redbank	134	754	holes/y	0.5900	kg/hole											70	% control
CL - Blasting coal - Redbank	597	13	blasts/y	46.9059	kg/blast	3569	Area of blast in square metres									0	% control
CL - Dozers ripping/pushing/clean-up ROM in-pit - Redbank	3,758	1,094	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Sh/Ex/FELs loading open coal to trucks - Redbank	201,365	3,342,020	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
CL - Hauling open coal in-pit roads - Redbank	83,273	3,342,020	t/y	0.12458	kg/t	70	t/load	65.0	Vehicle gross mass (t)	3.2	km/return trip	2.72	kg/VKT	4.1	% silt content	80	% control
CL - Hauling open coal to ROM pad - Redbank	188,844	3,342,020	t/y	0.37671	kg/t	70	t/load	65.0	Vehicle gross mass (t)	33.5	km/return trip	0.79	kg/VKT	0.7	% silt content	85	% control
CL - Unloading ROM to ROM stockpiles/hopper - Redbank	60,410	3,342,020	t/y	0.06025	kg/t	6.6	moisture content in %									70	% control
CL- Handle coal at CHPP - Redbank	1,086	3,342,020	t/y	0.0003	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	6.6	moisture content in %							0	% control
CL - Rehandle ROM coal at stockpiles/hopper - Redbank	20,137	334,202	t/y	0.06025	kg/t	6.6	moisture content in %									0	% control
ROM/REJECTS HANDLING																	
CL - Dozers ROM Coal Handling & Rejects - ROM stockpile	17,712	5,159	h/y	3.4333	kg/h	1.1	silt content in %	6.6	moisture content in %							0	% control
CL - Loading rejects	-	1,356,623	t/y	Rejects very wet therefore no dust												0	% control
CL - Transporting rejects	66,219	1,356,623	t/y	0.2441	kg/t	91	t/load	117.9	Vehicle gross mass (t)	6.2	km/return trip	3.55	kg/VKT	4.1	% silt content	80	% control
CL - Unloading rejects	-	1,356,623	t/y	Rejects very wet therefore no dust												0	% control
PRODUCT COAL																0	% control
CL - Loading product stockpile	1,702	5,274,542	t/y	0.0004	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	5.4	moisture content in %							25	% control
CL - Loading product coal to trains	2,270	5,274,542	t/y	0.0004	kg/t	1.46	average of (wind speed/2.2)^1.3 in m/s	5.4	moisture content in %							0	% control
WIND EROSION																	
WE - OB dump& disturbed area - Uncontrolled	653,948	187	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - OB dump& disturbed area - Controlled	326,974	187	ha	0.4	kg/ha/h	8760	h/y									50	% control
WE - Open mining area - Whynot	283,184	81	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Blakefield east	14,102	4	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Blakefield west	18,010	5	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - Open mining area - Redbank	37,620	11	ha	0.4	kg/ha/h	8760	h/y									0	% control
WE - ROM stockpiles	7,358	6	ha	0.4	kg/ha/h	8760	h/y									65	% control
WE - Product stockpiles	52,560	15	ha	0.4	kg/ha/h	8760	h/y									0	% control
Total	**3,836,630**																

APPENDIX B. $PM_{2.5}$ ASSESSMENT

B.1 PROJECT ONLY ANNUAL AVERAGE $PM_{2.5}$ PREDICTIONS

A summary of the Project-only predicted $PM_{2.5}$ concentrations at each of the individual residences for the original and revised modelling for year 5 and 10 are provided in **Table B.1**.

There are no privately owned residences during either year that are predicted to experience annual average $PM_{2.5}$ concentrations due to emissions from the Project-only above the NEPM standard (8 µg/m^3).

