TODOROSKI AIR SCIENCES
Suite 2B, 14 Glen Street Eastwood, NSW 2122
Phone: 02 9874 2123
Fax: 02 9874 2125
Email: info@airsciences.com.au
Web: www.airsciences.com.au
ACN: 151 202 765 | ABN: 74 955 076 914

30 November 2011

Geoff Moore
Chief Development Officer
The Bloomfield Group
Via email: gmoore@bloomcoll.com.au

RE: Rix's Creek South Continuation Project – Trade-off Scenarios for the Independent Planning Commission of NSW

Dear Geoff,

Todoroski Air Sciences has assessed the potential change in air quality impacts due to the proposed trade-off scenarios developed for the Rix's Creek South Continuation Project following recommendations from the Independent Planning Commission of NSW (IPCN).

Potential air quality impacts for the Rix's Creek South Continuation Project were previously assessed in *Air Quality and Greenhouse Gas Assessment Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2015**) and in the subsequent document *Response to Agency Submissions for Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2016**).

Description of trade-off scenarios

Following the review of the Rix's Creek South Continuation Project, the IPCN recommended assessing the environmental impacts of removing the Western Overburden Emplacement area and instead increasing the heights of the existing North Pit Dump and South Pit Dump to accept the overburden, hereafter called the trade-off scenario.

To determine what changes may arise in regard to air quality, the potential air quality impacts for the trade-off scenario were modelled and compared with those for the original scenario assessed for the Rix's Creek South Continuation Project.

The most current 2016 modelling results for the 2023 modelling scenario were considered for this comparison as the 2023 scenario represents the period of maximum production and hence maximum dust generation for the Rix's Creek South Continuation Project. Please note that in 2016, the 2023 modelling scenario presented in the *Air Quality and Greenhouse Gas Assessment Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2015**) was scaled back, and the revised scaled modelling predictions are outlined in the *Response to Agency Submissions for Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2016**).

Two variations of the trade-off scenario were considered; Option 1 and Option 2.

For Option 1, all overburden material which was previously allocated to the Western Overburden Emplacement area is directed to the existing North Pit Dump and South Pit Dump thereby increasing the height of these emplacement areas.

For Option 2, the northern half of the Western Overburden Emplacement area is utilised with the remainder of the volume that previously reported to the southern half, being allocated to the North Pit Dump and South Pit Dump. The North Pit Dump in Option 2 has a smaller footprint and a lower height than the North Pit Dump in Option 1.

In 2023, all emplacement is completed for the South Pit Dump and material previously allocated to the Western Overburden Emplacement area is all directed to the North Pit Dump in Option 1 and for Option 2 is proportioned to the northern half of the Western Overburden Emplacement area with the remainder allocated to the North Pit Dump.

Table 1 summarises the approximate overburden material split for each modelling option in 2023. **Figure 1** presents the indicative mine plan scenarios for consideration as compared with the original assessed scenario.

For the two modelled trade-off options, all other modelling variables have been kept consistent with the modelling variables in the original scenario, allowing for an accurate direct comparison with the original scenario.

Table 1: Comparison of approximate overburden material split for the trade-off options

Option	Western Overburden Emplacement area	North Pit Dump	West In-pit Dump
Original scenario	20%	-	80%
Option 1	-	20%	80%
Option 2	10%	10%	80%

Assessment of potential air quality impacts

To investigate the extent of the effects on air quality due to the proposed trade-off options, air dispersion modelling was performed using the detailed air dispersion model previously developed for the *Air Quality and Greenhouse Gas Assessment Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2015**).

The air dispersion model was set up identically (apart from adjusting activity associated with the proposed trade-off options) to allow for a direct comparison with the previous assessment. Full details regarding the air dispersion model setup can be found in the Air Quality and Greenhouse Gas Assessment (**Todoroski Air Sciences, 2015**).

A comparison of the estimated total annual dust emissions for Option 1 and Option 2 with the original scenario is presented in **Table 2**. The cells highlighted in blue indicate the activities associated with the trade-off options. The activities identified to change in the trade-off options include the hauling of overburden material to different emplacement locations, the emplacing of the overburden material, wind erosion areas and the hauling and emplacement of reject material.

