Appendix L

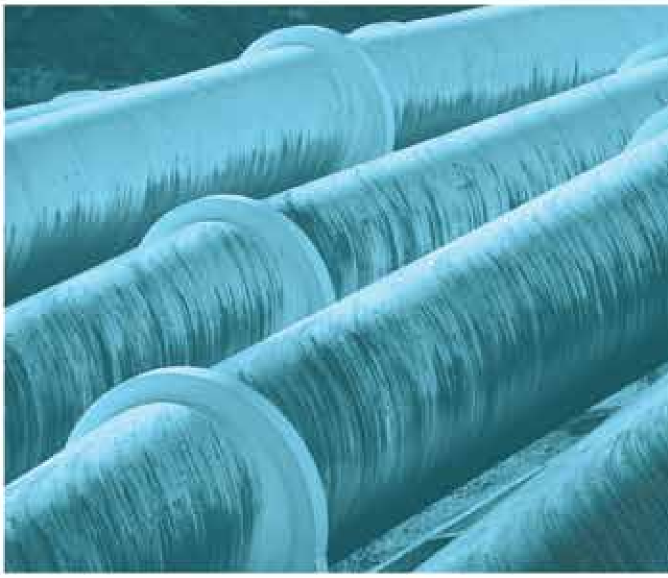
Revised Air Quality and Greenhouse Gas Assessment

REGIS
RESOURCES LTD


McPhillamys Gold Project

Amendment Report - Revised Air Quality and Greenhouse Gas Assessment

Prepared for LFB Resources NL
August 2020

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McPhillamys Gold Project

Amendment Report - Revised Air Quality and Greenhouse Gas Assessment

Report Number

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Client

LFB Resources NL

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13 August 2020

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Executive Summary

LFB Resources NL, a 100% owned subsidiary of Regis Resources Limited (Regis), is seeking development consent for the construction and operation of the McPhillamys Gold Project (the project), a greenfield open-cut gold mine and associated water supply pipeline in the Central West region of New South Wales (NSW).

The project for which development consent is sought comprises two key components; the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development), and an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (the pipeline development). The mine development is approximately 8 km north-east of Blayney, within the Blayney and Cabonne local government areas.

An Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM 2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended mine development, compared to those that were presented in the EIS.

This report has been prepared to assess the potential air quality impacts and greenhouse gas (GHG) emissions of the amended mine development. The assessment considers and outlines the differences in impacts compared to the EIS project as presented in the EIS. In this way, it serves as an update to the McPhillamys Gold Project Air Quality and Greenhouse Gas Assessment (EMM 2019) (Appendix M of the EIS).

Assessment locations, impact assessment criteria, existing meteorology and baseline air quality conditions were retained from Appendix M of the EIS.

Five specific periods of the project's development — year 1, year 2, year 4, year 6 and year 8 — were the focus of emissions quantification and dispersion modelling. Emissions of total suspended particulates (TSP), particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$), oxides of nitrogen (NO_x) and assorted metals and metalloids were estimated and modelled.

For year 1, 2 and 4, the emissions quantified for the amended mine development are lower than the equivalent scenario from Appendix M of the EIS. Year 6 represented maximum material movements from the amended mine schedule and was therefore introduced for this assessment. Year 8 emissions for the amended mine development are higher than the EIS modelling, which is attributable to a higher level of waste rock movement in the updated mine design at the comparable stage of mine life.

Consistent with Appendix M of the EIS, the atmospheric dispersion of air pollutant emissions for each mine development scenario was simulated using the AERMOD model.

The results of the dispersion modelling indicated that the project will not result in any exceedances of the applicable cumulative impact assessment criteria at any of the surrounding private residences. Relative to the model predictions for the EIS project design, the results from the amended mine development modelling highlight the following key points:

- The results for year 1, year 2 and year 4 for the amended mine development are lower than the corresponding years in the EIS project;
- While no modelling for year 6 was conducted in Appendix M of the EIS, the results are highest for year 6 for the amended mine development. These maximum predicted concentrations for year 6 are comparable with the peak year impacts for the EIS design (typically year 2 or 4); and
- The predicted concentrations and deposition rates for the year 8 amended mine development are higher than those from the Appendix M of the EIS. This is due primarily to the increased rate of waste rock movements in year 8 of the revised mining schedule, whereas the EIS project year 8 only involved ROM ore haulage.

It is considered that the results of the modelling presented above demonstrate that the changes associated with amended mine development have notably improved the model predictions relative to those presented in Appendix M of the EIS. These changes include the refinements to the open cut pit development, revision to the waste rock emplacement schedule to provide greater sheltering to southern receptors, increased haul truck capacity reducing annual truck movements and the relocation of open cut pit exit ramps.

The design of the project will incorporate a range of dust mitigation and management measures. A best practice dust control measures review was undertaken for the project, and this identified that the proposed mitigation and management measures will be in accordance with accepted industry best practice for dust control.

To supplement the mitigation measures, Regis commits to the installation and maintenance of a real-time particulate matter monitoring network (PM_{10}) during the life of the project. The real-time network will feature real-time monitoring locations in the Kings Plains area at the southwest, central south and southeast of the project area. In combination with data from the existing meteorological monitoring station and project-specific trigger conditions, the real-time monitoring network will be used to inform reactive management practices to prevent adverse impacts at sensitive receptors.

An updated GHG assessment was also undertaken for the amended mine development. Annual average GHG emissions (combined Scope 1, 2 and 3) generated by the project represent approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018.

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1 Introduction

1.1 Background

LFB Resources NL is seeking State significant development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to develop and operate a greenfield open cut gold mine, associated mine infrastructure and a water supply pipeline in Central West NSW. The project application area is illustrated at a regional scale in Figure 1.1. LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis).

As shown in Figure 1.1, the McPhillamys Gold Project (the project) is comprised of two key components; the mine site where the ore will be extracted, processed and gold produced for distribution to the market (the mine development), and an associated water pipeline which will enable the supply of water from approximately 90 km away near Lithgow to the mine site (the pipeline development). The mine development is around 8 km north-east of Blayney, within the Blayney and Cabonne local government areas (LGAs).

Up to 8.5 Million tonnes per annum (Mtpa) of ore will be extracted from the McPhillamys gold deposit over a total project life of 15 years. The mine development will include a conventional carbon-in-leach processing facility, waste rock emplacement, an engineered tailings storage facility (TSF) and associated mine infrastructure including workshops, administration buildings, roads, water management infrastructure, laydown and hardstand areas, and soil stockpiles.

In accordance with the requirements of the EP&A Act, the NSW *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project, an Environmental Impact Statement (EIS) was prepared to assess the potential environmental, economic and social impacts of the project. The development application and accompanying EIS was submitted to the NSW Department of Planning, Industry and Environment (DPIE) and subsequently publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019. During this exhibition period Regis received submissions from government agencies, the community, businesses and other organisations regarding varying aspects of the project.

In response to issues raised in submissions received, as well as a result of further detailed mine planning and design, Regis has made a number of refinements to the project. Accordingly, an Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM 2020a) to outline the changes to the project that have been made since the public exhibition of the EIS and to assess the potential impacts of the amended mine development, compared to those that were presented in the EIS. This report forms part of the Amendment Report and presents an assessment of the air quality impacts and greenhouse gas (GHG) emissions of the amended mine development.

Further, this report assesses the potential air quality impacts and GHG emissions associated with the mine development component of the project. References to 'the project' throughout this report are therefore referring to the mine development only. The potential air quality impacts and GHG emissions associated with the pipeline development component of the project are addressed in the Amendment Report (EMM 2020a).

1.2 Project amendment overview

A summary of the key amendments to the project since the exhibition of the EIS are summarised below and described in detail in Chapter 2 of the Amendment Report (EMM 2020a):

- **Site access** – a new location for the site access intersection off the Mid-Western Highway is proposed, approximately 1 km east of the original location assessed in the EIS, in response to feedback from Transport for NSW (TfNSW, former Roads and Maritime Services) and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

- **Mine and waste rock emplacement schedule** – revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement has been undertaken, in particular consideration of predicted noise levels in Kings Plains. This achieved a reduction in predicted noise levels at nearby residences while extending the construction timeframe for the southern amenity bund.

- **Pit amenity bund** – the size of the pit amenity bund has been reduced as a result of optimisation of the open cut pit design and the improved location of exit ramps for haul trucks.

- **Tailings Storage Facility (TSF)** – amendments to the design include changes to the embankment design and construction timing, the TSF footprint, and the TSF post closure landform.

- **Water management system** – the secondary water management facility (WMF) has been removed from the water management system resulting in an avoidance of impacts to a potential item of historic heritage (MGP 23 - Hallwood Farm Complex (Hallwood)). The size of the WMFs has also been revised to achieve a reduced likelihood of discharge from the storages within the operational water management system as part of a revised nil discharge design.

- **Mine administration and infrastructure area** – the layout of this area has been revised and optimised.

- **Mine development project area** – a very small change has been made to the mine development project area along the eastern boundary (an additional 1 ha, or 0.04% change), to accommodate the required clean water management system. The change takes the project area from 2,513 hectares (ha) to 2,514 ha.

No amendments have been made to other key aspects of the project as presented in the EIS for which approval is sought, such as the proposed mining method, operating hours, annual ore extraction rate of up to 8.5 Mtpa, approximate annual ore processing rate of up 7 Mtpa, employee numbers, and rehabilitation methods and outcomes.

The amended mine development project layout, compared to that assessed in the EIS, is shown in Figure 1.2.

1.3 Purpose of this report

This report has been prepared to assess the potential air quality impacts and GHG emissions of the amended mine development (i.e. the project). The assessment considers and outlines the differences in impacts compared to the project design as presented in the EIS. In this way, it serves as an update to the McPhillamys Gold Project Air Quality and Greenhouse Gas Assessment (EMM 2019) (Appendix M of the EIS).

It is considered that this report should be read in conjunction with Appendix M of the EIS, which remains the primary reference document.

1.4 Submissions on the EIS

A number of issues relevant to air quality were raised in submissions received on the EIS. These issues have also been considered in this revised assessment. Detailed responses to all the submissions received are provided in the Submissions Report prepared for the project (EMM 2020b), which has been prepared in conjunction with the Amendment Report (EMM 2020a). A summary of the key issues relevant to this assessment are provided in Table 1.1, together with how each matter has been addressed within this report.

Table 1.1 Key comments received in submissions from NSW EPA relating to air quality, and how they have been addressed

Issue		Where addressed
1.	The proponent revises the Air Quality modelling to include additional control strategies until compliance with the EPA criterion is predicted and outline additional administrative measures to ensure that residential occupants are not exposed to excessive air quality impacts.	Addressed in Submissions Report (EMM 2020b). Revised emissions presented in Chapter 6. Revised dispersion modelling presented in Chapter 7.
2.	The proponent nominates and commits to implement controls that are consistent with best practice control of fugitive emissions to minimise potential impacts.	Addressed in Submissions Report (EMM 2020b). Discussion on proposed mitigation measures and consistency with best practice control measures is presented in Section 6.3.1 of this report.
3.	The proponent revises the AQIA to transparently justify assumed and adopted input variables used to calculate expected emissions.	Addressed in Submissions Report (EMM 2020b). Detailed calculations for emissions are presented in Appendix B.
4.	The proponent revises the AQIA to ensure waste rock, ore and tailings composition used for modelling is representative of worst-case metal concentrations from materials.	Addressed in Submissions Report (EMM 2020b). Detailed calculations for emissions are presented in Appendix B.
5.	The proponent revises the AQIA to include detailed information for the calculation of the metal and metalloids emissions inventory. Adequate detail of all input data, assumptions and methods must be provided to enable the reviewer to replicate the modelled emissions	Addressed in Submissions Report (EMM 2020b). Detailed calculations for emissions are presented in Appendix B.
6.	The proponent revises the AQIA to include strategies that demonstrate that the modelled moisture content levels are achieved and maintained for all dozing operations	Addressed in Submissions Report (EMM 2020b).
7.	The proponent revises the AQIA to transparently justify the quantities and sources of water used to achieve the proposed mitigation performance across the life of the project.	Addressed in Submissions Report (EMM 2020b).
8.	The proponent revises the AQIA to transparently justify the results presented for NO_2 emissions in the assessment.	Addressed in Submissions Report (EMM 2020b). Detailed calculations for emissions are presented in Appendix B.
9.	The proponent revises the AQIA to nominate and commit to specific measures to minimise the risk of potential NO_2 exceedances.	Addressed in Submissions Report (EMM 2020b).
10.	If the project is approved, conditions of approval should ensure that all the proposed dust management strategies are formalised in an air quality management plan. All proposed management practices must be consistent with best management practice and be quantifiable, measurable, auditable and enforceable. Methods for determining compliance must be clearly identified.	Addressed in Submissions Report (EMM 2020b). Commitment to management plan is presented in Section 7.6.

1.5 Report outline and reference to the EIS AQIA report

Consistent with Appendix M of the EIS, this report has been conducted in general accordance with the guidelines specified by the NSW EPA in the Approved Methods for Modelling. Consistent with Section 2.1 of the Approved Methods for Modelling, this AQIA is classed as a 'Level 2' assessment, consisting of a refined dispersion modelling approach using site-specific and/or representative inputs.

The project setting, including the surrounding land use and local topography was documented within Appendix M of the EIS and is not repeated in this report. However, the assessment locations are illustrated in Section 2 and listed in Appendix A for ease of reference.

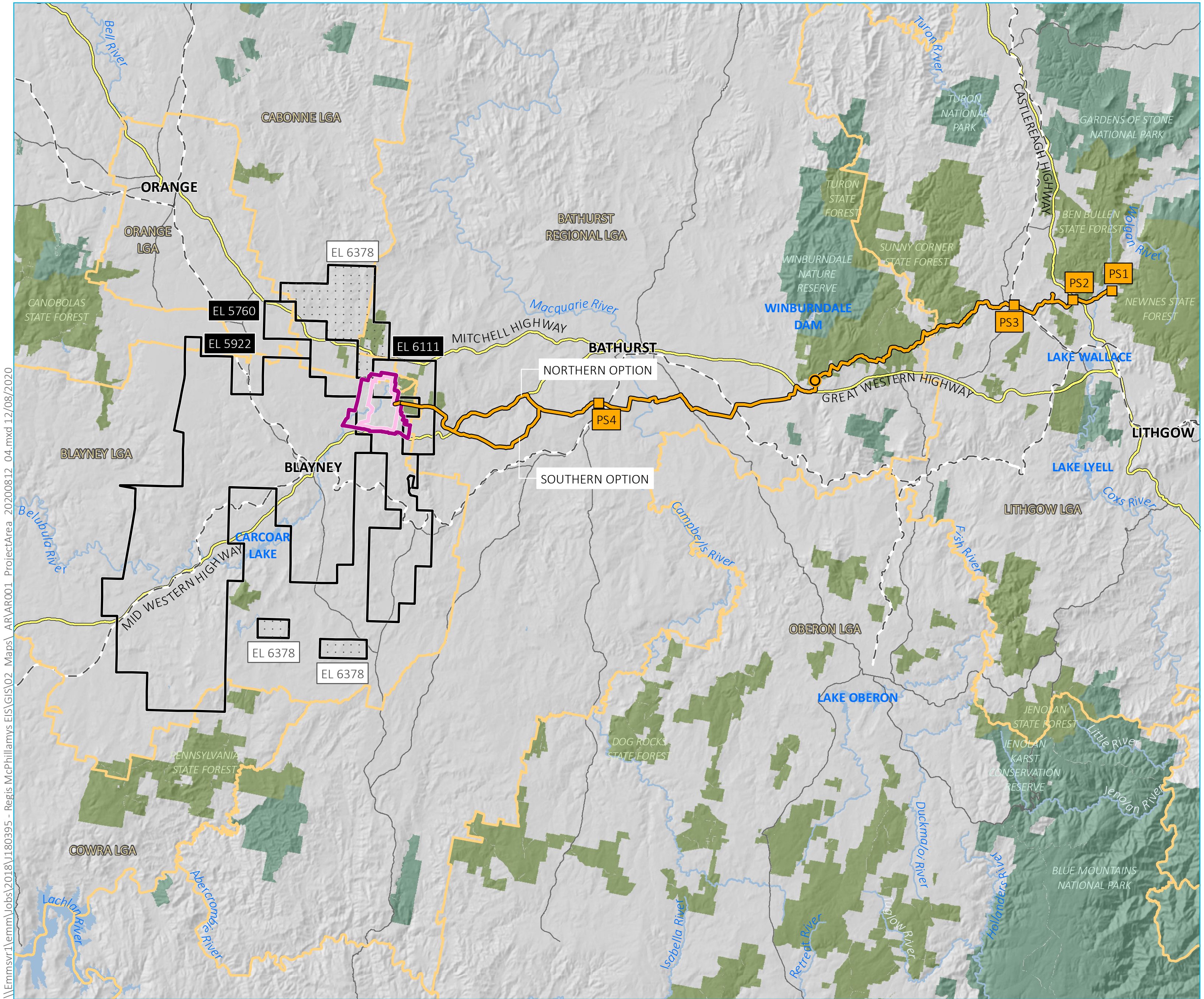
Air quality criteria applicable for the evaluation of measured and modelled air pollution levels was comprehensively documented within Appendix M of the EIS and are therefore not repeated in this report, as noted in Section 3.