Table B.1: Annual $PM_{2.5}$ concentrations (µg/m^3) at nearby residences for year 5 and 10 – Project Only

ID	Project Only	
	Annual Average $PM_{2.5}$ (µg/m^3)	
	Advisory Reporting Standard = 8 µg/m^3	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	0.1	0.1
3	0.1	0.1
24A	0.1	0.1
24B	0.1	0.1
25	0.1	0.1
172	0.2	0.2
207	0.2	0.1
209	0.2	0.2
211	0.2	0.2
217A	0.3	0.3
217B	0.2	0.2
219A	0.2	0.2
219B	0.3	0.2
219C	0.2	0.2
219D	0.2	0.2
226A	0.3	0.2
226B	0.3	0.3
226C	0.3	0.3
226D	0.2	0.2
227A	0.1	0.1
227B	0.1	0.1
227C	0.1	0.1
227D	0.1	0.1
227E	0.1	0.1
227F	0.2	0.2
228A	0.1	0.1
228B	0.1	0.1
228C	0.1	0.1
228D	0.1	0.1
228E	0.1	0.1
228F	0.1	0.1
228G	0.1	0.1
228H	0.1	0.1
228I	0.0	0.1
228J	0.1	0.1
228K	0.1	0.1
228L	0.1	0.1
228M	0.1	0.1
230	0.0	0.0
238A	0.0	0.0
238B	0.0	0.0
238C	0.0	0.0
238D	0.0	0.0
238E	0.0	0.0
238F	0.0	0.0
239A	0.0	0.0

ID	Project Only Annual Average $PM_{2.5}$ (µg/m³) *Advisory Reporting Standard = 8 µg/m³*	
	Year 5	Year 10
239B	0.0	0.0
239C	0.0	0.0
239D	0.0	0.0
239E	0.0	0.0
239F	0.0	0.0
239G	0.0	0.0
239H	0.0	0.0
239I	0.0	0.0
240A	0.1	0.1
240B	0.1	0.1
240C	0.1	0.1
240D	0.1	0.1
240E	0.1	0.1
250A	0.1	0.1
250B	0.1	0.1
253	0.1	0.1
254A	0.0	0.1
254B	0.0	0.1
254C	0.0	0.1
255	0.0	0.1
279	0.0	0.0
284	0.0	0.0
285	0.0	0.0
287	0.0	0.0
288	0.0	0.0
298A	0.1	0.1
298B	0.1	0.1
299	0.1	0.1
306	0.1	0.1
Drayton Mine		
384	0.0	0.0
385	0.0	0.0
386	0.0	0.0
387	0.1	0.0
390	0.1	0.0
398	0.1	0.0
399	0.1	0.0
400	0.0	0.0
401	0.0	0.0
402	0.1	0.0
403	0.1	0.0
411	0.1	0.0
418	0.1	0.0
419	0.1	0.0
420	0.1	0.0
421	0.0	0.0
423	0.0	0.0
424	0.0	0.0
425	0.0	0.0
427	0.0	0.0
429	0.0	0.0
432	0.0	0.0
433A	0.0	0.0
433B	0.0	0.0
435	0.0	0.0
438	0.0	0.0
440	0.0	0.0
441	0.0	0.0
443	0.0	0.0
444	0.0	0.0
446A	0.0	0.0
446B	0.0	0.0

ID	Project Only Annual Average $PM_{2.5}$ (µg/m³) *Advisory Reporting Standard = 8 µg/m³*	
	Year 5	Year 10
451	0.0	0.0
455	0.0	0.0
456	0.0	0.0
460	0.0	0.0
Mine owned residences		
57	0.3	0.3
58A	0.3	0.2
58B	0.3	0.2
60	1.7	2.0
145A	0.5	0.4
145B	0.5	0.5
145C	0.6	0.4
145D	0.5	0.4
388	0.1	0.0
389	0.1	0.0
404	0.0	0.0
410	0.1	0.0

B.2 CUMULATIVE ANNUAL AVERAGE $PM_{2.5}$ PREDICTIONS

To assess the cumulative impact of $PM_{2.5,}$ monitoring data were sourced taken from the nearest EPA monitoring sites at Muswellbrook, Singleton and Camberwell. The annual average for 2011 for each of the site is presented in **Table B.2**. These values are already close to or above the current annual NEPM standard for $PM_{2.5}$.