It is calculated that the net total annual dust emissions associated with the trade-off options would increase dust emissions by approximately 1.0 to 1.5% relative to the original scenario.

The increase in total annual dust emission due to the trade-off options primarily arises due to the additional haulage distance for transporting the overburden material.

Table 2: Comparison of estimated TSP emission rate for the trade-off options (kg of TSP)

ACTIVITY	Original scenario	Option 1	Option 2
OB - Dozers stripping topsoil	30,146	30,146	30,146
OB - Drilling	16,317	16,317	16,317
OB - Blasting	81,628	81,628	81,628
OB - Loading OB to haul truck	70,340	70,340	70,340
OB - Hauling to emplacement area – West In-pit 1	104,054	104,054	104,054
OB - Hauling to emplacement area – West In-pit 2	194,884	194,884	194,884
OB - Hauling to emplacement area – West In-pit 3	107,522	107,522	107,522
OB - Hauling to emplacement area – Western Overburden Emplacement	104,054	-	40,559
OB - Hauling to emplacement area – North Pit	-	162,758	75,591
OB - Emplacing at area – West In-pit 1	14,068	14,068	14,068
OB - Emplacing at area – West In-pit 2	20,399	20,399	20,399
OB - Emplacing at area – West In-pit 3	21,805	21,805	21,805
OB - Emplacing at area – Western Overburden Emplacement	14,068	-	7,034
OB - Emplacing at area – North Pit	-	14,068	7,034
OB - Dozers in pit	98,257	98,257	98,257
OB - Dozers on dump and rehab	294,772	294,772	294,772
CL - Dozers ripping/pushing/clean-up	211,234	211,234	211,234
CL - Loading ROM coal to haul truck	185,759	185,759	185,759
CL - Hauling ROM to hopper – 1	48,055	48,055	48,055
CL - Hauling ROM to hopper – 2	50,514	50,514	50,514
CL - Hauling ROM to hopper – 3	26,870	26,870	26,870
CHPP - Unloading ROM to hopper	92,879	92,879	92,879
CHPP - Rehandle ROM at hopper	9,288	9,288	9,288
CHPP - Dozer pushing ROM coal	25,944	25,944	25,944
CHPP - Dozer pushing Product coal	5,501	5,501	5,501
CHPP - Loading Product to Truck	317	317	317
CHPP - Hauling Product to hopper	36,058	36,058	36,058
CHPP - Unloading Product to hopper	317	317	317
CHPP - Loading Product coal to stockpile	238	238	238
CHPP - Conveying product to train loadout	185	185	185
CHPP - Loading Product coal to train	95	95	95
CHPP - Loading rejects	211	211	211
CHPP - Hauling rejects	45,614	40,311	35,629
CHPP - Unloading rejects	211	211	211
WE - Overburden emplacement areas	330,778	313,236	352,396
WE - Open pit	133,502	133,502	133,502
WE - ROM stockpiles	2,763	2,763	2,763
WE - Product stockpiles	6,469	6,469	6,469
Grading roads	47,445	47,445	47,445
Total TSP emissions (kg/yr)	**2,432,562**	**2,468,421**	**2,456,291**
Percentage change of Total TSP emissions		**1.5%**	**1.0%**

OB – overburden, CL – coal, CPP – coal preparation plant, WE – wind erosion

Dispersion modelling predictions

The predicted air quality levels due to the proposed trade-off scenarios are overlaid with the predictions for the original scenario (**Todoroski Air Sciences, 2016**).

The dispersion modelling results comparing the predicted incremental 24-hour average $PM_{2.5}$, annual average $PM_{2.5}$, 24-hour average PM_{10} and annual average PM_{10} are shown in **Figure 2** to **Figure 5**, respectively. These two dust metrics are chosen as they are most relevant to achieving compliance with criteria, and it can be inferred that all other dust metrics will display a similar relative effect, and also compliance with criteria.

The dispersion modelling results indicate that the proposed trade-off options have a minor effect with only small increases in impact in areas to the north and east, near the area where the activity associated with the trade-off options is taking place (i.e. North Pit). The trade-off options also show minor decreases in impact to the west and southwest associated with relocating some activity from the Western Overburden Emplacement Area to the North Pit.