The prevailing dispersion meteorology and baseline air quality were comprehensively documented within Appendix M of the EIS and are therefore not repeated in this report. High level summaries of dispersion conditions and baseline air quality levels are presented in Chapter 4 and Chapter 5 respectively.

Emission estimates calculated for the amended mine development are presented in Chapter 6. This includes a comparison with the emission totals calculated in within Appendix M of the EIS. Detailed information relating to the emission calculations are provided in Appendix C.

Predicted air pollutant concentrations for the revised emission estimates are presented and evaluated against air quality impact assessment criteria in Chapter 7 and Appendix C. The spatial variation in predicted concentrations is presented in isopleth plots in Appendix D.

The recommendations and commitments for air quality monitoring and emission mitigation are presented in Chapter 8. An updated GHG emissions inventory and assessment is presented in Chapter 9.



KEY

Project application area

- Mine development project area (2,514.06 ha)
- Mining lease application area (1,806.17 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline

Existing environment

- Rail line
- Primary road
- Arterial road
- River
- Waterbody
- NPWS reserve
- State forest
- Local government area

Exploration lease boundaries (of interest)

- Held by LFB Resources NL (Regis)
- Held by others

Regional setting – project application area

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Figure 1.1

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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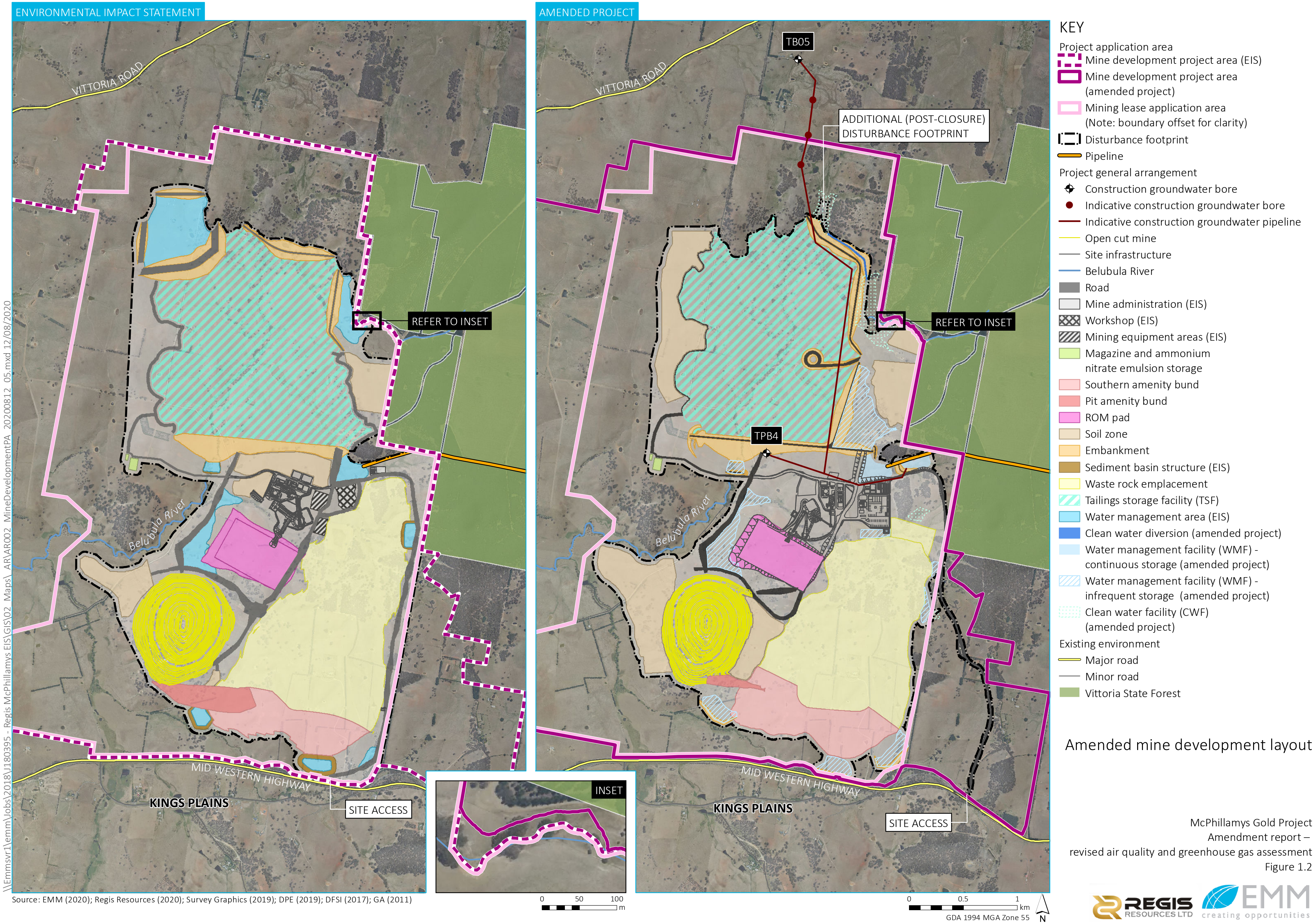

Amended mine development layout

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Figure 1.2

2 Project setting

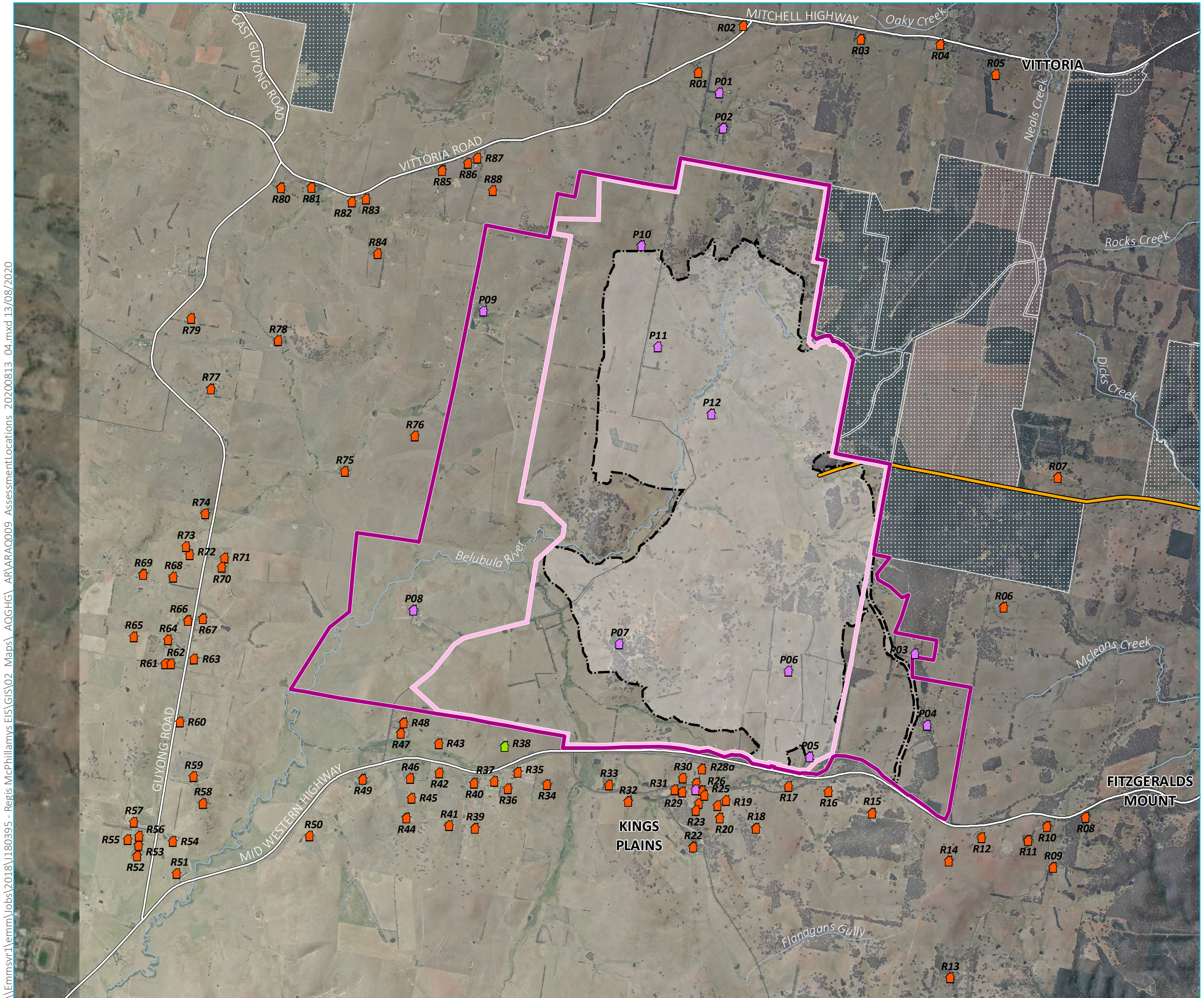
The project setting, including the surrounding land use, topographic features and the assessment locations used are described in Appendix M of the EIS. For ease of reference the locations of the selected assessment locations are illustrated in Figure 2.1, while the location details are presented in Appendix A.

It is noted that since the completion of Appendix M of the EIS, the following changes have been made to the adopted list of assessment locations:

- An additional assessment location (receptor 28a) has been identified in the Kings Plains catchment. Currently there is no dwelling at this location, however the property owner now has development approval to build a residence, and therefore it has been conservatively included in the list of private receptors used as assessment locations.

- Regis have purchased assessment location R27, changing the status of the location to Regis-owned. This assessment location has been renamed to P27 but has been retained as a model prediction point for completeness.

- Regis have agreed to purchase receptor R38 and anticipate taking ownership of the property in early 2021. However, for the current assessment, receptor R38 has been retained as an assessment location in the modelling conducted.



KEY

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Disturbance footprint

Pipeline

Sensitive receptor

Private

Residences under option

Project related (Regis-owned)

Existing environment

Major road

Minor road

Named watercourse

Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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Assessment locations

McPhillamys Gold Project
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Figure 2.1

3 Pollutants and assessment criteria

As identified in Appendix M of the EIS, the operation of the project has the potential to generate emissions of various air pollutants to the atmosphere. Consistent with the EIS, the project emission sources will include a mixture of the following:

- fugitive sources of particulate matter, such as material handling and processing activities, movement of mobile plant and equipment, and wind erosion of exposed surfaces;
- fugitive releases from the ore processing circuit and surface of active Tailings Storage Facility (TSF); and
- combustion sources, such as exhaust emissions from site equipment fleet, emergency generator and processing plant and blasting operations.

A detailed description of emission sources associated with the project is presented in Chapter 6. Consistent with the EIS, air pollutants emitted by the project will comprise of:

- particulate matter, specifically:
  - total suspended particulate matter (TSP);
  - particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}); and
  - particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$).
- oxides of nitrogen (NO_x)[1], including nitrogen dioxide (NO_2);
- sulphur dioxide (SO_2);
- carbon monoxide (CO);
- volatile organic compounds (VOCs);
- hydrogen cyanide (HCN); and
- assorted metals and metalloids[2].

The project must demonstrate compliance with the impact assessment criteria for these pollutants, as defined in the Approved Methods for Modelling (EPA 2016). The impact assessment criteria are designed to maintain ambient air quality that allows for the adequate protection of human health and well-being.

The air quality assessment criteria are comprehensively documented in Appendix M of the EIS. For ease of reference, a summary of applicable air quality impact assessment criteria is presented in Table 3.1.

Additionally, applicable mitigation and acquisition criteria for particulate matter as specified in the DPIE *Voluntary Land Acquisition and Mitigation Policy (VLAMP) for State Significant Mining, Petroleum and Extractive Industry Developments* are set out in Table 3.2 and Table 3.3 for mitigation and voluntary acquisition respectively.

1 By convention, NO_x = Nitrous oxide (NO) + NO_2.

2 A metalloid is a chemical element which has properties that are intermediate between those of typical metals and non-metals (eg silicon, arsenic).

Table 3.1 Impact assessment criteria for particulate matter

Pollutant	Averaging period	Impact assessment criterion
TSP	Annual	90 µg/m^3
PM_{10}	24 hour	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24 hour	25 µg/m^3
	Annual	8 µg/m^3
Dust deposition	Annual	2 g/m^2/month (project increment only)
		4 g/m^2/month (cumulative)
NO_2	1 hour	246 µg/m^3
	Annual	62 µg/m^3
Antimony and compounds (Sb)	99.9th percentile 1-hour	9.0
Arsenic and compounds (As)	99.9th percentile 1-hour	0.09
Barium (soluble compound) (Ba)	99.9th percentile 1-hour	9.0
Beryllium and compounds (Be)	99.9th percentile 1-hour	0.004
Cadmium and compounds (Cd)	99.9th percentile 1-hour	0.018
Chromium VI and compounds (Cr)	99.9th percentile 1-hour	0.09
Copper dusts and mists (Cu)	99.9th percentile 1-hour	18
Lead (Pb)	Annual average	0.5
Manganese and compounds (Mn)	99.9th percentile 1-hour	18
Mercury organic (Hg)	99.9th percentile 1-hour	0.18
Nickel and compounds (Ni)	99.9th percentile 1-hour	0.18
Silver (soluble compounds) (Ag)	99.9th percentile 1-hour	0.18

Table 3.2 VLAMP mitigation criteria

Pollutant	Averaging period	Mitigation criterion	Impact type
PM_{10}	24-hour	50 µg/m^3**	Human health
	Annual	25 µg/m^3*	Human health
$PM_{2.5}$	24-hour	25 µg/m^3**	Human health
	Annual	8 µg/m^3*	Human health
TSP	Annual	90 µg/m^3*	Amenity
Deposited dust	Annual	2 g/m^2/month**	Amenity
		4 g/m^2/month*	

Note: * - cumulative impact (project + background); ** - incremental impact (project only) with zero allowable exceedances of the criteria over the life of the development

Table 3.3 VLAMP acquisition criteria

Pollutant	Averaging period	Mitigation criterion	Impact type
PM_{10}	24-hour	50 µg/m³**	Human health
	Annual	25 µg/m³*	Human health
$PM_{2.5}$	24-hour	25 µg/m³**	Human health
	Annual	8 µg/m³*	Human health
TSP	Annual	90 µg/m³*	Amenity
Deposited dust	Annual	2 g/m²/month**	Amenity
		4 g/m²/month*	

Note: * - cumulative impact (project + background); ** - incremental impact (project only) with five allowable exceedances of the criteria over the life of the development

4 Meteorology and climate

The prevailing dispersion meteorology and climate features of the project area was comprehensively documented within the Appendix M of the EIS and is not repeated in this report.

Data from the Regis-owned on-site meteorological monitoring station was the primary resource for representing meteorological conditions at the project area in the dispersion modelling. As demonstrated in Appendix M of the EIS, the 2017 calendar year is representative of meteorological conditions experienced at the on-site meteorological station and was adopted as the 12-month modelling period. For consistency with Appendix M of the EIS, the same 2017 meteorological dataset has been used in the dispersion modelling undertaken for this report.