Table B.2: Annual average $PM_{2.5}$ concentrations (µg/m³) at nearby EPA monitoring sites

Monitor location	Annual average - 2011
Muswellbrook	9.11
Singleton	7.60
Camberwell	8.24

The 24-hour average values for these three sites are plotted in **Figure B-1**. These monitoring data show a clear seasonal signal, with and increase across all three sites through winter. This increase in $PM_{2.5}$ is possibly the result of domestic wood burning and would explain why the annual average is close or exceeding to the NEPM standard.

The Project alone predicted ground-level concentrations are less than 1 µg/m³ at most residences for all operational years, so they are unlikely contribute significantly to the background $PM_{2.5}$ levels.

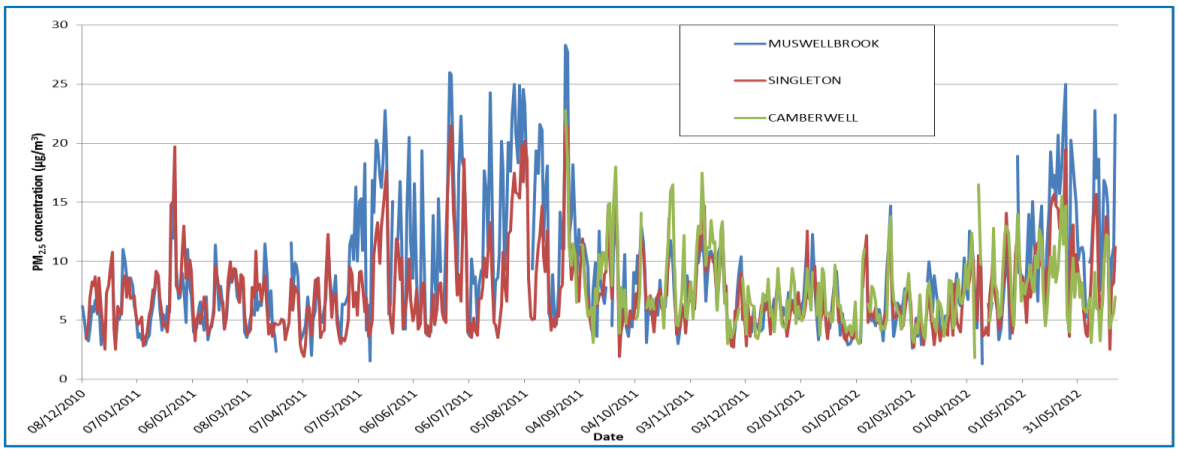

Figure B-1: Measured 24-hour average $PM_{2.5}$ at 3 EPA Upper Hunter monitoring sites

B.3 PROJECT ONLY 24-HOUR AVERAGE $PM_{2.5}$ PREDICTIONS

A summary of the predicted maximum 24-hour average $PM_{2.5}$ concentrations at each of the individual residences are provided in **Table B.3**. No residences are predicted to experience 24-hour average $PM_{2.5}$ levels above the NEPM standard of 25 µg/m³.

Note that the 24-hour $PM_{2.5}$ values do not represent a single worst case day, but rather represent the potential worst case 24-hour $PM_{2.5}$ concentration that could be reached at that particular location across the entire modelling year.

Table B.3: Maximum 24-hour $PM_{2.5}$ concentrations (µg/m³) at nearby residences for year 5 and 10 – Project Only