For example, in **Figure 3** showing the comparison of predicted annual average $PM_{2.5}$ concentrations, we can see the area to the southeast of the Rix's Creek Mine at Singleton would experience a slight decrease due to the proposed trade-off options and consequently a slight increase in areas to the east at North Singleton. This increase is small, approximately 0.05µg/m^3, is within the accuracy of the dispersion model and is unlikely to be measurable in practice.

Overall, the results also show that there is only a minor change in the predicted impacts and the effects are within the precision of the modelling predictions.

The figures also show that the predicted dust levels are unlikely to change significantly at any privately-owned receptor as a result of the proposed trade-off options in comparison with the original scenario.

Summary and Conclusions

The activities associated with the proposed trade-off options are predicted to generate between 1.0 to 1.5% more dust relative to the original scenario for 2023. This change arises primarily due to increased haul distances.

Notably, the predicted change in dust impacts is small, and within the modelling accuracy and the normal variation that naturally occurs in background dust levels daily or between years.

The comparison shows that the proposed trade-off options would only influence dust levels in the close vicinity to the site of the activity and that no significant or reasonably measurable change in dust levels at any off-site receptor would occur from the mine as a result of the proposed trade-off options.

It is concluded that the proposed trade-off options will not result in any discernible additional impact above that presented in the *Air Quality and Greenhouse Gas Assessment Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2015**) and *Response to Agency Submissions for Rix's Creek Continuation of Mining Project* (**Todoroski Air Sciences, 2016**).

Please feel free to contact us if you would like to clarify any aspect of this report.

Yours faithfully,
Todoroski Air Sciences

Aleks Todoroski
Director

Philip Henschke
Atmospheric Physicist

References

Todoroski Air Sciences (2015)

"Air Quality and Greenhouse Gas Assessment Rix's Creek Continuation of Mining Project", prepared by Todoroski Air Sciences for Rix's Creek Mine, August 2015.

Todoroski Air Sciences (2016)

"Response to Agency Submissions for Rix's Creek Continuation of Mining Project", prepared by Todoroski Air Sciences for Rix's Creek Mine, June 2016.