For ease of reference, a wind rose showing the wind speed and direction recorded at the on-site meteorological station during 2017 is presented in Figure 4.1, and illustrates a wind pattern dominated by easterly and westerly winds, with a minor north-westerly component. Recorded wind speeds show a high proportion of elevated wind (greater than 5.5 m/s). The annual average recorded wind speed for 2017 was 5.9 m/s, with a frequency of calm conditions (wind speeds less than 0.5 m/s) in the order of 0.1 % of the time.

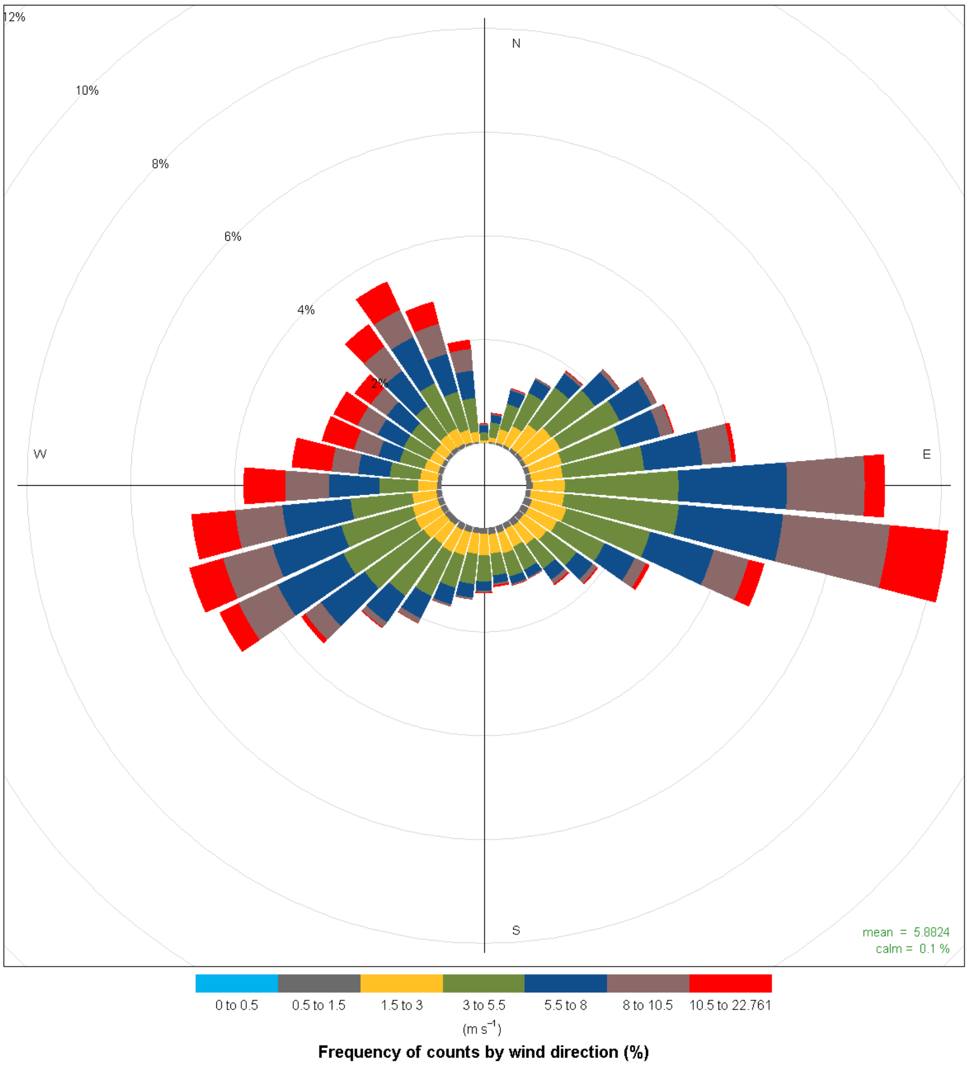


Figure 4.1 Recorded wind speed and direction – on-site meteorological station – 2017

5 Baseline air quality

The baseline air quality for the project area was comprehensively documented within Appendix M of the EIS and is not repeated in this report. For ease of reference, the background air quality conditions for the project to be used for cumulative assessment purposes, are as follows:

- annual average TSP – 35.3 µg/m^3, derived from the annual average PM_{10} concentration (see below);
- 24-hour PM_{10} – daily varying concentrations, combination of one-in-six day measurements from the on-site high volume air sampler (HVAS) air quality monitoring station (AQMS) and continuous measurements from the DPIE Bathurst station during 2017. Concentrations range from 3.0 µg/m^{3}to 49.9 µg/m^3;
- annual average PM_{10} – 14.1 µg/m^3, using a combination of the on-site HVAS and DPIE Bathurst AQMS results in 2017;
- 24-hour $PM_{2.5}$ – daily varying concentrations from the DPIE Bathurst AQMS during 2017. Concentrations range from 1.4 µg/m^{3}to 17.5 µg/m^3;
- annual average $PM_{2.5}$ – 6.1 µg/m^3, from the DPIE Bathurst AQMS station during 2017;
- annual dust deposition – 1.4 g/m^2/month, from the on-site dust deposition gauge (DDG) monitoring network;
- annual Pb – assumed to be negligible;
- NO_2 – hourly varying concentrations recorded at ACT Health Monash station during 2017 for contemporaneous ozone limiting method (OLM) analysis with modelling period predictions; and
- O_3 – hourly varying concentrations recorded at ACT Health Monash station during 2017 for contemporaneous OLM analysis with modelling period predictions.

6 Emissions inventory

6.1 Emission scenarios

The anticipated annual material extraction and processing totals for the project, as provided by Regis, are illustrated in Figure 6.1 for both the EIS mine development and the amended mine development (ie the project being assessed in this report).

Appendix M of the EIS quantified particulate matter emissions for four emission scenarios representative of different stages of the project, specifically year 1, year 2, year 4 and year 8.

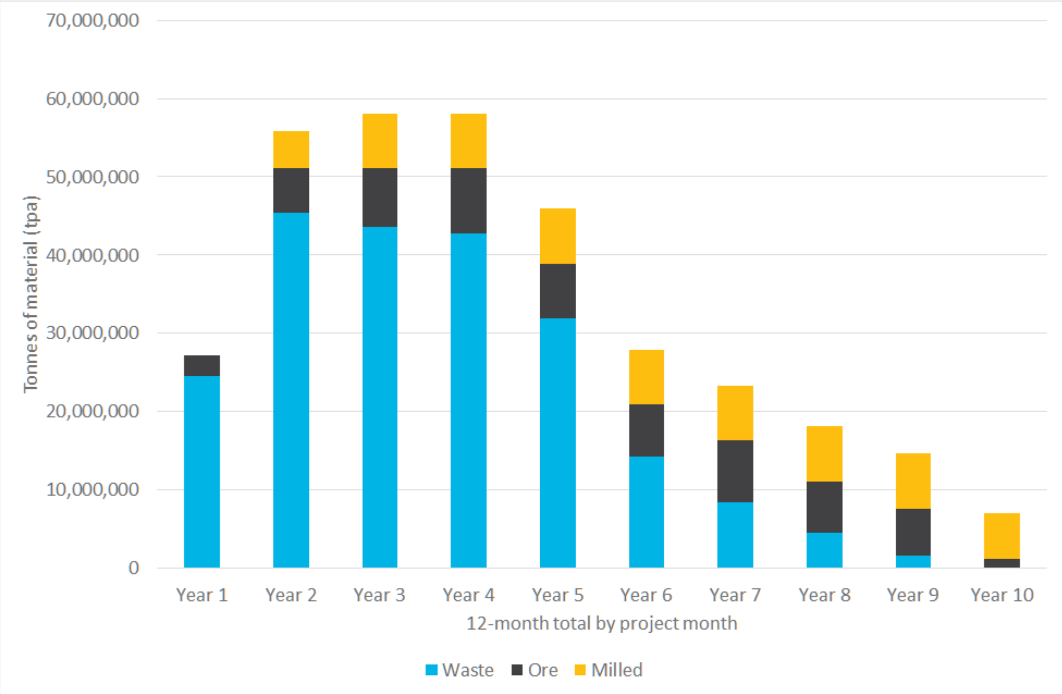
Following review of the revised annual mine and waste rock emplacement schedule associated with the amended mine development design, an additional emissions scenario representative of year 6 operations has been included. Consequently, for the amended mine development assessment, the following five emission scenarios were quantified:

- year 1;
- year 2;
- year 4;
- year 6; and
- year 8.

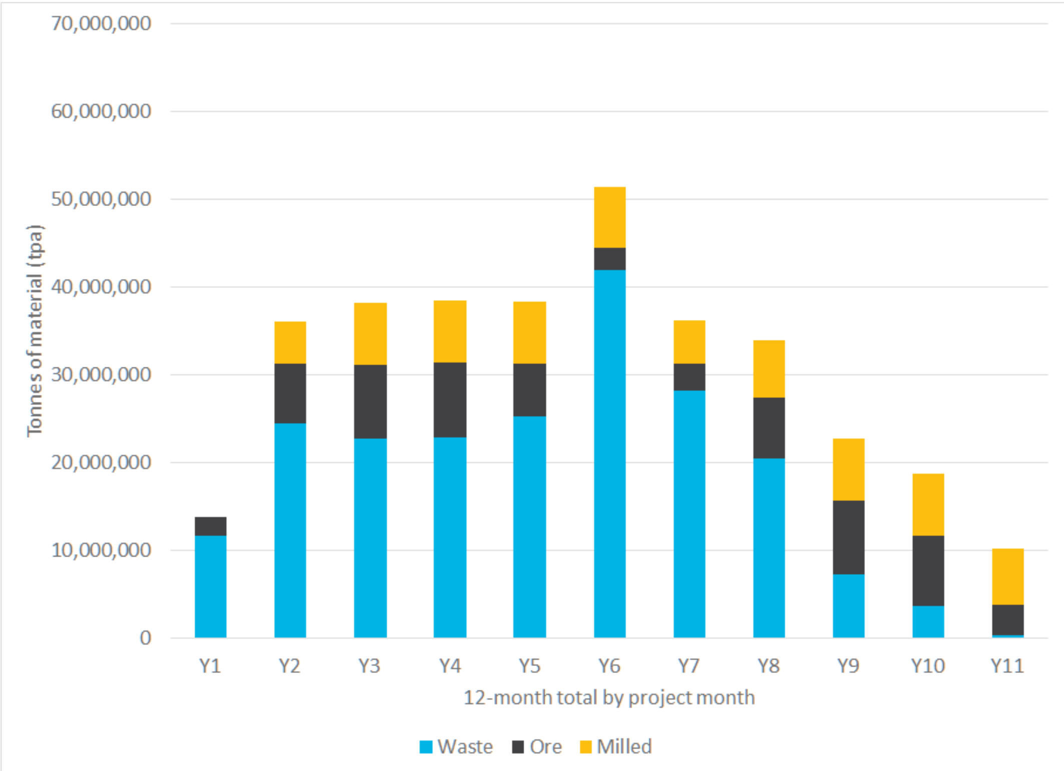
The five scenarios are considered to provide an indication of impacts under a range of operational conditions during the life of the amended project design. Similar to the EIS modelling, year 1 accounts for both construction (occurring in the first six months of year 1) and operational phase emissions. Year 2 and 4 represent the staged development of the waste rock emplacement area with the highest potential of impacts to receptors to the south of operations. Year 6 represents the highest period of material extraction and haulage for the project. Year 8 remains representative of peak haulage distances for ore material from the developed pit.

From the annual material throughputs presented in Figure 6.1, the following points are noted:

- the amended mine development schedule features an additional year of operations (year 11) with the material activity rates more evenly distributed across the mine years, rather than a peak occurring over the first five years of the EIS mine development schedule;
- material activity rates for year 1 through to year 5 are notably lower for the amended mine development;
- year 6 through year 11 material activity rates for the amended mine development are higher than the equivalent mine years in the EIS mine development schedule; and
- the maximum annual throughput is lower for the amended mine development schedule relative to the EIS mine development schedule.



EIS mine development



Amended mine development

Figure 6.1 Projected material handling and processing throughput by project year – EIS vs amended mine development

6.2 Sources of emissions

No new emission sources are introduced as a result of the amended mine development. Consistent with the EIS, the sources of atmospheric emissions for the five scenarios associated with the operation of the amended mine development include:

- clearing and transportation of topsoil material;
- drill and blasting activities in pit area;
- loading of blasted waste rock and ore material to haul trucks;
- transport of waste rock to waste rock emplacement and infrastructure areas;
- waste rock emplacement management by dozers
- transport of ore material to the ROM pad;
- material crushing, screening and grinding circuit and associated conveyor transfers;
- wind erosion associated with waste rock emplacements, topsoil stockpiles, ore material stockpiles and other exposed surfaces;
- diesel fuel combustion by on-site plant and equipment;
- fuel combustion associated with processing plant furnace and kiln; and
- fugitive releases from the processing circuit and TSF.

Emissions from the initial construction phase comprise of many of these emissions sources and are accounted for in the year 1 emissions scenario.

6.3 Fugitive particulate matter emissions

Consistent with Appendix M of the EIS, fugitive dust sources associated with the amended mine development were quantified through the application of NPI emission estimation techniques and USEPA AP-42 emission factor equations. Particulate matter emissions were quantified for the three size fractions identified in Section 3, with the TSP fraction also used to provide an indication of dust deposition rates. Emission rates for coarse particles (PM_{10}) and fine particles ($PM_{2.5}$) were estimated using ratios for the different particle size fractions available in the literature (principally the USEPA AP-42).

6.3.1 Particulate matter emission reduction factors

As detailed in Section 7.3.1 of Appendix M of the EIS, Regis proposes to implement a range of particulate matter emission control measures, including the following:

- chemical suppressants will be applied to high traffic haul road routes from pit exits to the waste rock emplacement area and ROM pad. All other unpaved transport routes (eg pit, ramps, WRE tip heads, topsoil haulage) will be controlled through water suppression;
- a road speed limit of 60 km/hr will be posted to all internal roads, however it is noted that the average travel speed of material haul trucks is less than 40 km/h;

- the design of all crushers, screens and associated transfer points at the processing circuit will include dust control, dust extraction and / or filter systems;
- all exposed conveyors at the processing circuit will be covered;
- water sprays will be utilised at the ROM pad hopper / primary crusher dump pocket;
- ROM pad operations will be controlled through the use of water trucks and / or water sprays;
- the fine ore stockpile will be covered;
- in pit drill rigs will be fitted with dry filter capture devices, nominally cyclones;
- wet suppression through watercarts will be applied to dozer activity areas for waste rock and topsoil operations; and
- topsoil stockpiles, waste rock emplacements and TSF walls will be progressively rehabilitated through hydro mulching or hydro seeding.

A comparison of proposed particulate matter control measures with accepted best practice mitigation measures for the mining industry was presented in Appendix M of the EIS. This comparison demonstrated that the control measures proposed for implementation at the project are consistent with best practice measures wherever practicable, taking the specifics of the project into consideration.

The particulate matter emission reduction measures implemented in Appendix M of the EIS will remain for the amended mine development. Consequently, the consistency with best practice mitigation measures remains applicable to the amended mine development.

Relative to the EIS project design, the following additional mitigation measures have been implemented for the amended mine development:

- increase in the load capacity of the haul trucks for waste rock and ore material, resulting in a reduction in the number of vehicle kilometres travelled per year;
- redesign of the pit development and haul route alignment, with pit exit ramps introduced to the north of the pit (the EIS pit design was almost exclusively exiting from the south of the pit) moving a proportion of material haul routes further away from residential receptors; and
- optimisation of the waste rock emplacement design to increase the amount of protection for waste rock emplacement activities by the southern amenity bund.

Regarding the use of chemical suppressants, the specific product for implementation has not been selected at the time of reporting. Regis commits to the selection of a product that is both environmentally friendly for human and ecological impacts and achieves the required particulate matter emission reduction.

Further, it is noted that the pipeline water supply, which will contribute to operational dust suppression practices, will feature an elevated saline content. Hygroscopic salts are noted to be an effective dust suppressant, with a quoted emissions control factor for unpaved roads of 82% within two weeks of application (Katestone 2011). Consequently, the use of pipeline water at site may represent an alternative to chemical suppressant use (84% control applied in this assessment). It is understood that any runoff from the use of pipeline water in dust suppression would be effectively captured in the water management system for the mine development (ie a nil discharge site).

