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22 February 2023

Luke Farrell
Principal Environmental Scientist
Element Environment
Via email: luke@elementenvironment.com.au

RE: Air Quality Assessment – Tyrecycle Modification

Dear Luke,

Todoroski Air Sciences has assessed the potential for air quality impacts to arise due to the proposed development application to expand production at the Tyrecycle Pty Ltd (Tyrecycle) tyre recycling facility at Erskine Park (hereafter referred to as the Project). This report investigates the likely change in dust emissions associated with the Project relative to the approved operations.

This air quality impact assessment has been prepared in general accordance with the New South Wales (NSW) Environment Protection Authority (EPA) document *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (**NSW EPA, 2022**).

Project setting and description

Tyrecycle operates a tyre recycling facility at 1-21 Grady Crescent, Erskine Park, New South Wales (NSW). Tyrecycle was granted approval for the facility on 20 December 2020 (DA 20/0589).

The facility is located within an industrial area with all operations at the site occurring within an industrial building. The operations include the receival and storage of tyres for shredding and granulating at an approved production rate of 29,000 tonnes per annum (tpa) and stockpiling of up to 970 tonnes of material at the site at any one time.

Figure 1 presents the location of the Project site with reference to the nearest identified surrounding residential receptors.

Tyrecycle is seeking a development consent to allow for an increase in the annual production rate to 60,000tpa and allow for stockpiling of up to 2,300 tonnes of material at the site at any one time. The Project does not require a change to the approved processing activities, building infrastructure or footprint, or hours of operation. Additional vehicle movements to and from the site will also result from transportation of additional received tyres and dispatched product due to the Project.

A quantitative assessment has been conducted to determine the potential change in air quality impacts associated with the Project relative to the approved operations.

Figure 1: Project setting

Existing environmental conditions

Local climatic conditions

Long term climatic data collected at the closest Bureau of Meteorology (BoM) weather station; the Horsley Park Equestrian Centre Automatic Weather Station (AWS) (Station Number 067119) were analysed to characterise the local climate in the proximity of the Project. The Horsley Park Equestrian Centre AWS is located approximately 2.1 kilometres (km) west-southwest of the Project.

Table 1 and **Figure 2** present a summary of the data collected from the Horsley Park Equestrian Centre AWS over an approximate 13 to 25 year period for the various meteorological parameters. These data assist in characterising the local climatic conditions based on the long-term meteorological parameters.

The data indicate that January is the hottest month with a mean maximum temperature of 30.0 degrees Celsius (ºC) and July is the coldest month with a mean minimum temperature of 5.9ºC.

Rainfall declines during the second half of the year, with an annual average rainfall of 780.3 millimetres (mm) over 77 days. The data show February is the wettest month with an average rainfall of 124.5 millimetres (mm) over 7.6 days and August is the driest month with an average rainfall of 38.0mm over 4.0 days.

Relative humidity levels exhibit variability over the day and seasonal fluctuations. Mean 9am relative humidity levels range from 81 percent (%) in March to 61% in October. Mean 3pm relative humidity levels vary from 55% in June to 42% in August and September.

Wind speeds during the warmer months have a greater spread between the 9am and 3pm conditions compared to the colder months. The mean 9am wind speeds range from 8.9 kilometres per hour (km/h) in March to 12.5km/h in October. The mean 3pm wind speeds vary from 12.9km/h in June to 19.9km/h in December.

Table 1: Monthly climate statistics summary – Horsley Park Equestrian Centre AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Temperature													
Mean max. temp. (ºC)	30.0	28.6	26.7	23.9	20.6	17.6	17.4	19.1	22.3	24.7	26.4	28.4	23.8
Mean min. temp. (ºC)	18.0	17.8	16.1	12.9	9.1	7.1	5.9	6.4	9.3	11.9	14.4	16.2	12.1
Rainfall													
Rainfall (mm)	74.3	124.5	94.5	69.2	44.7	68.6	53.0	38.0	38.3	64.3	77.4	66.2	780.3
No. of rain days (≥1mm)	7.8	7.6	8.8	6.7	5.2	6.1	5.5	4.0	5.0	6.1	7.0	7.2	77.0
9am conditions													
Mean temp. (ºC)	22.0	21.5	19.4	17.5	13.8	11.1	10.3	12.0	15.6	18.1	19.2	20.9	16.8
Mean R.H. (%)	73	77	81	76	77	80	78	70	65	61	70	71	73
Mean W.S. (km/h)	10.1	9.7	8.9	10.5	10.7	10.3	10.8	11.7	12.2	12.5	11.8	10.7	10.8
3pm conditions													
Mean temp. (ºC)	28.2	27.1	25.3	22.2	19.2	16.6	16.1	17.8	20.8	22.5	24.2	26.5	22.2
Mean R.H. (%)	49	53	54	53	52	55	50	42	42	45	50	48	49
Mean W.S. (km/h)	19.4	17.0	14.8	14.4	13.0	12.9	13.9	16.1	18.1	19.8	19.5	19.9	16.6