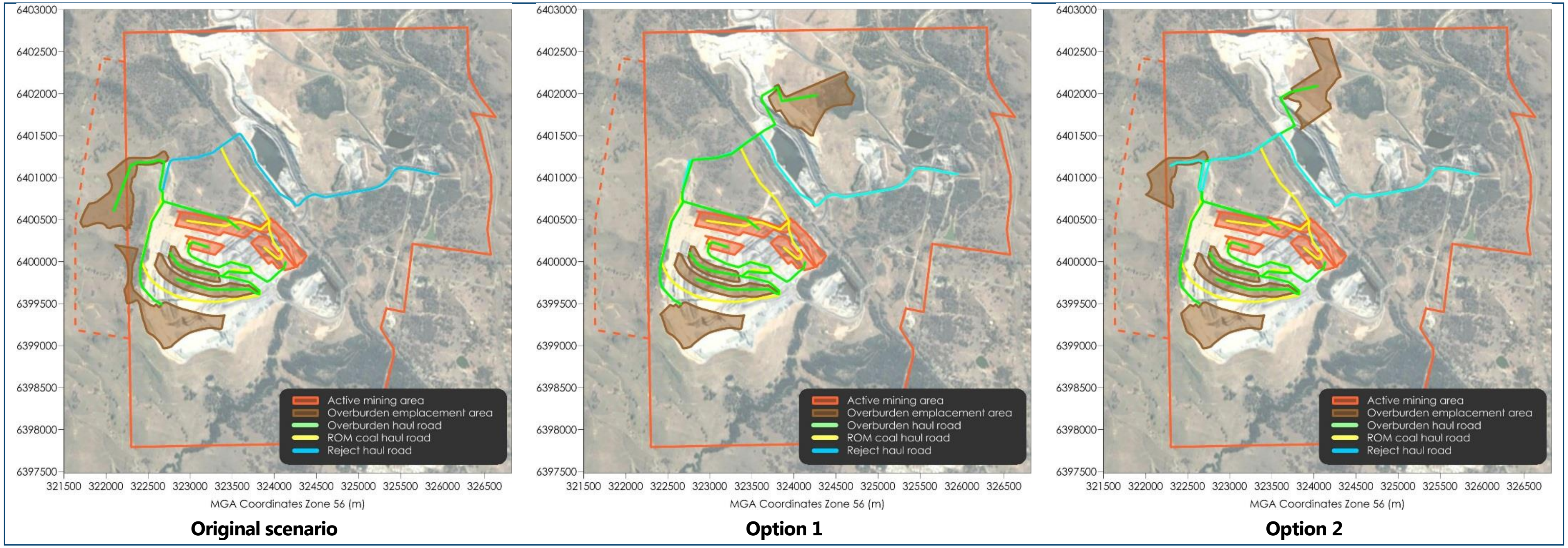

Figure 1: Comparison of modelling scenarios for Rix's Creek South Continuation Project – Year 2023

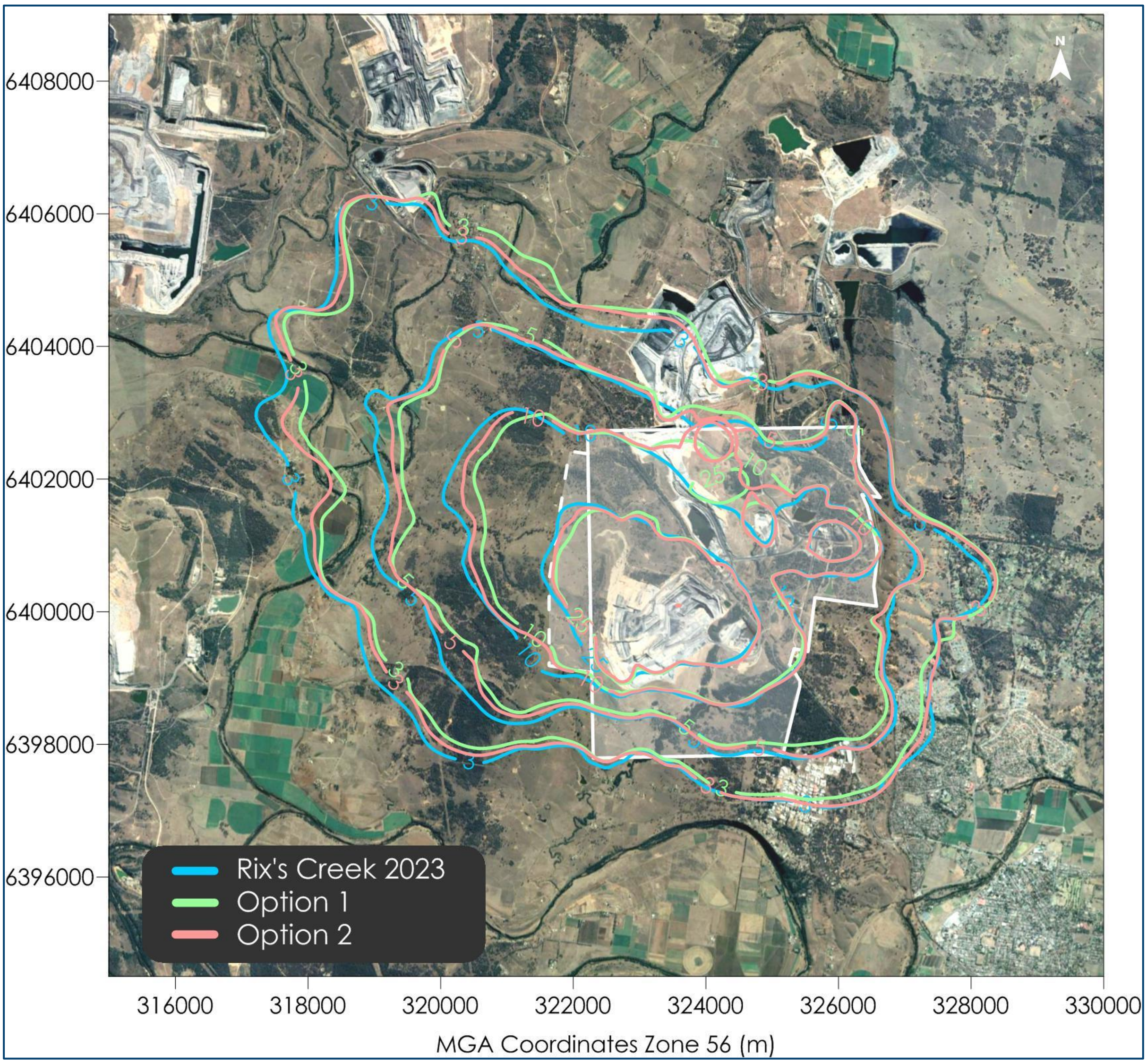

Figure 2: Comparison of incremental 24-hour average $PM_{2.5}$ concentrations (µg/m³)