Emission reduction factors for these control measures are presented in Table 6.1. These emission reduction factors have been applied to annual emission calculations for each emissions scenario where applicable.

Table 6.1 Particulate matter control measures – operational scenarios

Emission sources	Control measures	Emission reduction factors (%)[1]
Material haulage using watering only (applied to in pit haul routes)	Route watering Travel speed reduction **Combined emission reduction**	75 44 **86**
Material haulage using chemical suppressant (applied to surface haul roads after pit ramp exits)	Suppressant Travel speed reduction **Combined emission reduction**	84 44 **91**
Drilling	Dry bag filter	99
Dozer operations for topsoil and waste rock	High moisture in travel routes / watering	50
ROM Pad operations and stockpiles	Water sprays	50
Processing circuit	Dust capture and filters	99
ROM ore stockpile	Water sprays	50
Rehabilitated areas	Secondary rehabilitation	60
Established rehabilitated areas (applied to areas of rehabilitation greater than two years old in Year 6 and Year 8 only)	Revegetation	90

[1] All control reduction factors adopted from *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone 2011). Where multiple controls are in place (eg haulage routes), the multiplicative control factor has been applied as per NPI (2012).

6.3.2 Particulate matter emissions

Summaries of annual site emissions by source type are presented in Table 6.2 through to Table 6.6. Annual emission totals by particle size are illustrated in Figure 6.2, while the contribution of primary source types to annual emissions are shown in Figure 6.3. Particulate matter control measures, as documented in Section 6.3.1 are accounted for in these emission totals.

Consistent with Appendix M of the EIS, the most significant source of emissions at the amended mine development continues to be associated with the movement of vehicles across unpaved road surfaces. Waste rock emplacement operations and wind erosion of exposed surfaces are also notable contributing sources of particulate matter on an annual basis. The significance of diesel combustion emissions (mobile equipment and trucks) increases with decreasing particle size. Further details regarding emission estimation factors and assumptions are provided in Appendix C.

It is noted with regard to the processing plant components (eg crushers, screens, etc) that the emission factors adopted account for all associated processes, including conveying to and transfer from the crushing/screening equipment.

Table 6.2 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 1

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	23.25	5.79	2.44
Loading to haul truck	0.91	0.43	0.06
Haulage to topsoil storage	9.36	2.36	0.24
Truck unloading of topsoil	0.91	0.43	0.06
Drill	0.15	0.08	0.01
Blast	5.97	3.10	0.18
Blasted waste rock to haul truck	25.02	11.83	1.79
Haulage to waste dump - north - watering	16.69	4.22	0.42
Haulage to waste dump - north - chemical	78.32	19.79	1.98
Haulage to waste dump - central - watering	-	-	-
Haulage to waste dump - central - chemical	-	-	-
Haulage to waste dump - south - watering	1.51	0.38	0.04
Haulage to waste dump - south - chemical	3.86	0.98	0.10
Haulage to waste dump - infrastructure - watering	6.59	1.66	0.17
Haulage to waste dump - infrastructure - chemical	39.34	9.94	0.99
Blasted ore to haul truck	4.67	2.21	0.33
Haulage to ROM pad - watering	4.63	1.17	0.12
Haulage to ROM pad - chemical	16.78	4.24	0.42
Truck unloading of waste rock - north	16.85	7.97	1.21
Truck unloading of waste rock - central	-	-	-
Truck unloading of waste rock - south	1.52	0.72	0.11
Truck unloading of waste rock - infrastructure	6.65	3.14	0.48
Dozer on waste rock emplacement	53.52	12.30	5.62
Truck unloading ROM pad	4.67	2.21	0.33
Truck unloading direct to ROM hopper	-	-	-
FEL rehandle at ROM pad	-	-	-
Primary crusher	-	-	-
Secondary crusher	-	-	-
Tertiary crusher	-	-	-
Grinding	-	-	-
Kiln stack	-	-	-
Furnace stack	-	-	-
Grader	2.43	1.79	0.08

Table 6.2 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 1

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Road trucks entering/leaving site	13.59	3.43	0.34
Topsoil cleared area - wind erosion	126.87	63.43	9.52
Topsoil storage piles - wind erosion	105.32	52.66	7.90
Main pit - wind erosion	34.52	17.26	2.59
Cleared waste rock emplacement - wind erosion	15.28	7.64	1.15
Active waste rock emplacement - wind erosion	51.12	25.56	3.83
ROM Pad stockpiles - wind erosion	11.43	5.71	0.86
Rehabilitated areas - wind erosion	-	-	-
TSF - wind erosion	-	-	-
Diesel combustion - mining fleet	5.23	5.23	4.80
Diesel combustion - road trucks	0.01	0.01	0.01
Total	**686.95**	**277.69**	**48.17**

Table 6.3 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 2

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	23.25	5.79	2.44
Loading to haul truck	0.82	0.39	0.06
Haulage to topsoil storage	6.59	1.67	0.17
Truck unloading of topsoil	0.82	0.39	0.06
Drill	0.32	0.17	0.02
Blast	18.11	9.42	0.54
Blasted waste rock to haul truck	52.55	24.85	3.76
Haulage to waste dump - north - watering	64.25	16.24	1.62
Haulage to waste dump - north - chemical	123.36	31.17	3.12
Haulage to waste dump - central - watering	20.92	5.29	0.53
Haulage to waste dump - central - chemical	26.78	6.77	0.68
Haulage to waste dump - south - watering	83.52	21.11	2.11
Haulage to waste dump - south - chemical	94.57	23.90	2.39
Haulage to waste dump - infrastructure - watering	13.16	3.33	0.33
Haulage to waste dump - infrastructure - chemical	19.66	4.97	0.50
Blasted ore to haul truck	14.87	7.03	1.06
Haulage to ROM pad - watering	44.18	11.16	1.12
Haulage to ROM pad - chemical	62.83	15.88	1.59
Truck unloading of waste rock - north	21.62	10.23	1.55
Truck unloading of waste rock - central	7.04	3.33	0.50
Truck unloading of waste rock - south	19.46	9.20	1.39
Truck unloading of waste rock - infrastructure	4.43	2.09	0.32
Dozer on waste rock emplacement	53.52	12.30	5.62
Truck unloading ROM pad	9.66	4.57	0.69
Truck unloading direct to ROM hopper	2.60	1.23	0.19
FEL rehandle at ROM pad	2.55	1.21	0.18
Primary crusher	9.56	0.96	0.18
Secondary crusher	19.12	1.59	0.29
Tertiary crusher	133.84	7.65	1.40
Grinding	57.36	7.65	1.40
Kiln stack	0.01	0.01	0.00
Furnace stack	0.07	0.07	0.02
Grader	2.43	1.79	0.08

Table 6.3 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 2

Emissions source	**Calculated annual emissions (tonnes/annum) by source**		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Road trucks entering/leaving site	1.29	0.33	0.03
Topsoil cleared area - wind erosion	98.65	49.33	7.40
Topsoil storage piles - wind erosion	64.01	32.00	4.80
Main pit - wind erosion	35.52	17.76	2.66
Cleared waste rock emplacement - wind erosion	30.14	15.07	2.26
Active waste rock emplacement - wind erosion	124.39	62.19	9.33
ROM Pad stockpiles - wind erosion	11.43	5.71	0.86
Rehabilitated areas - wind erosion	19.52	9.76	1.46
TSF - wind erosion	15.02	7.51	1.13
Diesel combustion - mining fleet	11.61	11.61	10.64
Diesel combustion - road trucks	0.01	0.01	0.01
Total	**1,425.40**	**464.65**	**76.50**

Table 6.4 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 4

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	23.25	5.79	2.44
Loading to haul truck	0.54	0.26	0.04
Haulage to topsoil storage	5.00	1.26	0.13
Truck unloading of topsoil	0.54	0.26	0.04
Drill	0.31	0.16	0.02
Blast	17.65	9.18	0.53
Blasted waste rock to haul truck	49.17	23.26	3.52
Haulage to waste emplacement - north - watering	2.29	0.58	0.06
Haulage to waste emplacement - north - chemical	5.62	1.42	0.14
Haulage to waste emplacement - central - watering	22.70	5.74	0.57
Haulage to waste emplacement - central - chemical	50.86	12.85	1.29
Haulage to waste emplacement - south - watering	54.76	13.84	1.38
Haulage to waste emplacement - south - chemical	81.78	20.67	2.07
Haulage to waste emplacement - infrastructure - watering	73.60	18.60	1.86
Haulage to waste emplacement - infrastructure - chemical	69.71	17.62	1.76
Blasted ore to haul truck	18.42	8.71	1.32
Haulage to ROM pad - watering	152.09	38.43	3.84
Haulage to ROM pad - chemical	62.30	15.74	1.57
Truck unloading of waste rock - north	1.16	0.55	0.08
Truck unloading of waste rock - central	11.46	5.42	0.82
Truck unloading of waste rock - south	27.64	13.07	1.98
Truck unloading of waste rock - infrastructure	8.92	4.22	0.64
Dozer on waste rock emplacement	53.52	12.30	5.62
Truck unloading ROM pad	11.98	5.66	0.86
Truck unloading direct to ROM hopper	3.22	1.52	0.23
FEL rehandle at ROM pad	4.34	2.05	0.31
Primary crusher	14.04	1.40	0.26
Secondary crusher	28.08	2.34	0.43
Tertiary crusher	196.54	11.23	2.06
Grinding	84.23	11.23	2.06
Kiln stack	0.01	0.01	0.00
Furnace stack	0.07	0.07	0.02

Table 6.4 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 4

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Grader	2.43	1.79	0.08
Road trucks entering/leaving site	1.29	0.33	0.03
Topsoil cleared area - wind erosion	85.40	42.70	6.40
Topsoil storage piles - wind erosion	9.84	4.92	0.74
Main pit - wind erosion	55.86	27.93	4.19
Cleared waste rock emplacement - wind erosion	-	-	-
Active waste rock emplacement - wind erosion	170.68	85.34	12.80
ROM Pad stockpiles - wind erosion	11.43	5.71	0.86
Rehabilitated areas - wind erosion	49.08	24.54	3.68
TSF - wind erosion	29.42	14.71	2.21
Diesel combustion - mining fleet	12.84	12.84	11.77
Diesel combustion - road trucks	0.01	0.01	0.01
Total	**1,564.05**	**486.26**	**80.72**

Table 6.5 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 6

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	23.25	5.79	2.44
Loading to haul truck	0.39	0.19	0.03
Haulage to topsoil storage	3.60	0.91	0.09
Truck unloading of topsoil	0.39	0.19	0.03
Drill	0.48	0.25	0.04
Blast	33.52	17.43	1.01
Blasted waste rock to haul truck	90.30	42.71	6.47
Haulage to waste emplacement - north - watering	28.37	7.17	0.72
Haulage to waste emplacement - north - chemical	39.62	10.01	1.00
Haulage to waste emplacement - central - watering	138.88	35.10	3.51
Haulage to waste emplacement - central - chemical	111.10	28.08	2.81
Haulage to waste emplacement - south - watering	187.96	47.50	4.75
Haulage to waste emplacement - south - chemical	130.32	32.93	3.29
Haulage to waste emplacement - infrastructure - watering	-	-	-
Haulage to waste emplacement - infrastructure - chemical	-	-	-
Blasted ore to haul truck	5.37	2.54	0.38
Haulage to ROM pad - watering	46.14	11.66	1.17
Haulage to ROM pad - chemical	18.17	4.59	0.46
Truck unloading of waste rock - north	7.81	3.69	0.56
Truck unloading of waste rock - central	35.05	16.58	2.51
Truck unloading of waste rock - south	47.44	22.44	3.40
Truck unloading of waste rock - infrastructure	-	-	-
Dozer on waste rock emplacement	53.52	12.30	5.62
Truck unloading ROM pad	3.49	1.65	0.25
Truck unloading direct to ROM hopper	0.94	0.44	0.07
FEL rehandle at ROM pad	6.61	3.13	0.47
Primary crusher	14.00	1.40	0.26
Secondary crusher	28.00	2.33	0.43
Tertiary crusher	196.00	11.20	2.05
Grinding	84.00	11.20	2.05
Kiln stack	0.01	0.01	0.00
Furnace stack	0.07	0.07	0.02

Table 6.5 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 6

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	**PM_{10}**	**$PM_{2.5}$**
Grader	2.43	1.79	0.08
Road trucks entering/leaving site	1.29	0.33	0.03
Topsoil cleared area - wind erosion	61.60	30.80	4.62
Topsoil storage piles - wind erosion	9.84	4.92	0.74
Main pit - wind erosion	55.86	27.93	4.19
Cleared waste rock emplacement - wind erosion	-	-	-
Active waste rock emplacement - wind erosion	140.47	70.24	10.54
ROM Pad stockpiles - wind erosion	11.43	5.71	0.86
Rehabilitated areas - wind erosion	50.76	25.38	3.81
Established rehab areas - wind erosion	2.53	1.27	0.19
TSF - wind erosion	42.72	21.36	3.20
Diesel combustion - mining fleet	20.58	20.58	18.87
Diesel combustion - road trucks	0.01	0.01	0.01
Total	**1,734.31**	**543.79**	**93.00**

Table 6.6 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 8

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Dozer stripping topsoil	-	-	-
Loading to haul truck	-	-	-
Haulage to topsoil storage	-	-	-
Truck unloading of topsoil	-	-	-
Drill	0.27	0.14	0.02
Blast	14.57	7.58	0.44
Blasted waste rock to haul truck	44.02	20.82	3.15
Haulage to waste emplacement - north - watering	-	-	-
Haulage to waste emplacement - north - chemical	-	-	-
Haulage to waste emplacement - central - watering	348.83	88.15	8.82
Haulage to waste emplacement - central - chemical	139.53	35.26	3.53
Haulage to waste emplacement - south - watering	-	-	-
Haulage to waste emplacement - south - chemical	-	-	-
Haulage to waste emplacement - infrastructure - watering	-	-	-
Haulage to waste emplacement - infrastructure - chemical	-	-	-
Blasted ore to haul truck	15.08	7.13	1.08
Haulage to ROM pad - watering	129.49	32.72	3.27
Haulage to ROM pad - chemical	51.00	12.89	1.29
Truck unloading of waste rock - north	-	-	-
Truck unloading of waste rock - central	44.02	20.82	3.15
Truck unloading of waste rock - south	-	-	-
Truck unloading of waste rock - infrastructure	-	-	-
Dozer on waste rock emplacement	53.52	12.30	5.62
Truck unloading ROM pad	9.80	4.64	0.70
Truck unloading direct to ROM hopper	2.64	1.25	0.19
FEL rehandle at ROM pad	4.32	2.04	0.31
Primary crusher	12.90	1.29	0.24
Secondary crusher	25.80	2.15	0.39
Tertiary crusher	180.60	10.32	1.89
Grinding	77.40	10.32	1.89
Kiln stack	0.01	0.01	0.00
Furnace stack	0.07	0.07	0.02

Table 6.6 Calculated annual TSP, PM_{10} and $PM_{2.5}$ emissions – Year 8

Emissions source	Calculated annual emissions (tonnes/annum) by source		
	TSP	PM_{10}	$PM_{2.5}$
Grader	1.21	0.89	0.04
Road trucks entering/leaving site	1.29	0.33	0.03
Topsoil cleared area - wind erosion	28.15	14.08	2.11
Topsoil storage piles - wind erosion	-	-	-
Main pit - wind erosion	55.86	27.93	4.19
Cleared waste rock emplacement - wind erosion	-	-	-
Active waste rock emplacement - wind erosion	118.67	59.33	8.90
ROM Pad stockpiles - wind erosion	11.43	5.71	0.86
Rehabilitated areas - wind erosion	62.88	31.44	4.72
Established rehab areas – wind erosion	6.57	3.28	0.49
TSF - wind erosion	47.57	23.79	3.57
Diesel combustion - mining fleet	16.25	16.25	14.90
Diesel combustion - road trucks	0.01	0.01	0.01
Total	**1,503.75**	**452.94**	**75.81**