Source: **Bureau of Meteorology, 2022**

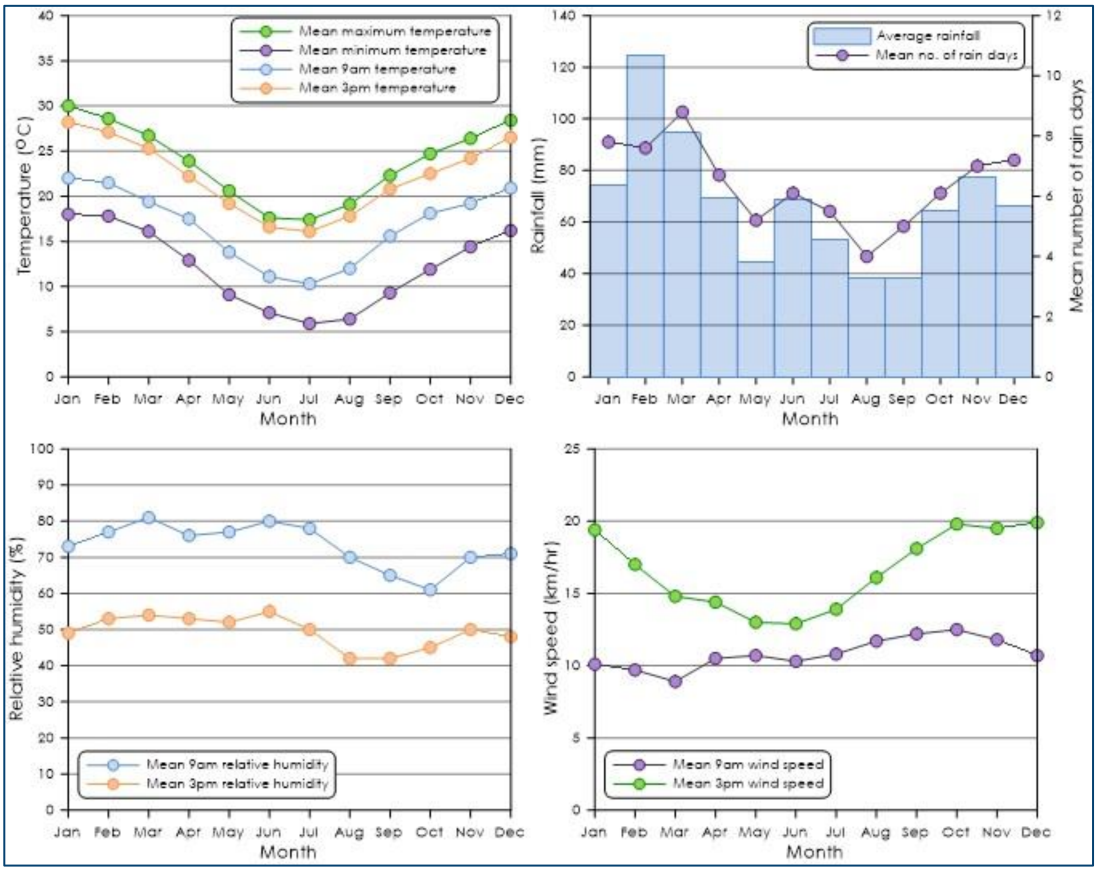

Figure 2: Monthly climate statistics summary – Horsley Park Equestrian Centre AWS

Annual and seasonal windroses generated from data recorded at the Horsley Park Equestrian Centre AWS during 2021 are presented in **Figure 3**.

On an annual basis, the most dominant winds are from the southwest with variable winds from the other directions. In summer, winds predominately originate from the south-southeast, southeast and east. In autumn the most prevalent winds are from the southwest with few winds from the northeast. In winter, winds predominantly occur from the southwest to the north. Spring has varied winds from all directions with the most dominant winds from the southwest.