ID	Project Only Maximum 24-hour Average $PM_{2.5}$ (µg/m³) *Advisory Reporting Standard = 25 µg/m³*	
	Year 5	Year 10
Privately owned residences		
Drayton South		
2	0.9	1.0
3	1.0	1.0
24A	1.3	1.4
24B	1.3	1.4
25	1.4	1.5
172	1.2	1.2
207	1.1	1.0
209	1.4	1.3
211	1.3	1.3
217A	1.7	1.6
217B	1.3	1.5
219A	1.8	1.7
219B	1.7	1.7
219C	1.8	1.7
219D	1.9	1.7
226A	2.8	3.6
226B	2.9	3.8
226C	2.8	3.7
226D	2.6	3.4
227A	1.8	2.2
227B	1.8	2.2
227C	1.8	2.3
227D	1.9	2.4
227E	2.0	2.6
227F	3.1	2.5
228A	1.6	1.8
228B	1.6	1.8
228C	1.6	1.8
228D	1.7	1.8
228E	1.7	1.8
228F	1.7	1.9
228G	1.7	1.9
228H	1.7	1.9
228I	1.4	1.5
228J	1.7	1.8
228K	2.2	2.4
228L	2.4	2.6
228M	2.6	2.9
230	1.2	1.3
238A	1.0	1.1
238B	0.9	1.1
238C	0.9	1.1
238D	0.9	1.1
238E	0.9	1.1
238F	0.9	1.1
239A	0.8	0.9

ID	Project Only Maximum 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) *Advisory Reporting Standard = 25 $\mu g/m^3$*	
	Year 5	Year 10
239B	0.8	0.9
239C	0.8	0.9
239D	0.8	0.9
239E	0.8	0.9
239F	0.8	0.9
239G	0.8	0.9
239H	0.8	0.9
239I	0.8	0.9
240A	1.2	1.3
240B	1.4	1.5
240C	1.4	1.5
240D	1.4	1.5
240E	1.4	1.5
250A	1.9	1.9
250B	1.9	1.9
253	1.2	1.2
254A	1.2	1.2
254B	1.2	1.2
254C	1.2	1.2
255	1.1	1.1
279	0.9	0.9
284	1.0	1.1
285	0.9	0.9
287	0.9	1.0
288	0.7	0.8
298A	1.5	1.6
298B	1.4	1.5
299	1.3	1.3
306	1.1	1.1
Drayton Mine		
384	0.6	0.4
385	0.6	0.4
386	0.8	0.4
387	1.0	0.5
390	1.2	0.6
398	1.1	0.5
399	1.0	0.5
400	0.8	0.4
401	0.8	0.4
402	0.9	0.5
403	1.0	0.5
411	1.6	0.5
418	1.8	0.5
419	1.6	0.5
420	1.4	0.5
421	0.9	0.5
423	0.7	0.5
424	0.7	0.4
425	0.7	0.4
427	0.6	0.4
429	0.6	0.4
432	0.5	0.4
433A	0.5	0.4
433B	0.5	0.3
435	0.5	0.3
438	0.4	0.3
440	0.5	0.4
441	0.5	0.3
443	0.7	0.4
444	0.9	0.4
446A	1.0	0.4
446B	0.6	0.4

ID	Project Only	
	Maximum 24-hour Average $PM_{2.5}$ ($\mu g/m^3$)	
	Advisory Reporting Standard = 25 $\mu g/m^3$	
	Year 5	Year 10
451	0.4	0.3
455	0.5	0.3
456	0.5	0.3
460	0.5	0.3
Mine owned residences		
57	3.7	3.4
58A	3.2	3.2
58B	3.1	3.1
60	9.1	9.5
145A	2.1	1.7
145B	2.0	2.0
145C	2.2	1.8
145D	2.1	1.7
388	1.1	0.5
389	1.2	0.6
404	0.8	0.4
410	1.6	0.6

B.4 CUMULATIVE 24 HOUR AVERAGE $PM_{2.5}$ PREDICTIONS

The Monte Carlo method was used for the cumulative analysis of the 24-hour average $PM_{2.5}$. The three nearest EPA Upper Hunter Air Quality network sites of Muswellbrook, Singleton and Camberwell $PM_{2.5}$ data were used as the background data to add to the predicted Project alone concentrations, as in the $PM_{2.5}$ cumulative analysis. The same 13 residences were assessed for the average 24-hour $PM_{2.5}$ impacts.