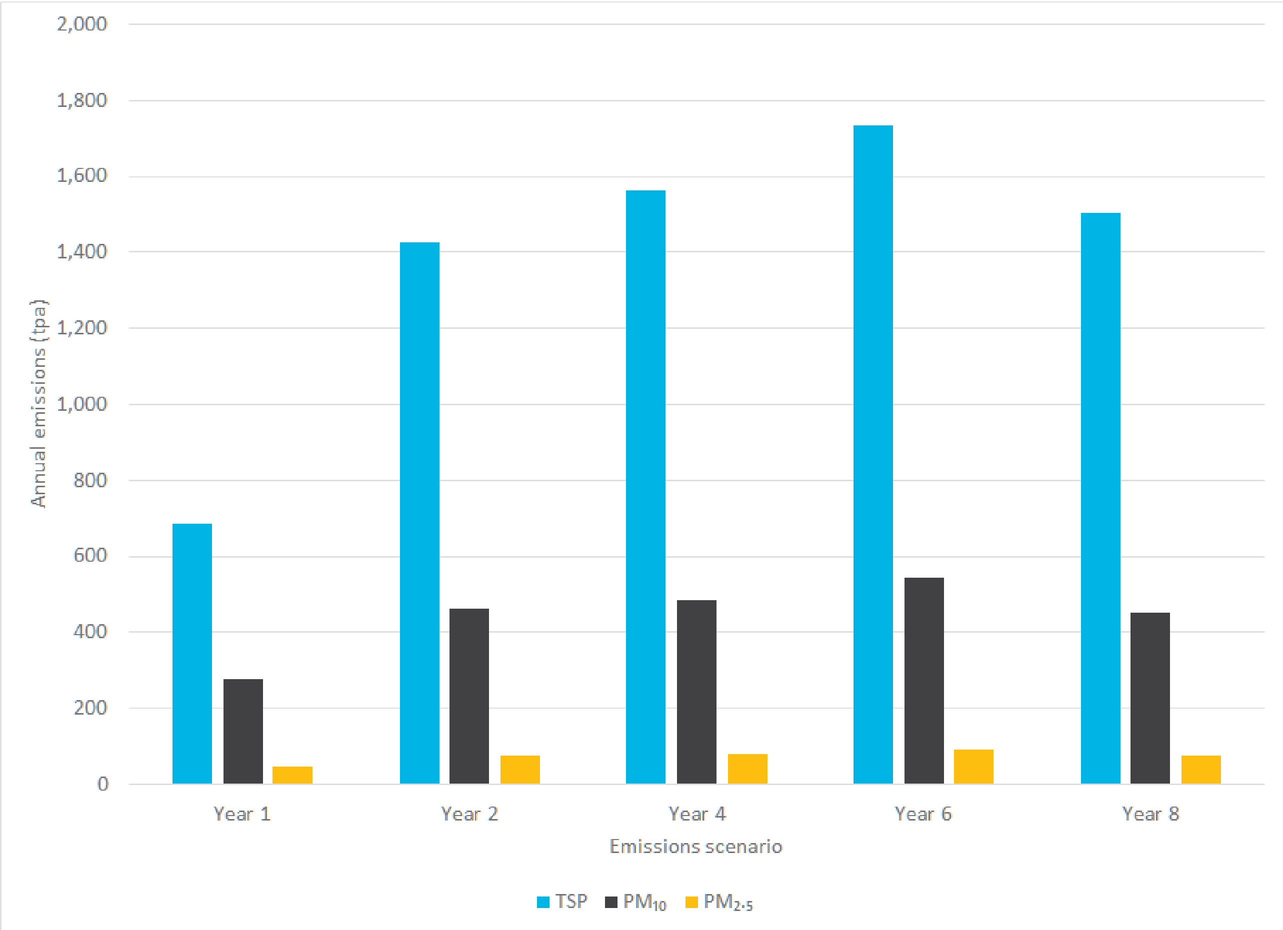


Figure 6.2 Annual emission totals for the amended mine development by particle size – all scenarios

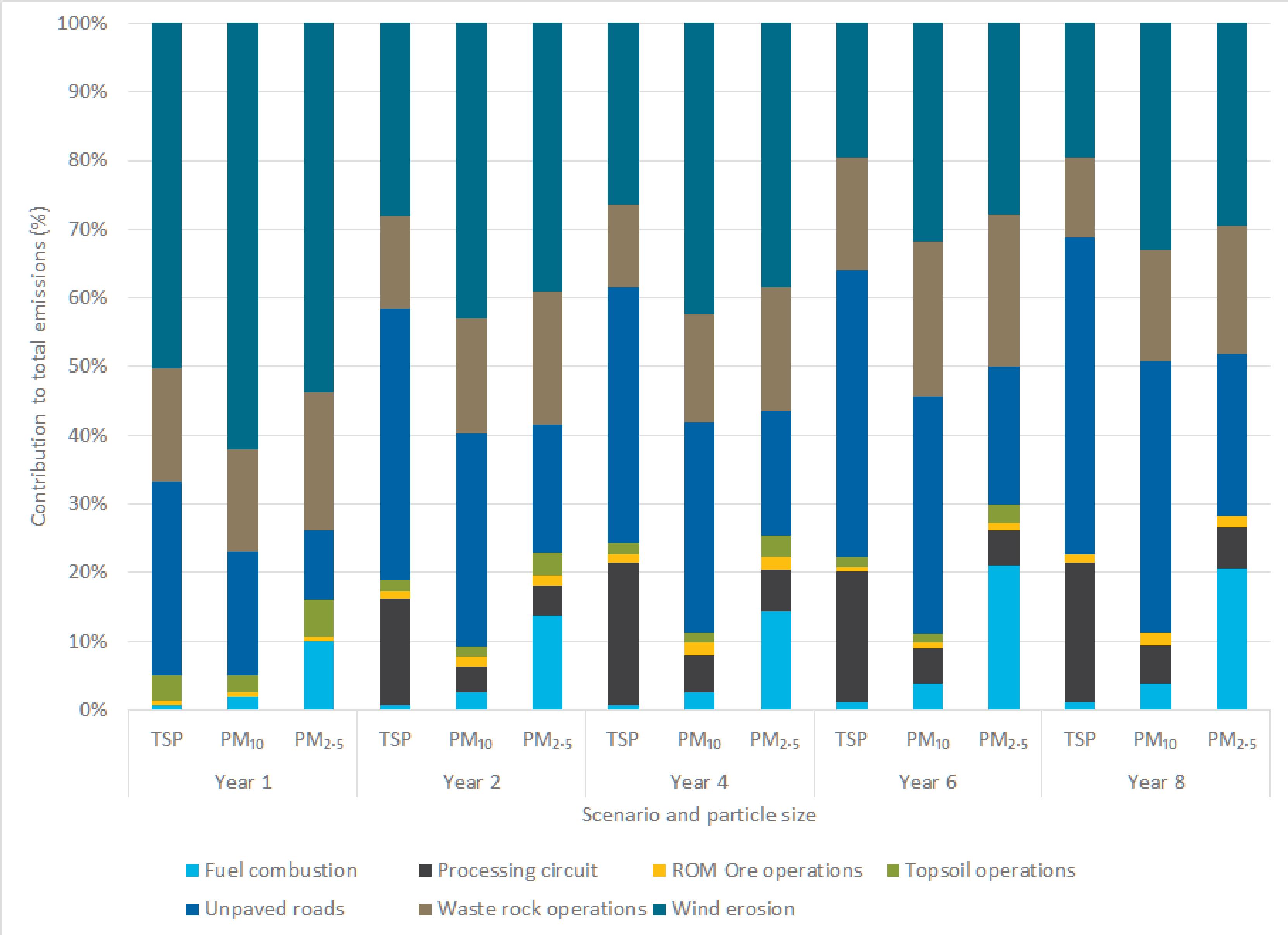


Figure 6.3 **Contribution to annual emissions by emissions source type and particle size – all scenarios**

6.3.3 Comparison with EIS mining development

A comparison of the annual emission totals presented in Appendix M of the EIS and those quantified for the amended mine development is presented in Table 6.7 and Figure 6.4.

Table 6.7 Comparison of annual emissions by scenario – EIS vs amended mine development

Mine year scenario	EIS mine development			Amended mine development		
	TSP (tpa)	PM_{10} (tpa)	$PM_{2.5}$ (tpa)	TSP (tpa)	PM_{10} (tpa)	$PM_{2.5}$ (tpa)
Year 1	900.0	323.8	54.3	686.9	277.7	48.2
Year 2	1,712.3	547.9	84.8	1,425.4	464.7	76.5
Year 4	2,129.8	622.8	89.9	1,564.1	486.3	80.7
Year 6	-	-	-	1,734.3	543.8	93.0
Year 8	1,168.0	333.4	54.8	1,503.7	452.9	75.8

Note: The EIS mine development air quality assessment (Appendix M of EIS) did not quantify year 6 emissions.

The key points are noted from the emissions comparison are as follows:

- for year 1, 2 and 4, the emissions quantified for the amended mine development are lower than the equivalent scenario from Appendix M of the EIS;
- as discussed previously, year 6 was introduced for this assessment and there is no comparable scenario available; and
- year 8 emissions for the amended mine development are higher than the EIS modelling, which is attributable to a higher level of waste rock movement in the updated mine design at the comparable stage of mine life.

The primary reasons for the change in annual emissions relative to the EIS mine development include the following:

- a reduction in the material activity rates for year 1 through year 5 for the amended mine development, as discussed in Section 6.1;
- changes to the haul truck capacity in the amended mine development, increasing from 177 t to 221 t, which reduces the number of truck loads required to move annual material totals about site; and
- changes to the progression of the open cut pit and waste rock emplacement resulting in shorter haul distances between point of loading and unloading, reducing annual vehicle kilometres travelled.

This comparison demonstrates that the refinements to the project development design have generally resulted in benefits for the generation of particulate matter emissions from mining operations.

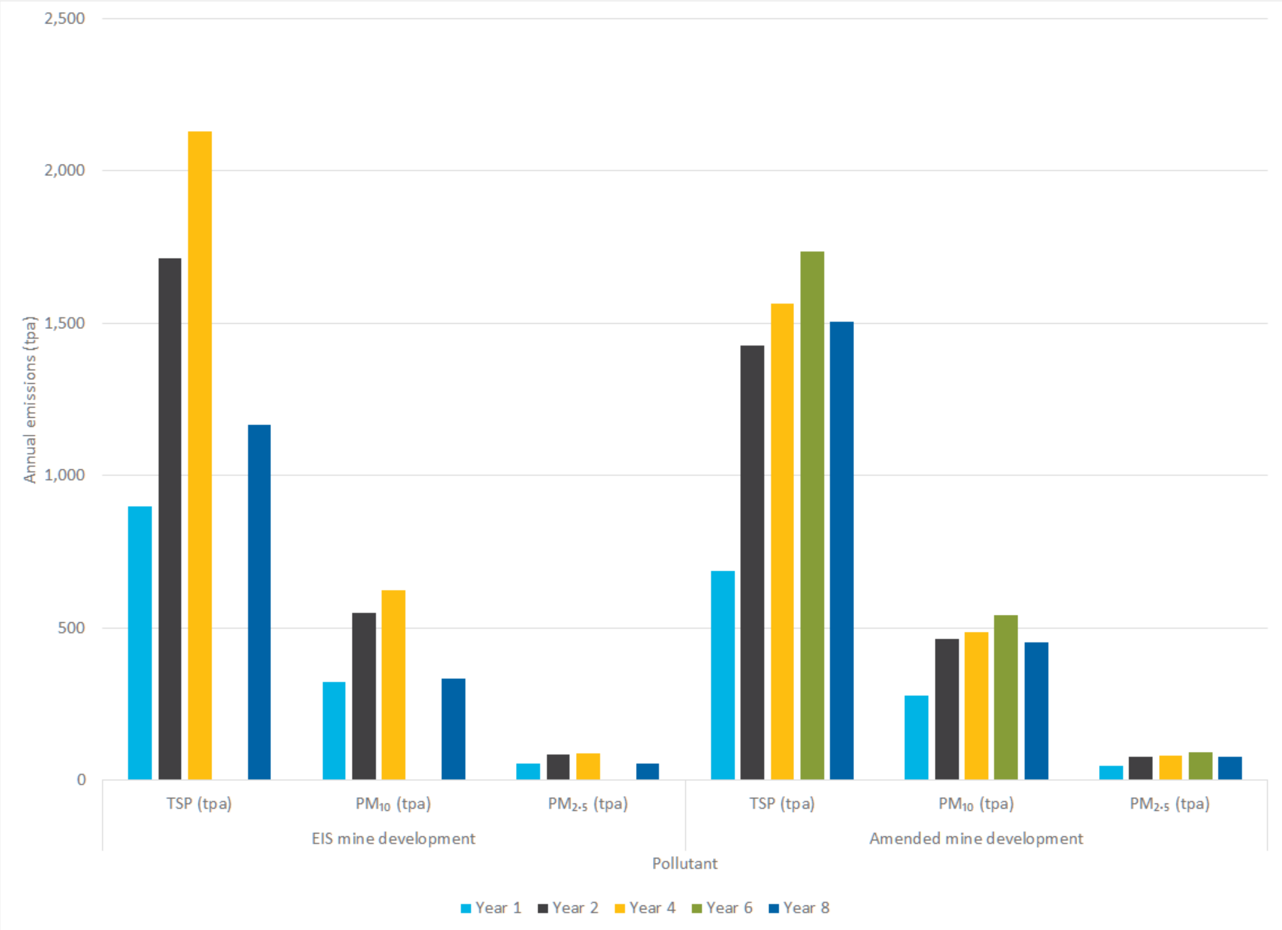


Figure 6.4 Comparison of annual emissions by scenario – EIS vs amended mine development

6.4 Gaseous pollutants

In addition to particulate matter emissions generated by the crushing, screening and grinding of ore material, the processing circuit will generate emissions of other pollutants to the atmosphere. Consistent with the EIS, these include combustion emissions from diesel-fuelled equipment and the furnace and kiln stacks at the processing plant, and fugitive releases from processing circuit tanks and through losses to atmosphere from the tailings deposited to the TSF.

6.4.1 Processing circuit fugitive emissions

Fugitive emission from tanks in the processing circuit and active TSF areas associated with the use of cyanide were quantified in Appendix M of the EIS. Resultant modelling of these emissions demonstrated compliance with applicable HCN criterion at all assessment locations and site boundary. There has been negligible change to the processing circuit under the amended mine development. Consequently, there is no change to processing circuit fugitive emissions from the amended mine development and the results from Appendix M of the EIS remain applicable for this assessment.

6.4.2 Combustion emissions

Annual diesel consumption totals for the operational mining fleet and emergency diesel generator were provided by Regis. As previously stated, this assessment has focussed on combustion emissions of particulate matter and NO_x.

In order to estimate worst case diesel combustion emissions from the project, the maximum 12 month diesel consumption rate, being 34,064,050 L for year 6, was adopted. This maximum year diesel amount is lower than the maximum for the EIS mine development, which is consistent with the reduction in maximum material activity rates presented in Section 6.1.

The year 6 model configuration was used to model combustion emission releases. Consistent with the EIS, other assumptions adopted were:

- the proposed mining equipment fleet comprised primarily of equipment with an engine power greater than 225 kW;
- for engines greater than 225 kW, the corresponding USEPA (USEPA, 2016) Tier 2 emission standards for PM and NOx of 0.2 g/kWh and 6.08 g/kWh respectively were selected. The NO_x emission standard correlated to 95% of the USEPA Tier 2 emission standard for non-methane hydrocarbons + NO_x (BAAQMD, 2004);
- the g/kWh emission standard was converted to g per litre of diesel by applying a scaling factor of 3, as per the notes for Table 35 in *NPI Emission Estimation Technique Manual for Combustion Engines* (NPI, 2008); and
- the PM emission standard is assumed to correspond to PM_{10}, with $PM_{2.5}$ emissions derived from the relationship between PM_{10} and $PM_{2.5}$ emission factors presented in Table 35 in NPI, 2008 (91.7%).

Given that the emission standards are the upper limit of emissions from USEPA Tier 2 equipment, it is considered that the use of emission factors equating to the USEPA Tier 2 emission standards provides a conservative upper bound estimate of diesel combustion NO_x emissions from the project.