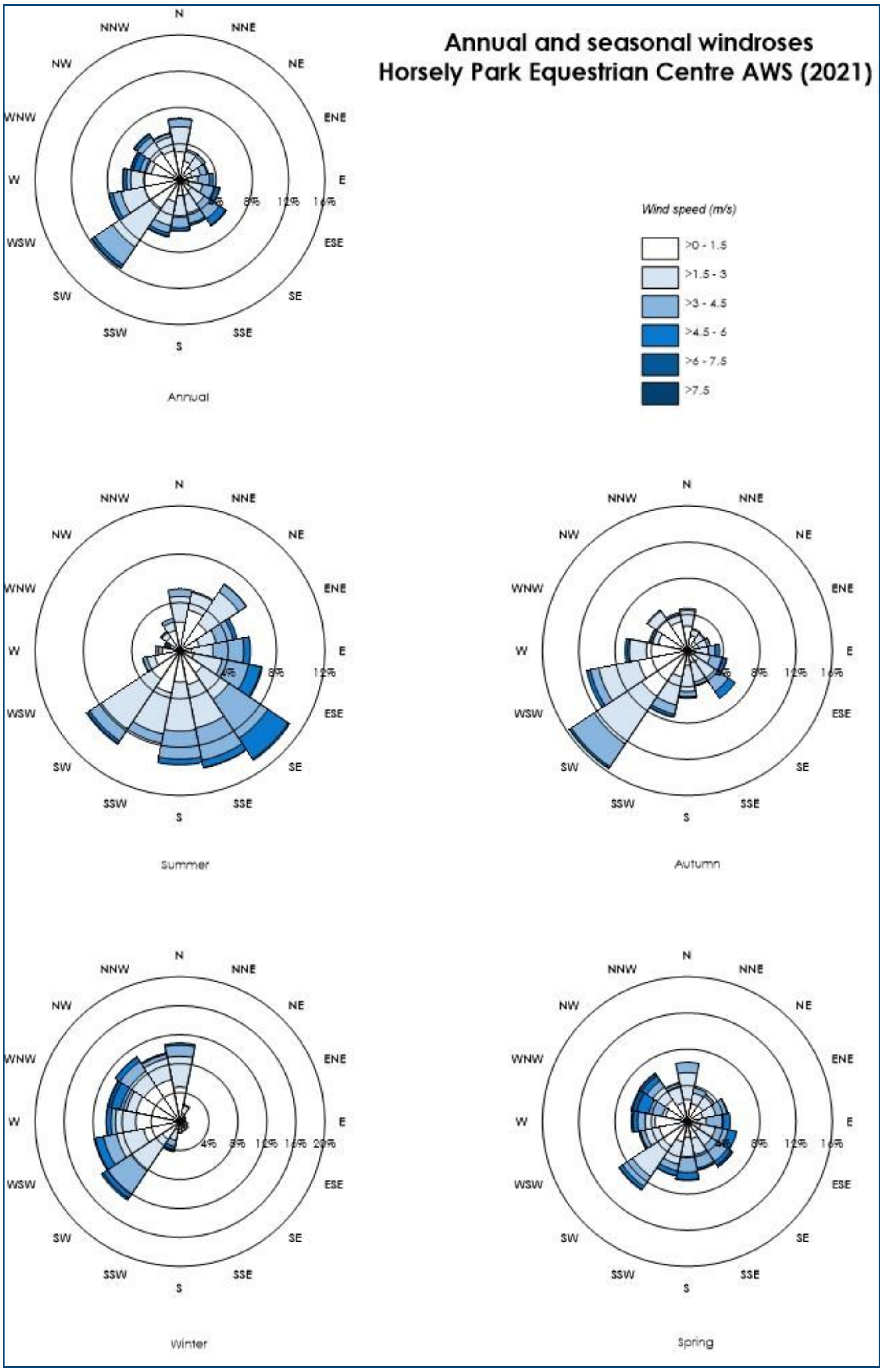

Figure 3: Annual and seasonal windroses – Horsley Park Equestrian Centre AWS (2021)

Local ambient air quality

The main sources of air pollutants in the wider area surrounding the Project include industrial and commercial operations and local anthropogenic activities such as wood heaters and motor vehicle exhaust. This section reviews the available ambient air quality monitoring data sourced from the nearest NSW Department of Planning and Environment (DPE) air quality monitors at St Marys and Prospect.

Recorded 24-hour average PM_{10} concentrations from 2015 to 2021 are presented in **Figure 4**. The maximum 24-hour average PM_{10} concentrations were found to exceed the relevant criterion of 50µg/m^3 on occasion for most years of the review period. **Figure 4** shows high PM_{10} concentration recorded at the monitor from November 2019 to January 2020 and is attributed to wildfires and the drought period affecting NSW.

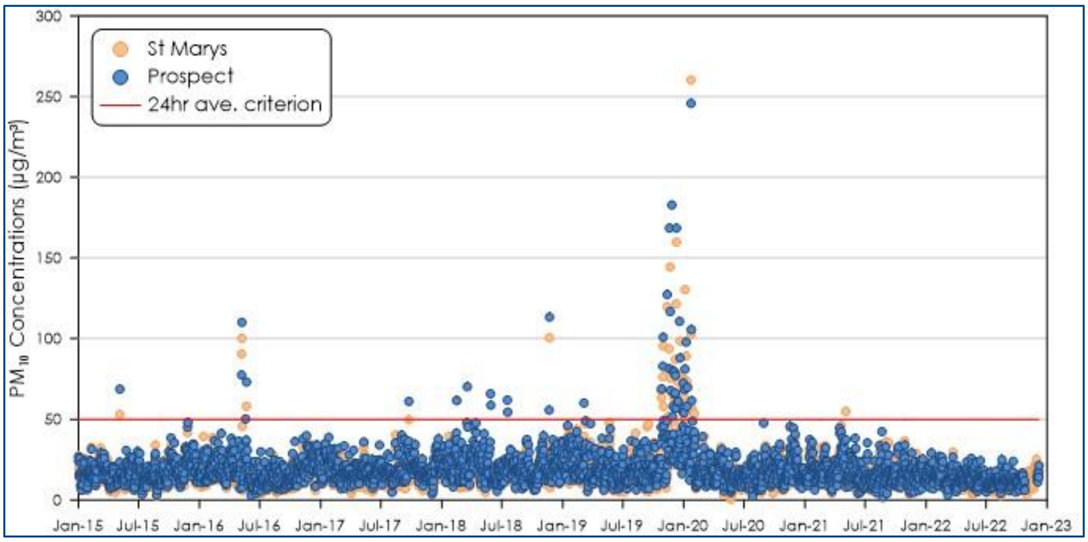

Figure 4: 24-hour average PM_{10} concentrations

Recorded 24-hour average $PM_{2.5}$ concentrations from 2015 to 2021 are presented in **Figure 5**. It is noted the high $PM_{2.5}$ levels seen in the monitoring data can be attributed to bushfire events, in particular those occurring in the November 2019 to January 2020 period, which coincide with the high levels in PM_{10}.