The results of the Monte Carlo simulations are presented in **Figure B-2**. As in the $PM_{2.5}$ analysis the residences closer to the Project are more likely to experience days over the NEPM standard, however for all sites the predicted number of days varying between 1 to 2 days per year (see **Table B.4**). There is a reduction in the predicted number of days to exceed the advisory reporting standard compared to the original EA modelling.

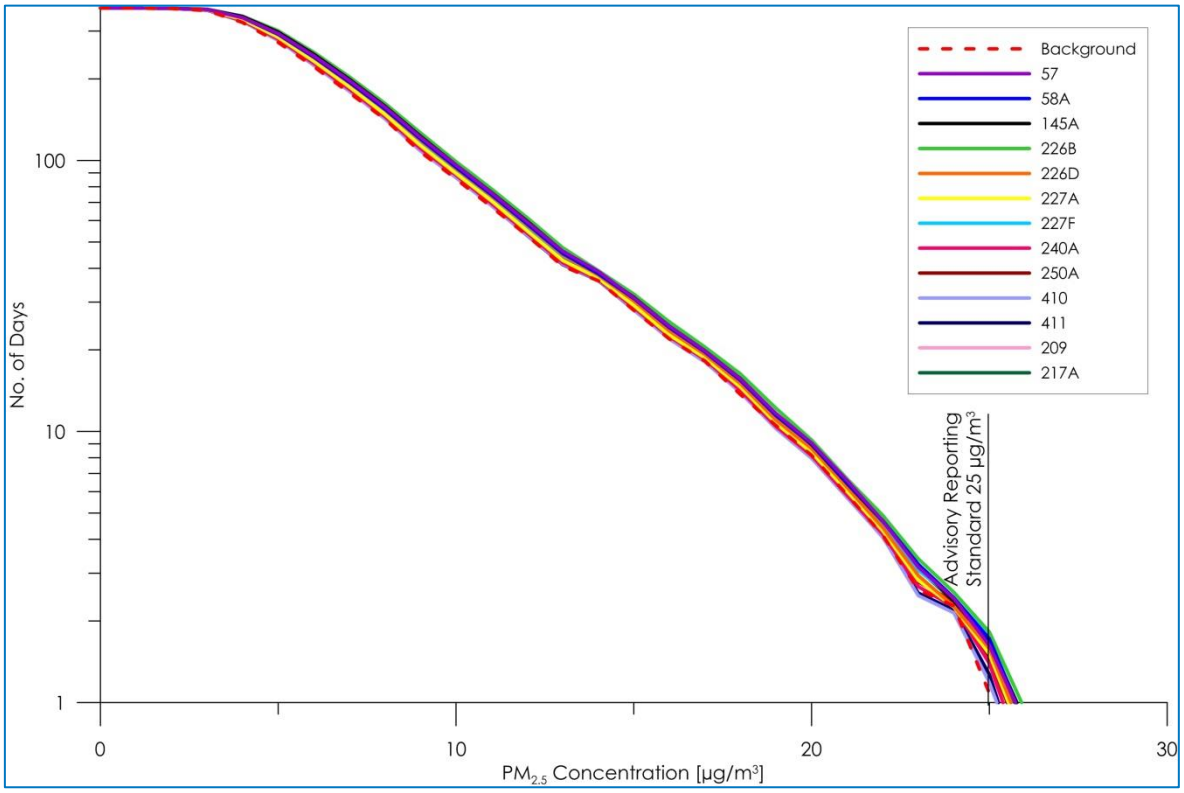

Figure B-2: Number of days likely to exceed cumulative maximum 24-h average $PM_{2.5}$ concentration (25 µg/m³) - Year 5