Emissions from the kiln and furnace at the processing plant have been estimated using projected liquid petroleum gas (LPG) consumption rates and emission factors for LPG combustion from Table 25 of *the NPI Emission Estimation Technique Manual for Combustion in Boilers* (NPI, 2011). To assist with quantifying LPG combustion emissions, Regis has indicated the following:

- the furnace will operate for 10 hours per week, consuming LPG at a rate of 80 L per hour;
- the kiln will operate for 16 hours per day, five days a week, consuming LPG at a rate of 130 L per hour; and
- processing plant emissions will commence from around the end of year 2 onwards.

Annual diesel and LPG combustion emissions are summarised in Table 6.8. Relative to Appendix M of the EIS, the annual emissions associated with diesel combustion have decreased for the amended mine development. This is directly associated with the reduction in maximum annual diesel combustion, as discussed above.

Table 6.8 Annual particulate matter and NO_X emissions from diesel and LPG combustion

Fuel type	Maximum annual emissions (tonnes/annum)
Diesel – PM_{10}	20.6
LPG – PM_{10}	0.08
Diesel – $PM_{2.5}$	18.9
LPG – $PM_{2.5}$	0.02
Diesel – NO_x	625.7
LPG – NO_x	1.34

Note: for the purpose of this assessment, it is assumed that 100% of TSP emissions are in the PM_{10} range

6.4.3 Blasting emissions

In addition to fuel combustion emissions, the use of explosives during blasting operations within the open cut pit area has the potential to generate emissions of particulate matter and gaseous pollutants. Particulate matter from blasting emissions are addressed in Section 6.3. Emissions of NO_x from blasting operations at the project have been quantified for an anticipated maximum potential blast size and used to model potential blast-related NO_2 concentrations in the surrounding environment (refer to Section 8.3). Further details on blasting emissions are presented in Appendix C.

6.5 Metals and metalloids

Emissions of individual metals and metalloids have been estimated based on the average content by material type from the samples analysed. Consistent with the EIS, the material geochemistry profiles have been applied to the following source types:

- waste rock – unpaved road sources, waste rock handling in pit, waste rock emplacement operations, drill and blast operations, wind erosion of waste and topsoil stockpiles, topsoil activities;
- ore – ore material handling in pit, ROM pad operations, processing plant releases, ROM stockpile wind erosion; and
- tailings – TSF wind erosion.

For each scenario, a weighted average emission scaling factor for each metal and metalloid species was derived based on calculated annual TSP emissions. This approach is considered conservative, as the health-based impact assessment criteria for air quality are linked to the inhalable and respirable fractions of particulate matter (PM_{10} and $PM_{2.5}$) rather than TSP.

Annual emission totals of metals and metalloids associated with the amended mine development are presented in Table 6.9. Because annual metals and metalloids emissions are derived from the particulate matter emissions presented in Section 6.3, the change in annual metals and metalloids emissions for the amended mine development is linked to the same factors discussed in Section 6.3.3.

Table 6.9 Annual metal and metalloid emission totals – all scenarios

Element	Annual emission (kg/annum) by metal or metalloid and scenario				
	Year 1	Year 2	Year 4	Year 6	Year 8
Sb	2.2	4.4	4.8	5.3	4.6
As	117.8	249.3	273.9	302.6	263.4
Ba	108.2	216.2	236.7	261.5	225.8
Be	0.2	0.4	0.4	0.4	0.4
Cd	2.5	4.9	5.3	5.9	5.0
Cr	50.4	90.9	99.9	110.3	94.3
Cu	367.1	967.3	1,092.4	1,206.9	1,082.8
Fe	51,157.4	108,776.8	119,640.6	132,175.2	115,140.6
Hg	0.3	0.7	0.7	0.8	0.7
Mg	16,206.3	33,361.4	36,493.1	40,316.4	34,922.3
Mn	2,434.7	4,962.1	5,397.4	5,962.8	5,147.2
Ni	25.7	47.4	52.2	57.6	49.5
Pb	77.7	151.3	166.6	184.0	158.8
Ag	1.0	2.3	2.6	2.8	2.5
Zn	778.0	1,472.7	1,587.2	1,753.4	1,494.9

7 Air dispersion modelling

7.1 Dispersion model selection and configuration

The atmospheric dispersion modelling completed for this assessment used the AERMOD dispersion model (version v19191). AERMOD is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

In addition to the 89 individual assessment locations (documented in Chapter 2), air pollutant concentrations were predicted over a 10 km by 10 km domain featuring nested grids (a 5 km domain with 250 m resolution, a 7 km domain with 500 m resolution and a 10 km domain with 1,000 m resolution). Model predictions for the nested grid were used to generate concentration isopleth plots (Appendix D).

Each modelling scenario featured the corresponding mine development elevations, including open-cut pit depth and waste rock emplacement heights. The influence these mine features have on emission dispersion, such as retention of particles from pit depth, were therefore accounted for in the modelling.

Specific activities (hauling, dozers, excavators, wind erosion etc) were represented by a series of volume sources and area sources which were located according to the mine plan for each scenario. The modelled volume source locations and modelled haul road locations are shown in Appendix B.

Simulations were undertaken for the 12-month period of 2017 using the AERMET-generated file based largely on the on-site meteorological monitoring dataset as input (see Chapter 4 for a description of input meteorology).

With the exception of the use of an updated version of AERMOD (EIS modelling utilised the older v18081), the modelling approach implemented in this assessment is consistent with Appendix M of the EIS.

7.2 Conversion of NO_x to NO_2

NO_x emissions associated with fuel combustion are primarily emitted as NO with some NO_2. The transformation in the atmosphere of NO to NO_2 was accounted for using the USEPA's Ozone Limiting Method (OLM) which requires ambient ozone data, as per the Approved Methods for Modelling.

Reference has been made to the hourly-varying O_3 concentrations recorded at the ACT Health Monash station.

The equation used to calculate NO_2 concentrations from predicted NO_X concentrations is as follows:

$$[NO_2]_{TOTAL} = \{0.1 \text{ x } [NO_x]_{PRED}\} + MIN\{(0.9) \text{ x } [NO_x]_{PRED} \text{ or } (46/48) \text{ x } [O_3]_{BKGD}\} + [NO_2]_{BKGD}$$

Where:

$[NO_2]_{TOTAL}$ = The predicted concentration of NO_2 in µg/m^3;

$[NO_x]_{PRED}$ = The AERMOD prediction of ground level NO_X concentrations in µg/m^3;

MIN = The minimum of the two quantities within the braces;

$[O_3]_{BKGD}$ = The background ambient O_3 concentration – Hourly Varying ACT Health Monash in µg/m^3;

46/48 = the molecular weight of NO_2 divided by the molecular weight of O_3; and

$[NO_2]_{BKGD}$ = The background ambient NO_2 concentration – Hourly Varying ACT Health Monash in µg/m^3.

The USEPA's OLM assumes that all of the available O_3 in the atmosphere will react with NO until either all of the O_3, or all of the NO has reacted. A major assumption of this method is that the reaction is instantaneous. In reality, this reaction takes place over a number of hours and over distance. The OLM will therefore tend to overestimate concentrations at near-source locations.

Furthermore, the method assumes that the complete mixing of the emitted NO and ambient ozone, down to the level of molecular contact, will have occurred by the time the emissions reach the assessment location having the maximum ground-level NO_X concentration.

Consequently, concentrations of the NO_2 reported within this assessment should be viewed as highly conservative, providing an upper bound estimate of NO_2 concentrations from the project.

7.3 Incremental (site-only) results

7.3.1 Amended mine development results

The predicted incremental concentrations and deposition rates from the five modelled scenarios were collated, and the maximum predicted results across the 89 assessment locations are presented in Table 7.1. In the case of the assorted metals and metalloids, the maximum predicted project increment concentrations presented in Table 7.1 are the maximum predicted concentration at the site boundary.

On the basis that the results presented relate to the maximum predicted concentration across all assessment locations, all other assessment locations have lower results than those presented in Table 7.1.

The predicted concentrations and deposition rates for all pollutants and averaging periods presented in Table 7.1 are below the applicable NSW EPA assessment criteria. However, with the exception of dust deposition and the assorted metals and metalloids, the assessment criteria listed are applicable to cumulative concentrations. Analysis of cumulative impact compliance is presented in Section 7.3.2.

The maximum predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations by assessment location for each mine year are illustrated in Figure 7.1 and Figure 7.2 respectively.

Contour plots, illustrating spatial variations in site-related incremental TSP, PM_{10} and $PM_{2.5}$ concentrations and dust deposition rates are provided in Appendix D. Isopleth plots of the maximum 1-hour or 24-hour average concentrations presented in Appendix D do not represent the dispersion pattern on any individual hour or day, but rather illustrate the maximum hourly or daily concentration that was predicted to occur at each model calculation point given the range of meteorological conditions occurring over the 2017 modelling period.

Table 7.1 Summary of highest predicted project-only increment concentrations and deposition levels across all assessment locations

Pollutant	Averaging period	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
TSP	Annual	µg/m³	1.5	3.3	3.6	4.7	3.3	90
PM_{10}	24-hour maximum	µg/m³	9.9	18.6	16.3	22.9	15.2	50
	Annual	µg/m³	1.0	2.1	2.1	2.7	1.8	25
$PM_{2.5}$	24-hour maximum	µg/m³	2.0	3.7	3.7	5.2	3.4	25
	Annual	µg/m³	0.2	0.5	0.4	0.6	0.4	8
Dust deposition	Annual	g/m²/month	0.2	0.5	0.6	0.7	0.6	2
NO_2	1-hour maximum	µg/m³			149.6			246
	Annual	µg/m³			2.0			62
Ag	99.9th percentile 1-hour	µg/m³	0.0002	0.0002	0.0003	0.0003	0.0003	1.8
As	99.9th percentile 1-hour	µg/m³	0.019	0.023	0.033	0.027	0.027	0.09
Ba	99.9th percentile 1-hour	µg/m³	0.017	0.020	0.028	0.023	0.023	9
Be	99.9th percentile 1-hour	µg/m³	0.00003	0.00003	0.00005	0.00004	0.00004	0.004
Cd	99.9th percentile 1-hour	µg/m³	0.0004	0.0005	0.0006	0.0005	0.0005	0.018
Cr	99.9th percentile 1-hour	µg/m³	0.008	0.008	0.012	0.010	0.010	0.09
Cu	99.9th percentile 1-hour	µg/m³	0.059	0.090	0.130	0.108	0.112	18
Fe	99.9th percentile 1-hour	µg/m³	8.2	10.1	14.2	11.9	11.9	90
Hg	99.9th percentile 1-hour	µg/m³	0.00005	0.00006	0.00009	0.00007	0.00007	0.18
Mg	99.9th percentile 1-hour	µg/m³	2.6	3.1	4.3	3.6	3.6	180
Mn	99.9th percentile 1-hour	µg/m³	0.39	0.46	0.64	0.53	0.53	18
Ni	99.9th percentile 1-hour	µg/m³	0.004	0.004	0.006	0.005	0.005	0.18
Pb	Annual	µg/m³	0.00017	0.00037	0.00042	0.00053	0.00038	0.5
Sb	99.9th percentile 1-hour	µg/m³	0.0004	0.0004	0.0006	0.0005	0.0005	9
Zn	99.9th percentile 1-hour	µg/m³	0.12	0.14	0.19	0.16	0.15	90

Note: A single worst case scenario was modelled for NO_2 emissions based on year 6 diesel combustion.

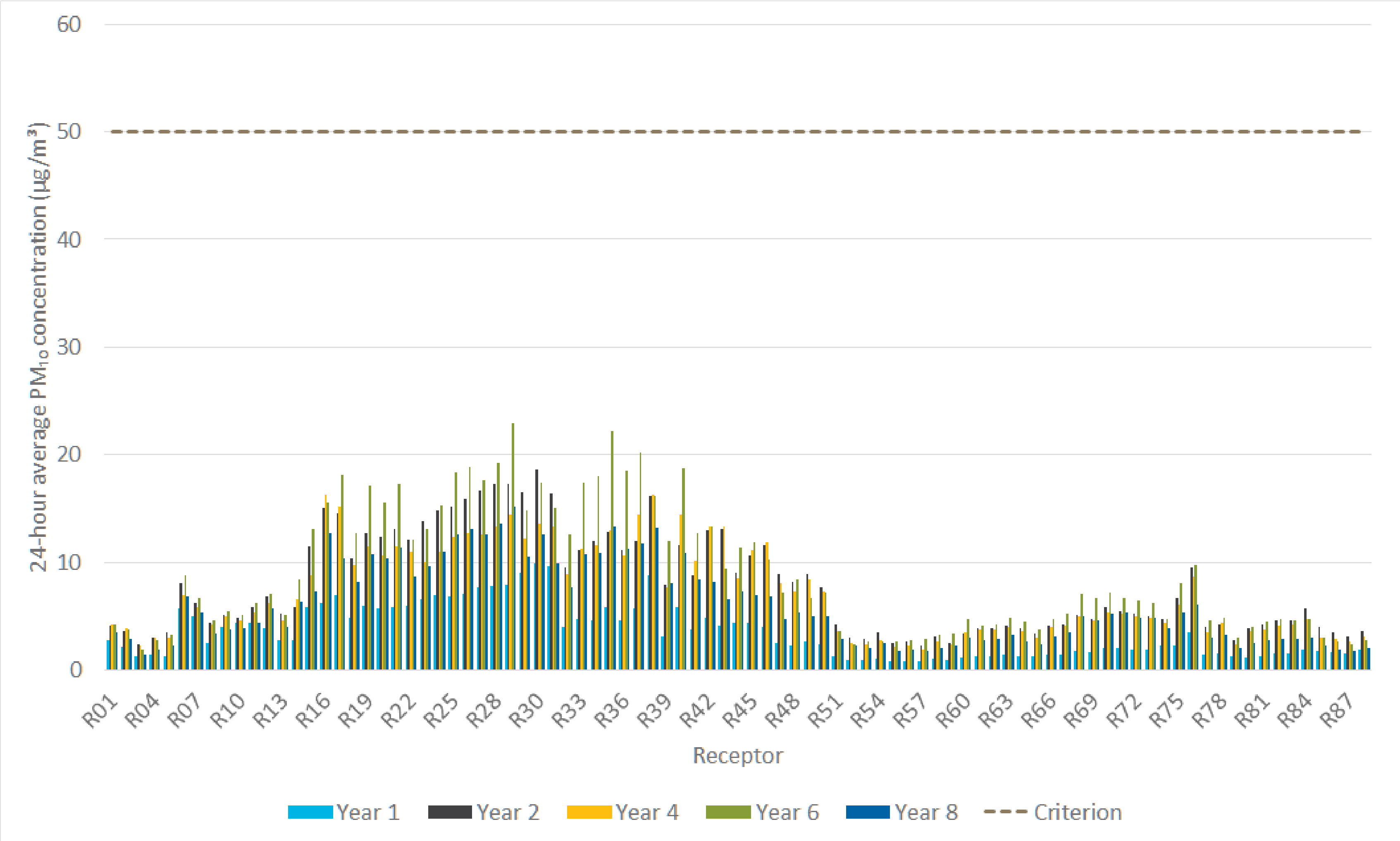


Figure 7.1 Maximum incremental 24-hour average PM_{10} concentrations – all scenarios