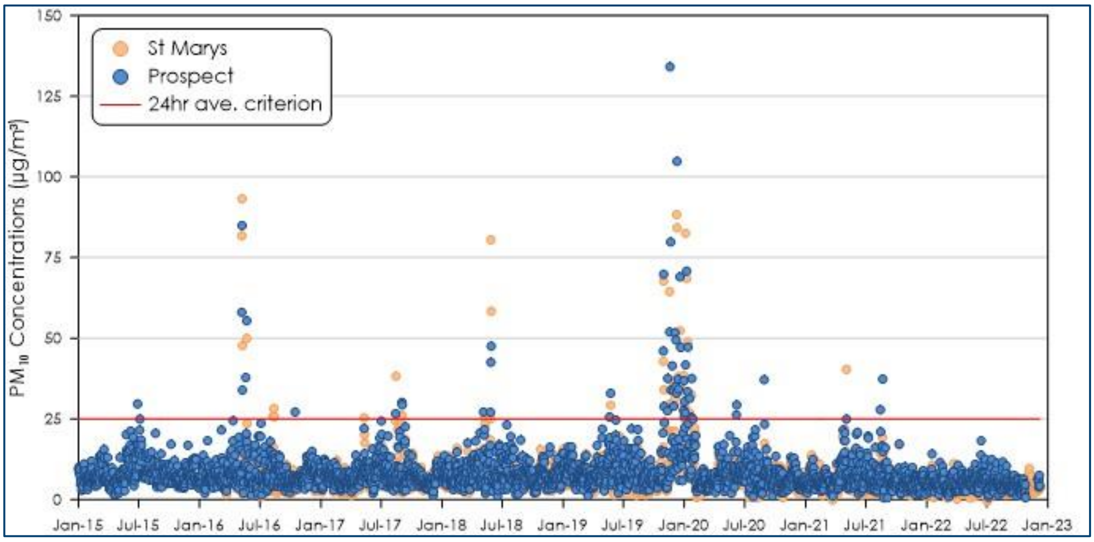

Figure 5: 24-hour average $PM_{2.5}$ concentrations

Assessment of potential air quality impacts

The Project has the potential to affect the quantum of dust emissions generated at the site. To investigate the potential effect the Project may have on dust emissions, an analysis was undertaken for the proposed change in dust levels associated with the Project relative to the dust levels associated with the approved operations as presented in the *Air Quality Impact Assessment Tyrecycle Erskine Park* (AQIA) (**Todoroski Air Sciences, 2022**).

The estimated dust emissions for the Project reflects the current conditions at the site. This includes only one stack ventilation point servicing the cyclone filters emitting from the roof, with the other ventilation point emitting into the warehouse building. The location of the stack ventilation point has also been revised to the northwest corner of the warehouse roof, as shown in **Figure 6**, from the previously modelled location in the southwest corner. The manufacture specification for standard concentration of particulates in the cyclone filters has been revised to a level of 5mg/m^3, compared to a level of 10mg/m^3 as included in the AQIA.

Figure 6: Actual stack location

Other changes compared to the AQIA include a control efficiency of 80% being applied to the material handling activities at the Project as these processes are largely contained within the warehouse, which significantly reduces the potential for fugitive dust emissions. This control was not considered in the original modelling assessment and was a conservative (i.e., overestimate) for the operations at the time.

A summary of the estimated total fugitive dust emissions from the Project presented in **Table 2**. A detailed dust emissions inventory for the Project is presented in **Appendix A**.

Table 2: Summary of estimated dust emission rate for operational activities associated with the Project

Activity	Total suspended particulate (TSP) emission	Particulate matter ≤10µm (PM_{10}) emission	Particulate matter ≤2.5µm ($PM_{2.5}$) emission
Delivering material to site	204	39	9
Unloading material to stockpile in building	9	4	1
Rehandle material at stockpile	9	4	1
Loading material to shredder	9	4	1
Shredding material	32	14	3
Granulating material	150	52	3
Granulating material	150	52	3
Unloading processed material to stockpile in building	9	4	1
Rehandle material at stockpile	9	4	1
Loading processed material to truck	46	22	3
Hauling processed material offsite	206	39	10
Exhaust emissions	101	101	98
Cyclone venting in warehouse	175	175	88
Total emissions (kg/yr.)	**1,109**	**516**	**221**

A comparison of the estimated annual dust emissions for the approved operations (**Todoroski Air Sciences, 2020**) and the Project for all sources (fugitive and stack) is presented in **Table 3**.

Table 3: Comparison of estimated dust emission rate for the Project

Source type	Scenario	TSP emissions	PM_{10} emission	$PM_{2.5}$ emission
Fugitive	Approved	1,232	483	137
	Project	1,109	516	221
	Percent change (%)	**-10%**	**7%**	**61%**
Stack	Approved	7,884	7,884	3,942
	Project	3,066	3,066	1,533
	Percent change (%)	**-61%**	**-61%**	**-61%**

It is calculated that the net annual fugitive TSP emissions associated with the Project would decrease by approximately 10% relative to the approved operations, however, would see an increase in the estimated fugitive PM_{10} and $PM_{2.5}$ emissions. It is important to note that the total annual PM_{10} and $PM_{2.5}$ emissions are very low, thuis the increase is not significant relative to all other dust in the air.