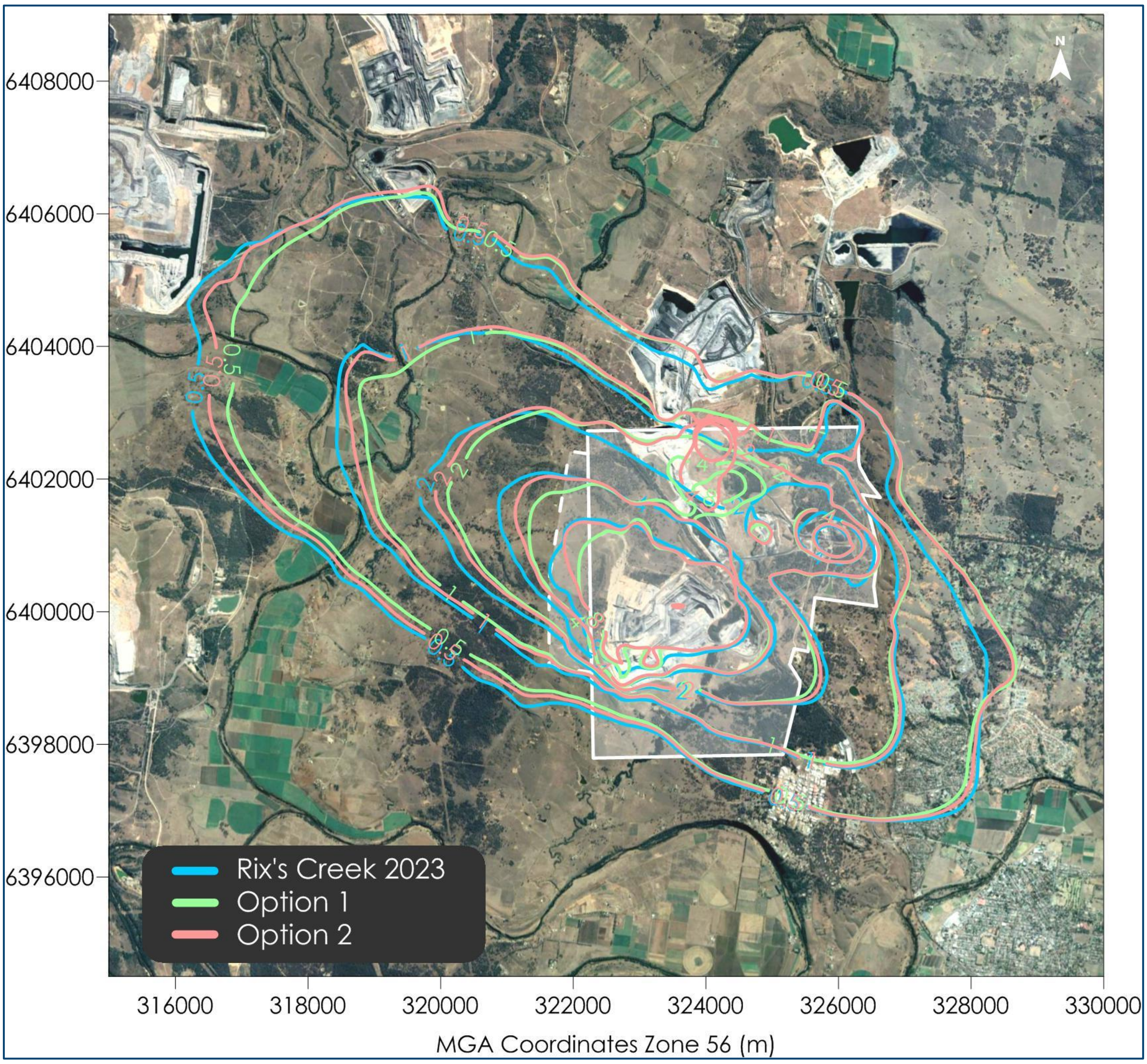

Figure 3: Comparison of incremental annual average $PM_{2.5}$ concentrations (µg/m³)