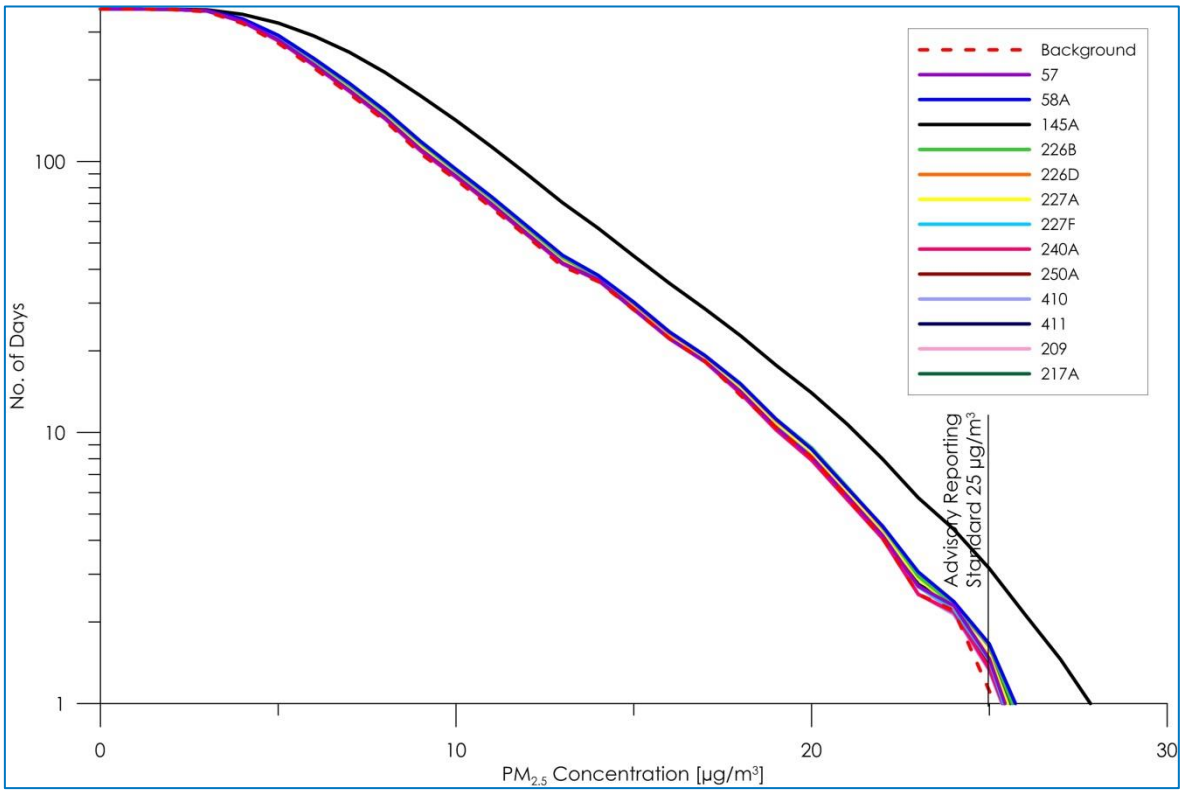

Figure B-3: Number of days likely to exceed cumulative maximum 24-h average $PM_{2.5}$ concentration (25 µg/m³) – Year 10

Table B.4: Summary of days exceeding 25 µg/m³ for 24 hour $PM_{2.5}$– project alone and cumulative

Receptor ID	Predicted number of days exceeding 25 µg/m³ cumulative criteria							
	Project Alone		Cumulative		Background		Days more than background	
	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10	Year 5	Year 10
Units	**Number of days**							
Privately owned residences								
226B	0	0	2	2	1	1	1	1
226D	0	0	2	2	1	1	1	0
227A	0	0	2	2	1	1	0	0
227F	0	0	1	2	1	1	0	1
240A	0	0	1	1	1	1	0	0
250A	0	0	1	1	1	1	0	0
209	0	0	1	2	1	1	0	0
217A	0	0	2	2	1	1	1	1
411	0	0	1	1	1	1	0	0
Mine owned residences								
57	0	0	1	2	1	1	0	1
58A	0	0	2	2	1	1	1	1
145A	0	0	3	2	1	1	2	1
410	0	0	1	1	1	1	0	0

Note: Totals may differ to the sum of the columns due to rounding and significant figures.