The estimate change in total annual dust emissions due to the Project arises from a combination of the increase in the amount of material processed from 29,000tpa to 60,000tpa, and the control efficiency associated with the activities occurring within the warehouse and the incorporation of the ventilation point emitting into the warehouse building. For the stack sources, dust emissions associated with the Project are lower (by approximately 61%) as expected with the removal of one stack ventilation point and a reduction in particulate concentrations.

To further investigate the extent of the effects on air quality due to the Project, air dispersion modelling was performed using the detailed air dispersion model previously developed for the AQIA (**Todoroski Air Sciences, 2020**). The model was simply updated to reflect the Project.

The air dispersion model was setup identically (apart from the changes associated with the Project) to allow for a direct comparison with the previous assessment. Full details regarding the air dispersion model setup can be found in the AQIA (**Todoroski Air Sciences, 2020**).

Dispersion modelling predictions

The predicted air quality levels due to the Project are overlaid with the predictions for the approved operations (**Todoroski Air Sciences, 2020**). Overlaying these contours allows for a direct comparison of the potential change associated with the Project.

Overall, the modelling indicates the estimated increase in dust emissions due to the Project is minor in comparison to the approved operations with the greatest change occurring close to the site. Further afield and near the residential areas the predicted impact would be unlikely to be discernible beyond the existing approved levels of dust in the area surrounding the site.

The comparison of the results for all assessed dust metrics in all years (see dust isopleths in **Appendix B**) show that the Project has a negligible effect at the assessment locations and are not predicted to exceed the applicable air quality impact criteria.

A similar negligible change to cumulative impacts would also be anticipated and would not result in any significant additional impacts at the surrounding receptor locations.

Summary and Conclusions

The report has assessed the potential for air quality impact associated with the proposed development application to increase production at the tyre recycling facility at 1-21 Grady Crescent, Erskine Park.

The Project is predicted to generate less dust relative to the approved operations , and based on a direct comparison of the approved impacts, it is concluded the Project will not result in any discernible additional effect at any receptor location relative to the approved project presented in the **Todoroski Air Sciences (2020)** assessment.

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

Yours faithfully,
Todoroski Air Sciences.

Philip Henschke
CAQP

Emilie Aragnou

References

Bureau of Meteorology (2022)

Climate statistics for Australian locations, Bureau of Meteorology website, accessed December 2022. http://www.bom.gov.au/climate/averages

Todoroski Air Sciences (2020)

"Air Quality Impact Assessment Tyrecycle Erskine Park", prepared by Todoroski Air Sciences for Tyrecycle Pty Ltd, September 2020.

NSW EPA (2022)

"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales", August 2022

Appendix A – Emission Estimation

Table A-1: Dust Emissions Inventory

Activity	TSP emission (kg/year)	PM10 emission (kg/y)	PM25 emission (kg/y)	Intensity	Units	Emission Factor - TSP	Emission Factor - PM10	Emission Factor - PM25	Units	Var. 1	Units	Var. 2	Units	Var. 3	Units	Var. 4	Units	Var. 5	Units	Var. 6	Units	Var. 7	Units
Delivering material to site	204	39	9	60,000	t/yr	0.0034	0.00065	0.000158	kg/t	9	t/load	0.4	km	0.07	0.01	0.00	kg/VKT	2	S.L/ g/m2	9	Ave GMV (tonnes)		
Unloading material to stockpile in building	9	4	1	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %									80	%C
Rehandle material at stockpile	9	4	1	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %									80	%C
Loading material to shredder	9	4	1	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %									80	%C
Shredding material	32	14	3	60,000	t/yr	0.0027	0.0012	0.0002	kg/t													80	%C
Granulating material	150	52	3	60,000	t/yr	0.0125	0.0043	0.0003	kg/t													80	%C
Granulating material	150	52	3	60,000	t/yr	0.0125	0.0043	0.0003	kg/t													80	%C
Unloading processed material to stockpile in building	9	4	1	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %									80	%C
Rehandle material at stockpile	9	4	1	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %									80	%C
Loading processed material to truck	46	22	3	60,000	t/yr	0.00076	0.00036	0.00005	kg/t	0.644	ave. wind speed (m/s)	2	M.C. %										
Hauling processed material offsite	206	39	10	60,000	t/yr	0.0034	0.00066	0.000159	kg/t	14	t/load	0.4	km	0.11	0.02	0.01	kg/VKT	2	S.L/ g/m2	15	Ave GMV (tonnes)		
Exhaust emissions	101	101	98																				
Cyclone venting in warehouse	175	175	88	5.00	mg/m3	20,000	m3/hr															80	%C
Total TSP emissions (kg/yr.)	**1109**	**516**	**221**																				