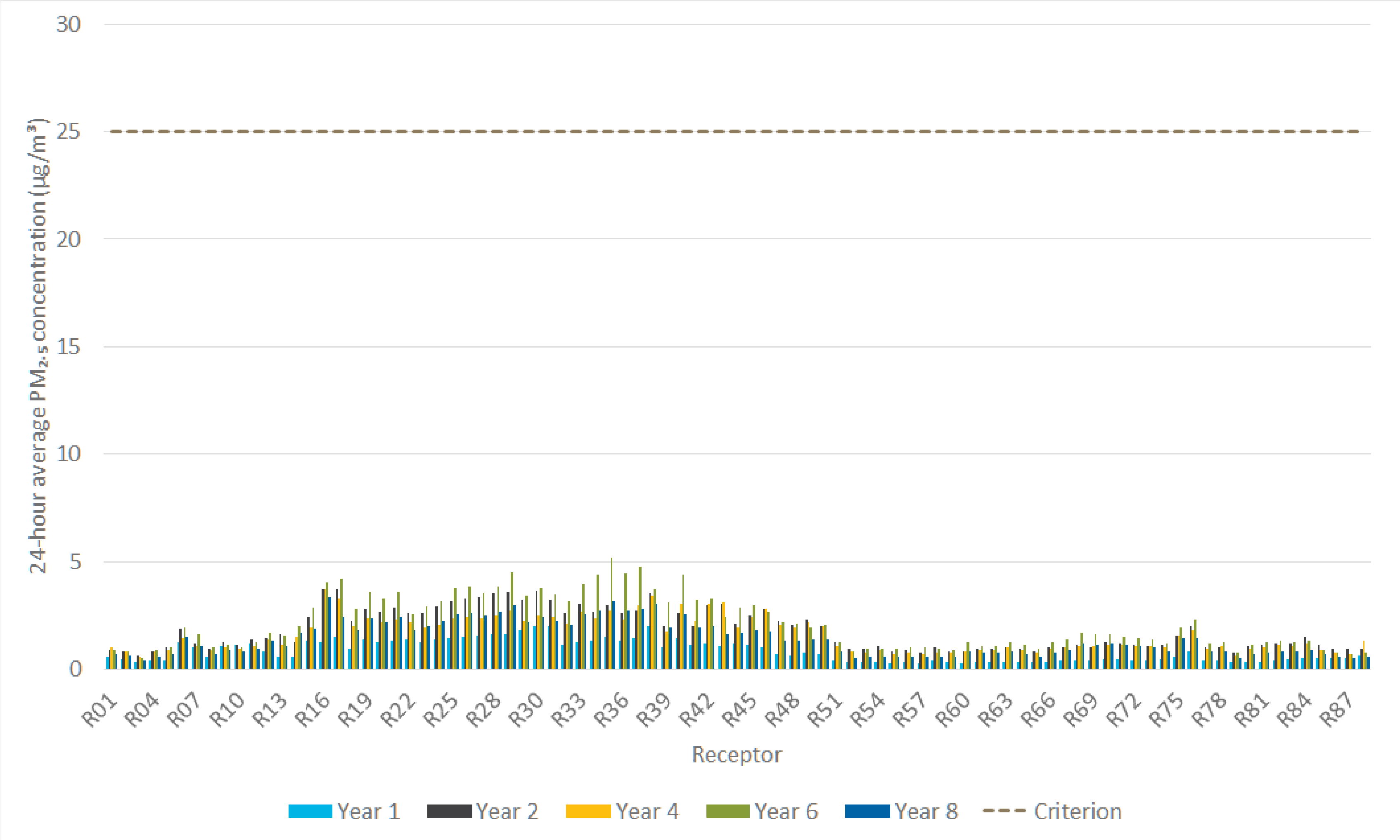


Figure 7.2 **Maximum incremental 24-hour average $PM_{2.5}$ concentrations – all scenarios**

7.3.2 Comparison with Appendix M of the EIS

In order to compare the change in predicted impacts from the EIS project design to the amended mine development (being considered in this report), the maximum incremental concentrations and deposition rates across all assessment locations for each mine year scenario have been compared. Specifically, this relates to a comparison between Table 8.1 of Appendix M of the EIS and Table 7.1 of this report. Focus is given to particulate matter pollutants with the following comparison figures generated:

- Figure 7.3 – annual average TSP;
- Figure 7.4 – maximum 24-hour average PM_{10};
- Figure 7.5 – annual average PM_{10};
- Figure 7.6 – maximum 24-hour average $PM_{2.5}$;
- Figure 7.7 – annual average $PM_{2.5}$;
- Figure 7.8 – annual average dust deposition; and
- Figure 7.9 – 99.9^{th} percentile 1-hour average arsenic (used as representative comparison for all metals/metalloids).

The following key points are noted in the comparison between the two sets of modelling results:

- The modelling results for year 1, year 2 and year 4 for the amended mine development are lower than the corresponding years in the EIS project;
- While no modelling for year 6 was conducted in Appendix M of the EIS, the results are highest for year 6 for the amended mine development. These maximum predicted concentrations for year 6 are comparable with year 2 and year 4 (peak operational years) from Appendix M of the EIS; and
- The predicted concentrations and deposition rates for the year 8 amended mine development are higher than those from the Appendix M of the EIS. This is due primarily to the increased rate of waste rock movements in year 8 of the revised mining schedule, whereas the EIS project year 8 only involved ROM ore haulage.

It is considered that the results of the modelling presented above demonstrate that the changes associated with amended mine development have notably improved the model predictions for the earlier operational years (years 1, 2 and 4) relative to those presented in Appendix M of the EIS. Year 8 impacts are higher for the amended project design due to a higher level of activity in later years of the amended mine schedule. However, predicted year 8 impacts are below applicable impact assessment criterion and the peak year impacts predicted in Appendix M of the EIS.

These changes include the refinements to the open cut pit development, revision to the waste rock emplacement schedule to provide greater sheltering to southern assessment locations, increased haul truck capacity reducing annual truck movements and the relocation of open cut pit exit ramps.

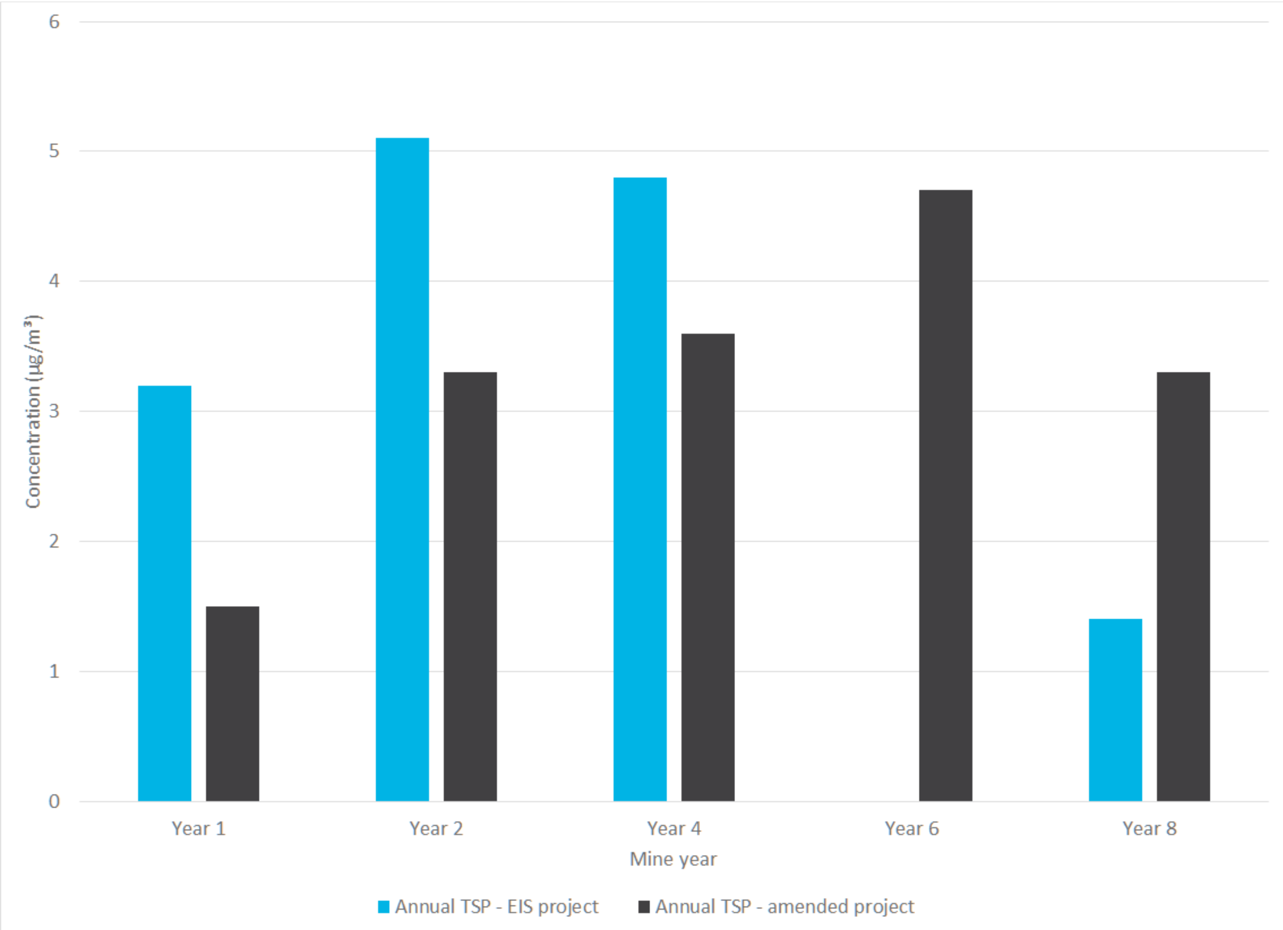


Figure 7.3 Comparison of predicted highest annual average incremental TSP concentration by mine year - EIS vs amended mine development

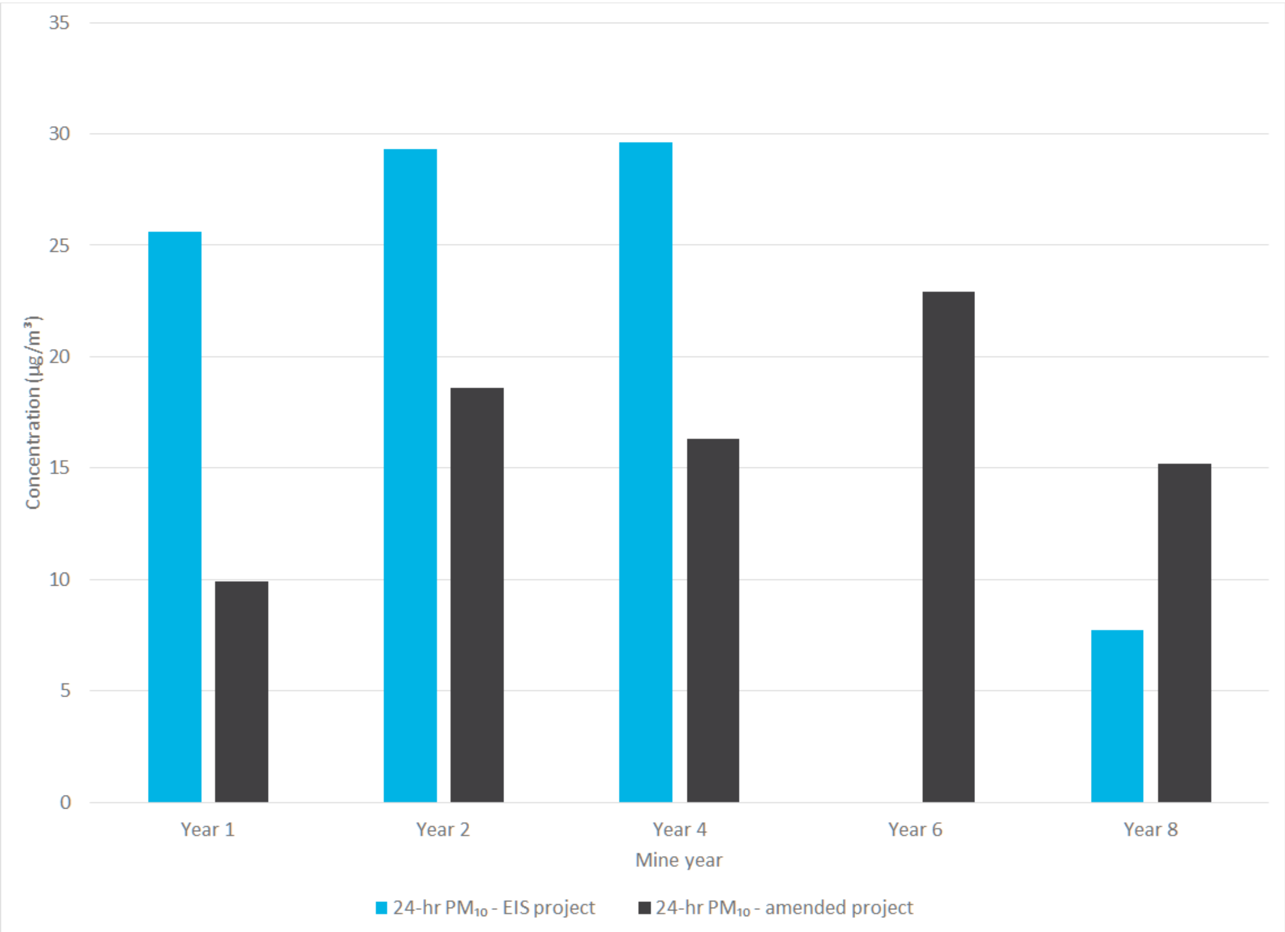


Figure 7.4 **Comparison of predicted highest 24-hour average incremental PM_{10} concentration by mine year - EIS vs amended mine development**

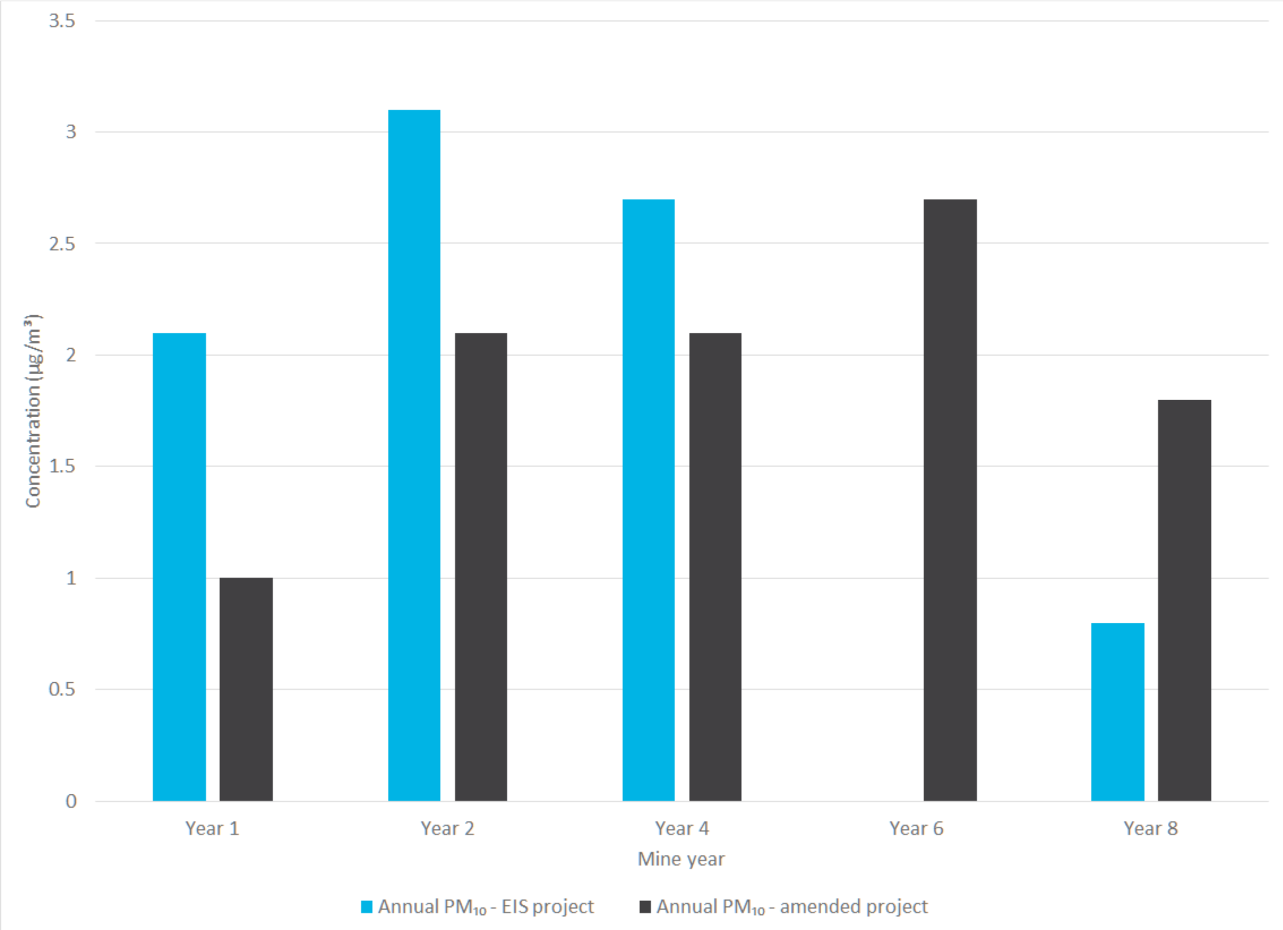


Figure 7.5 Comparison of predicted highest annual average incremental PM_{10} concentration by mine year - EIS vs amended mine development