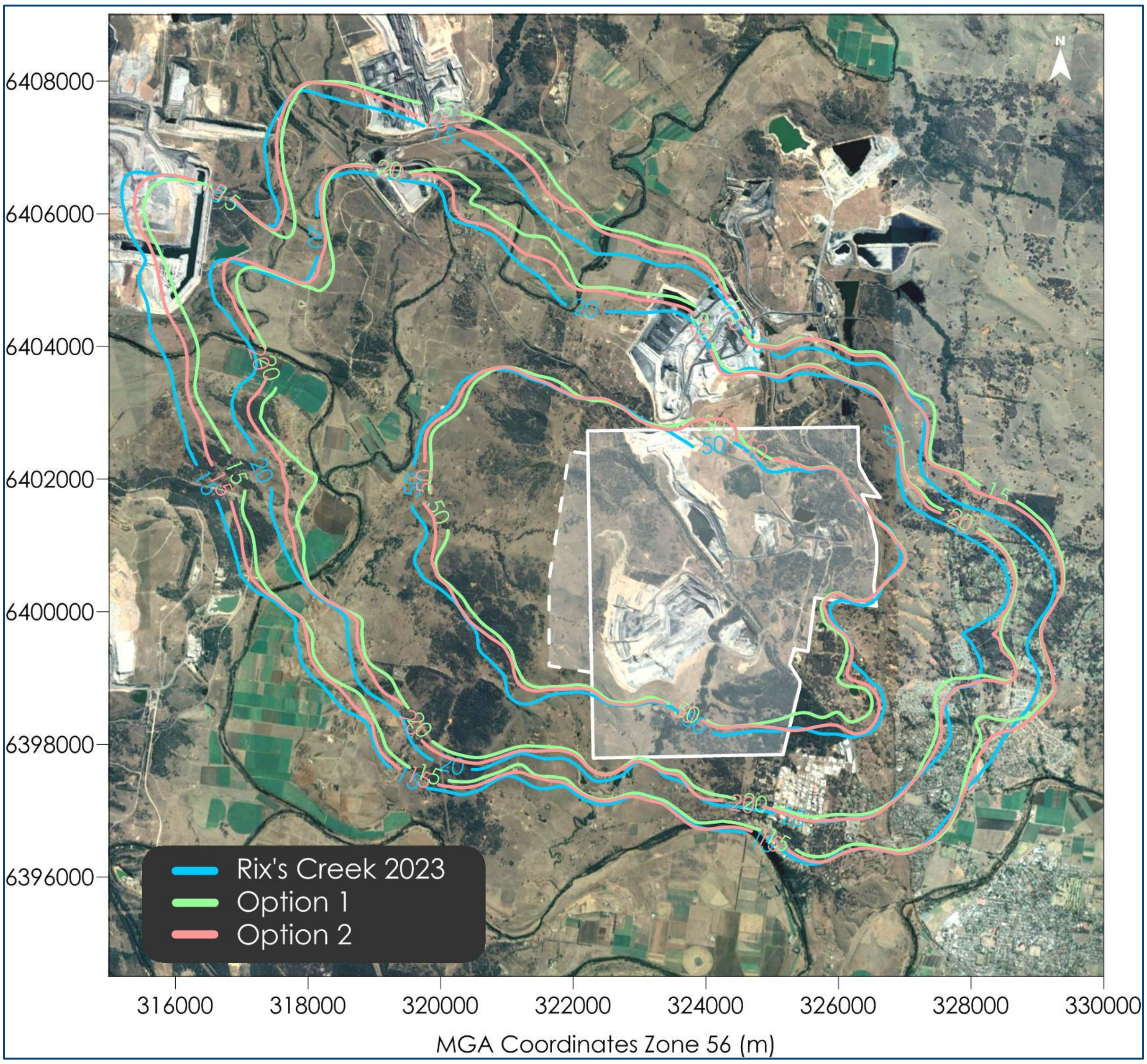

Figure 4: Comparison of incremental 24-hour average PM_{10} concentrations (µg/m³)