Appendix B – Isopleth Diagrams

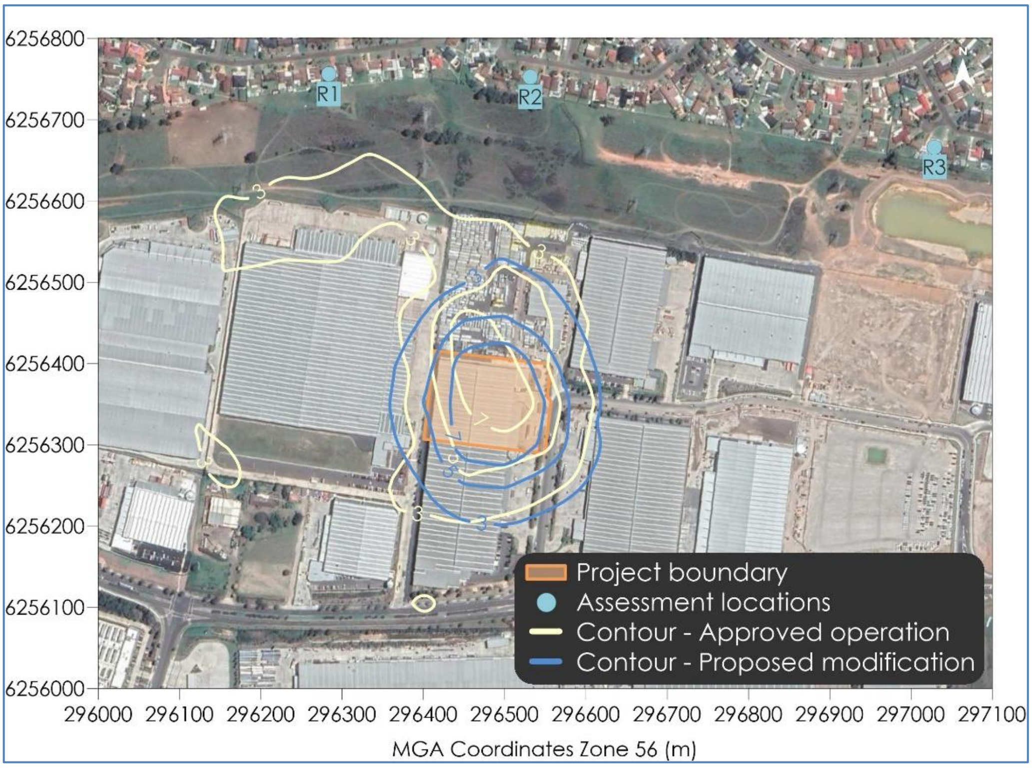

Figure B-1: Predicted incremental maximum 24-hour average $PM_{2.5}$ concentrations (µg/m³)

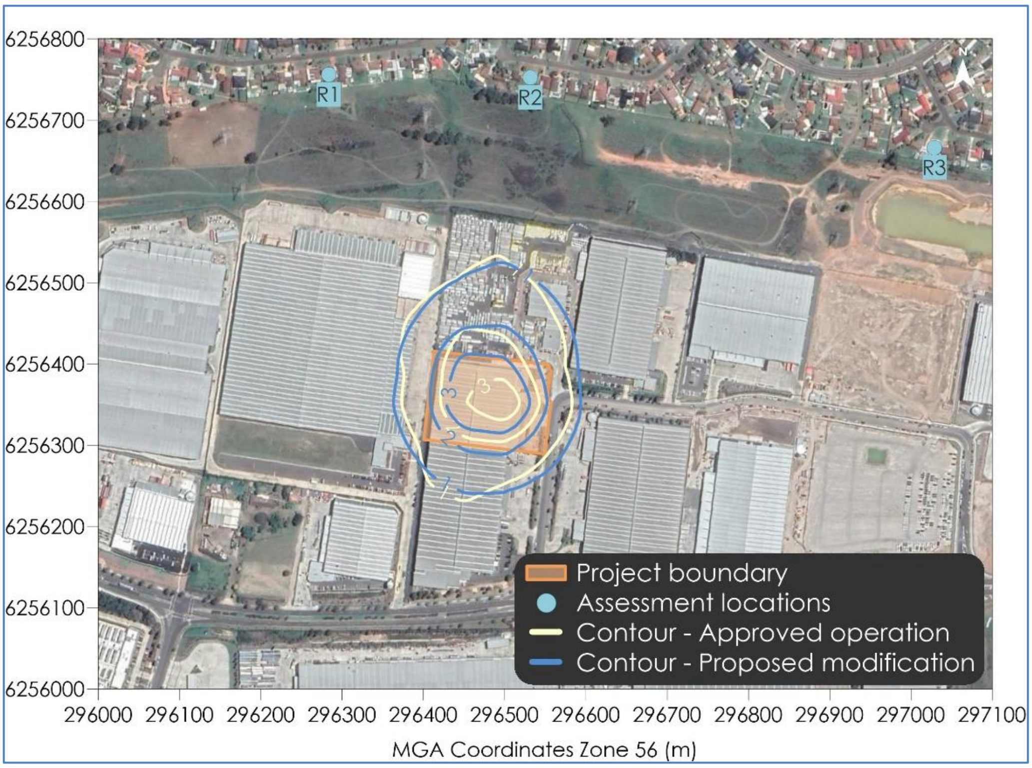

Figure B-2: Predicted incremental annual average $PM_{2.5}$ concentrations (µg/m³)

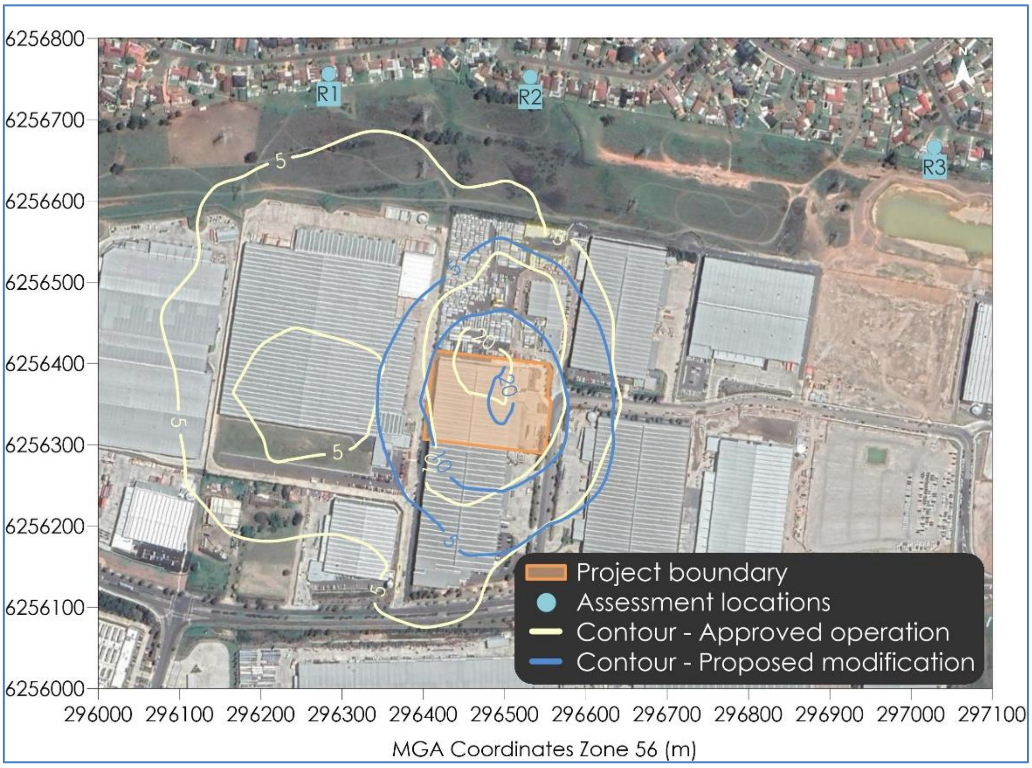

Figure B-3: Predicted incremental maximum 24-hour average PM_{10} concentrations (µg/m³)

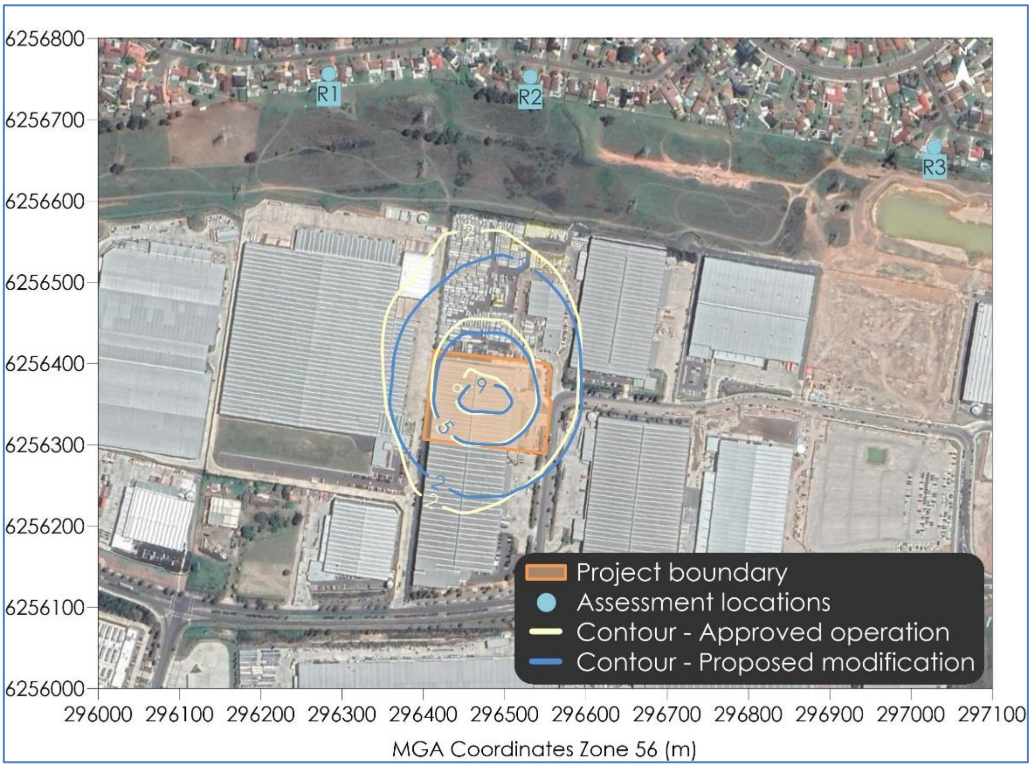

Figure B-4: Predicted incremental annual average PM_{10} concentrations (µg/m³)