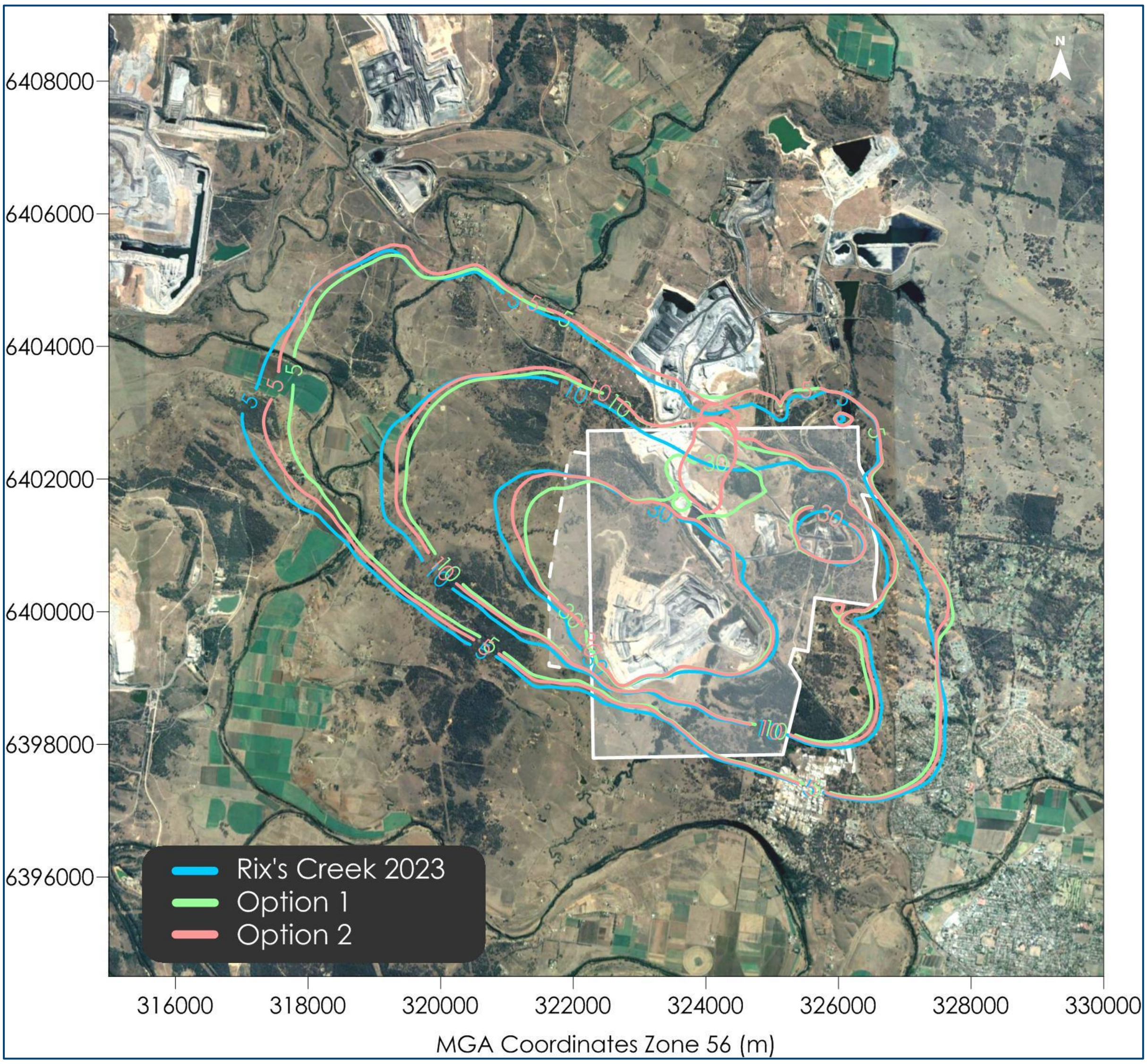

Figure 5: Comparison of incremental annual average PM_{10} concentrations (µg/m³)