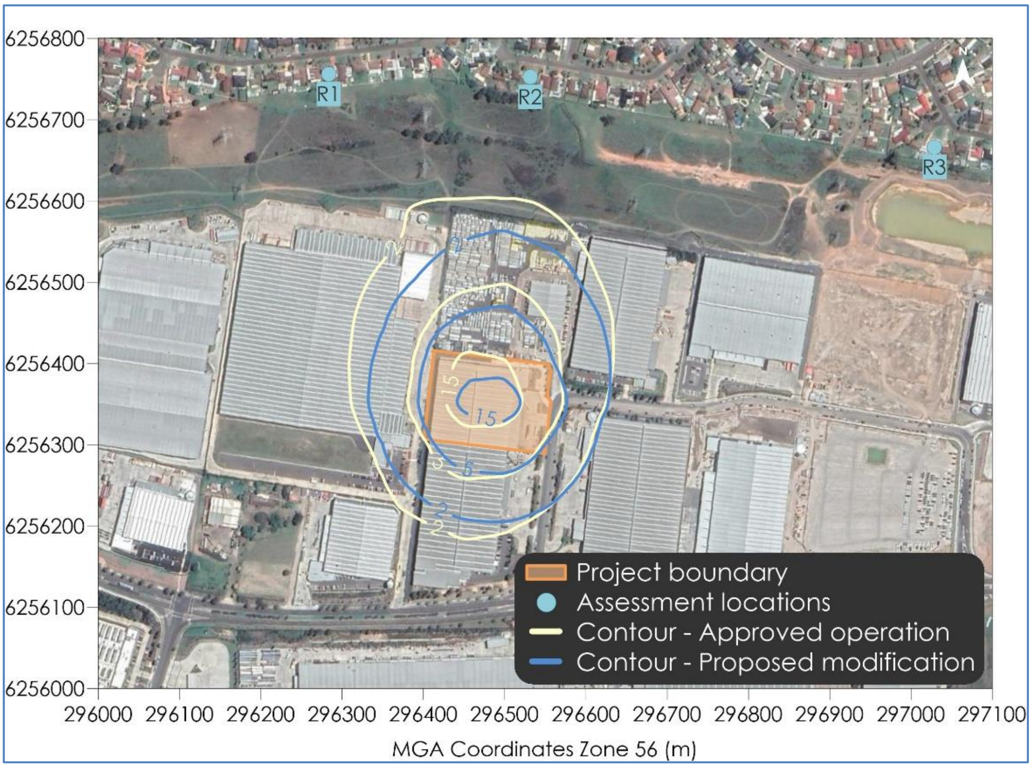

Figure B-5: Predicted incremental annual average TSP concentrations (µg/m³)

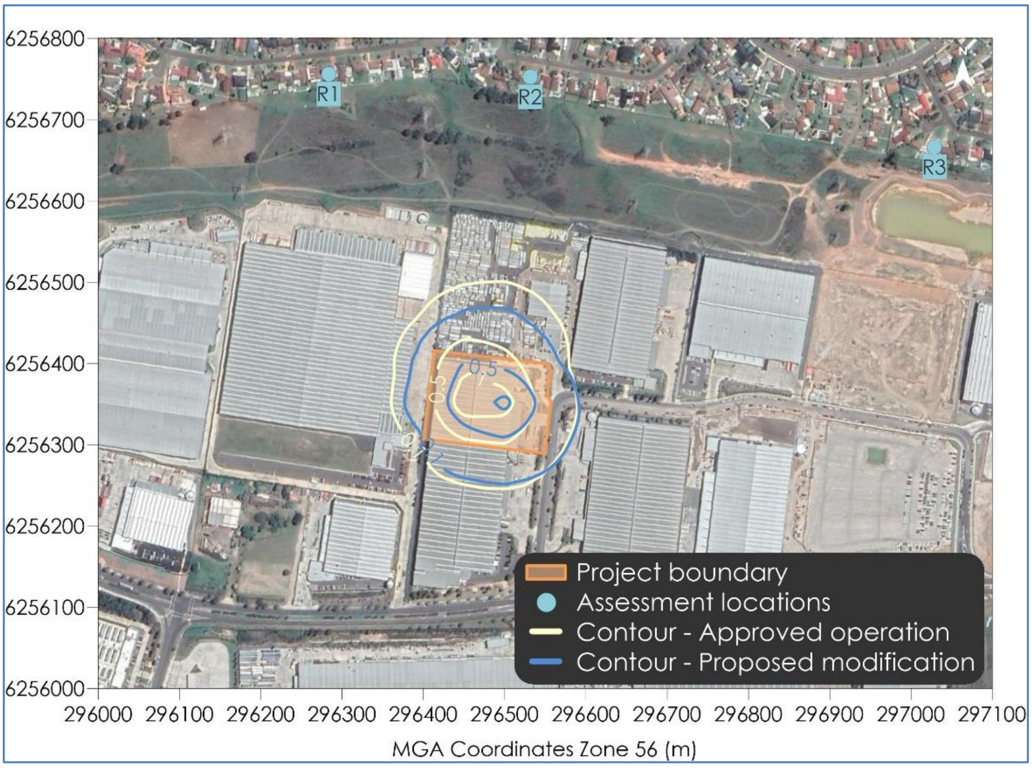

Figure B-6: Predicted incremental annual average dust deposition levels (g/m²/month)