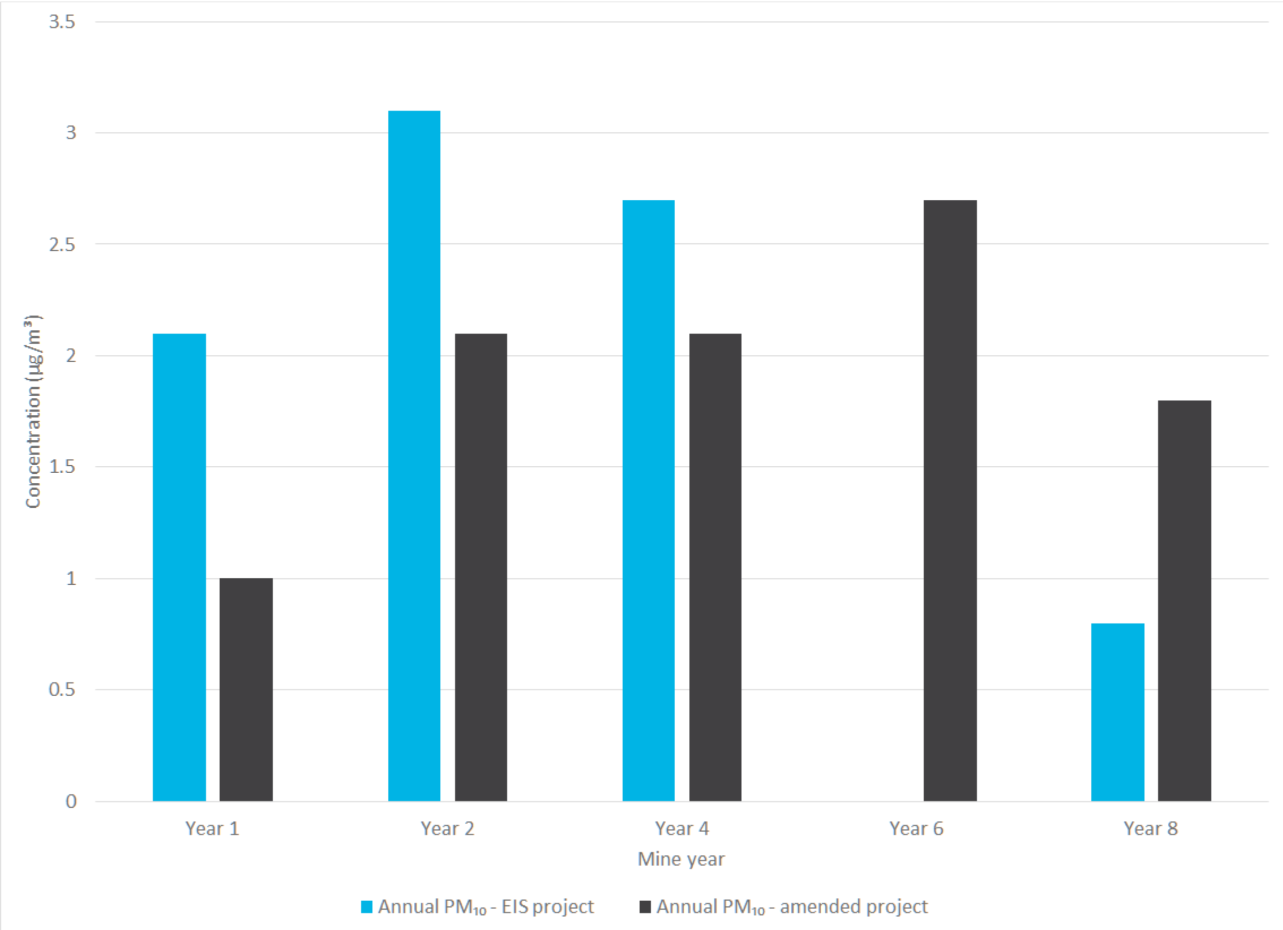


Figure 7.6 Comparison of predicted highest 24-hour average incremental $PM_{2.5}$ concentration by mine year - EIS vs amended mine development

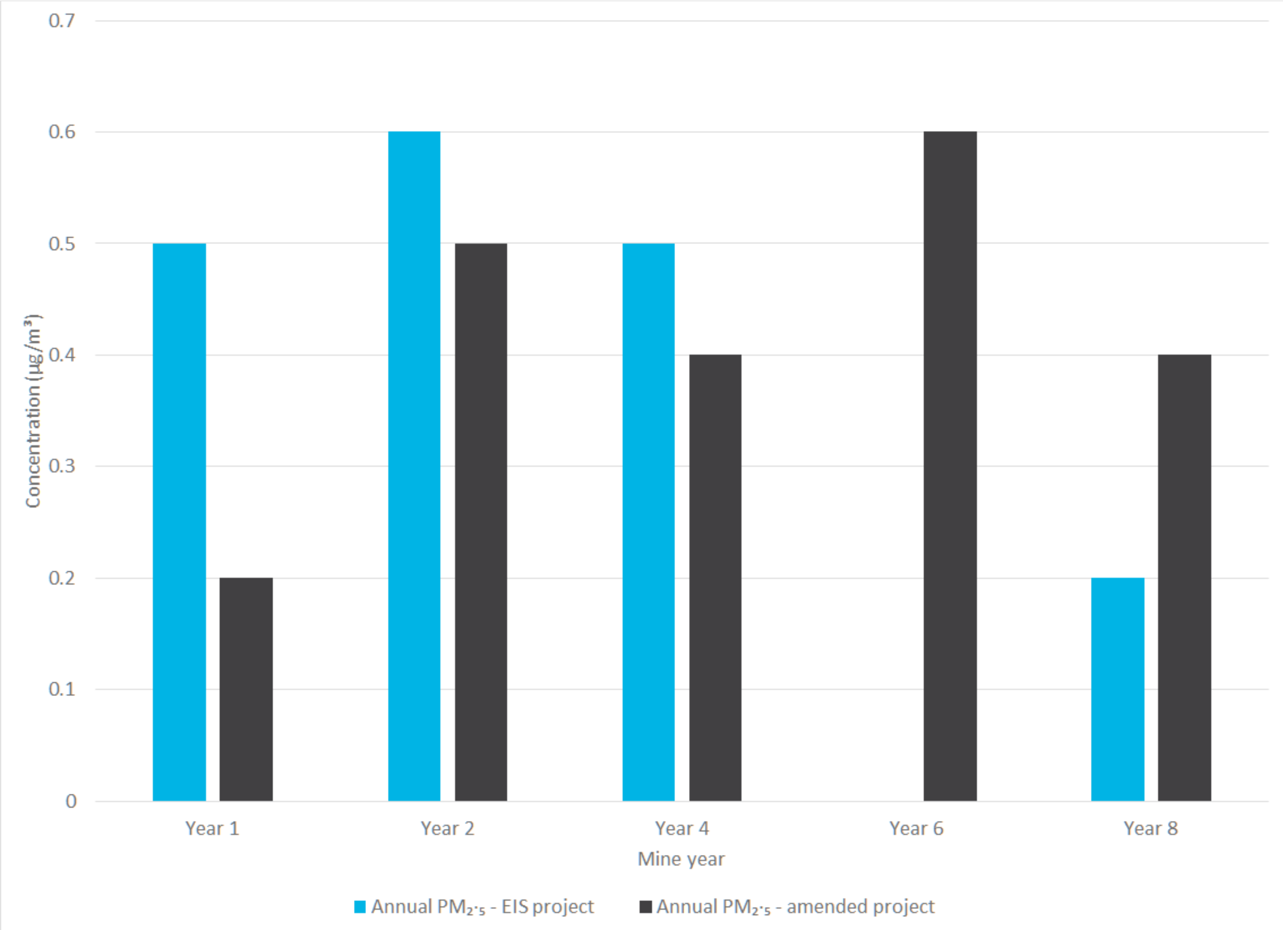


Figure 7.7 Comparison of predicted highest annual average incremental $PM_{2.5}$ concentration by mine year - EIS vs amended mine development

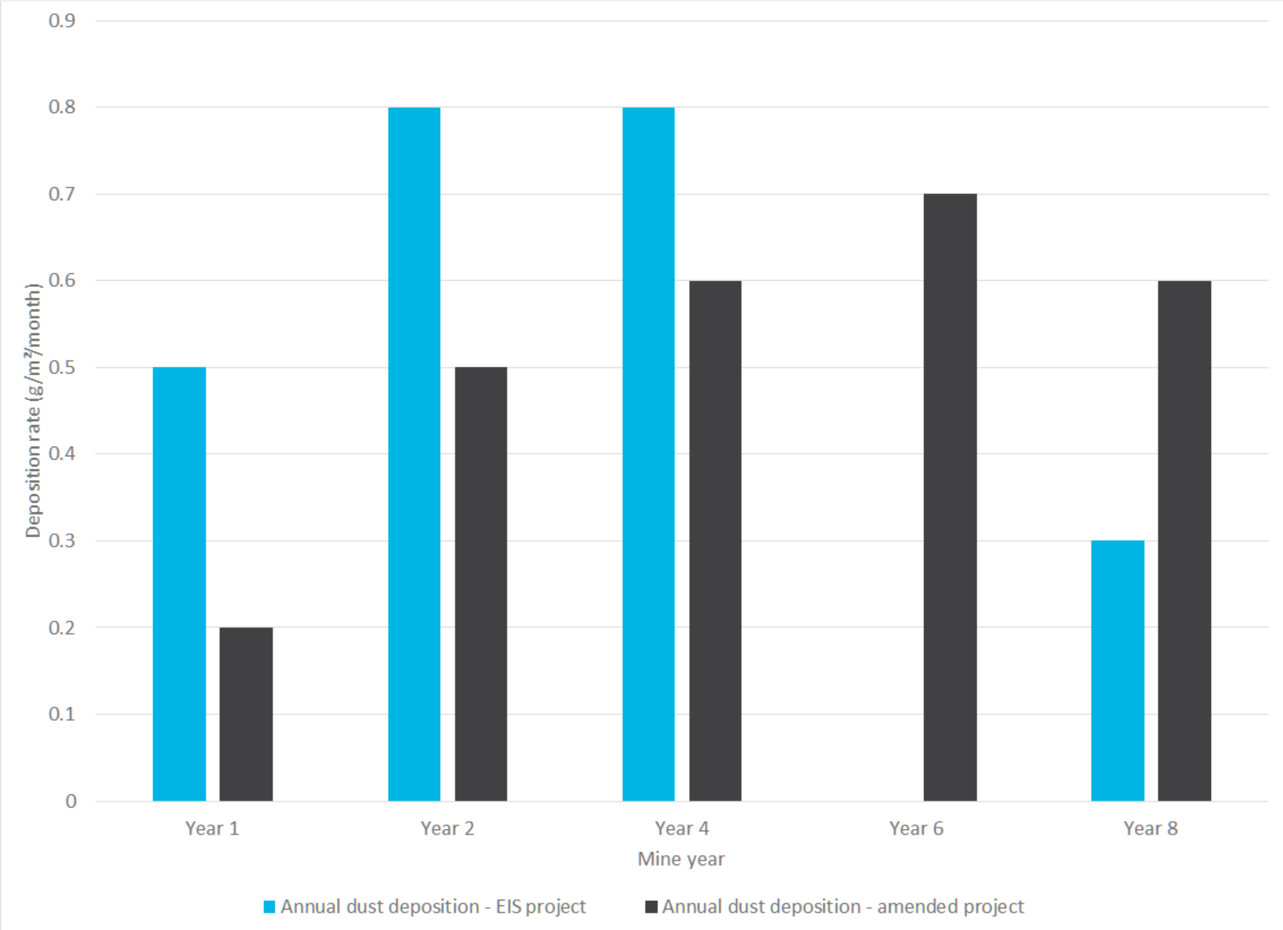


Figure 7.8 Comparison of predicted highest annual average incremental dust deposition rate by mine year - EIS vs amended mine development

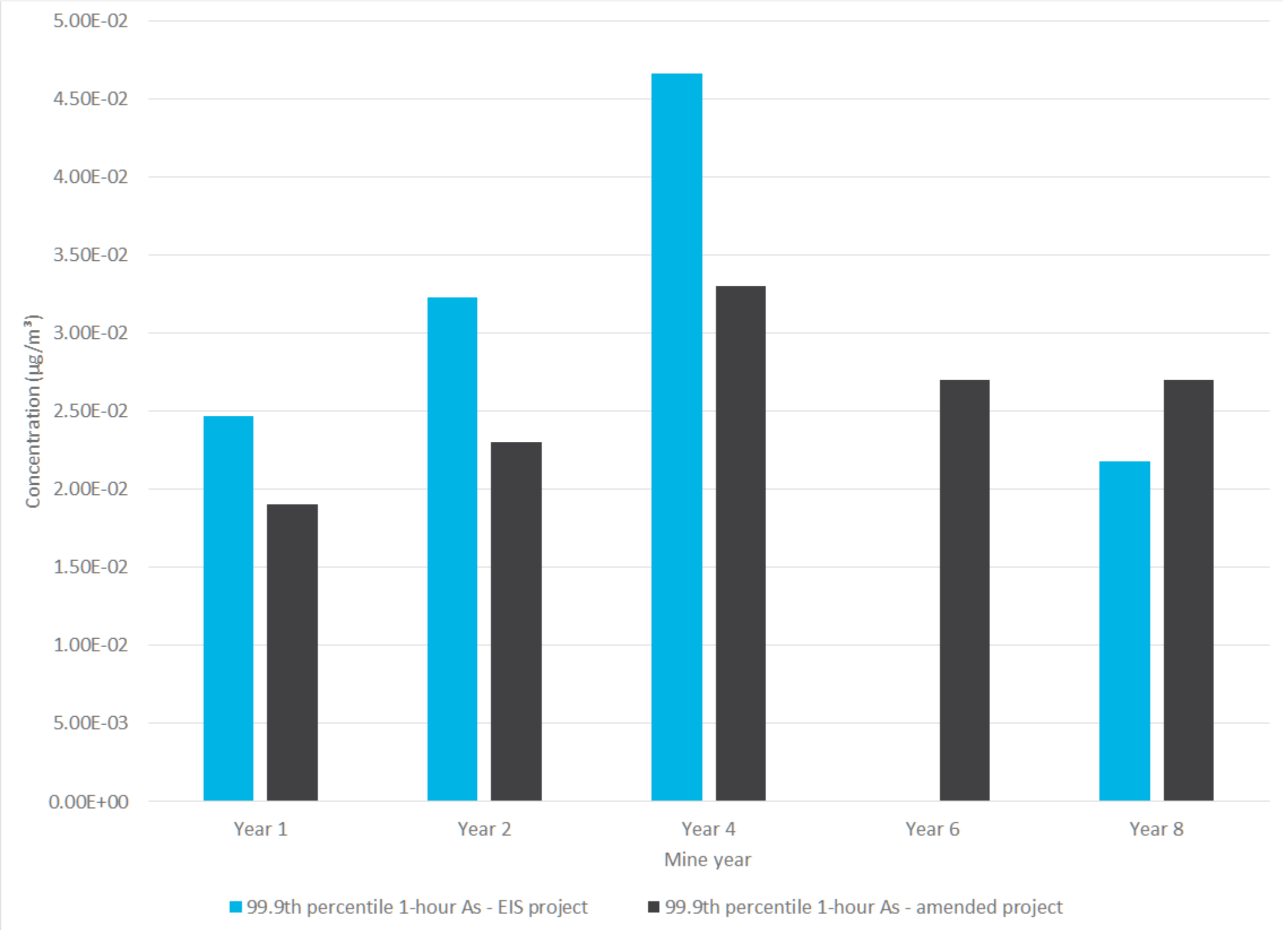


Figure 7.9 Comparison of predicted highest 99.9th percentile 1-hour average incremental As concentration by mine year - EIS vs amended mine development

7.4 Cumulative (background + project) results

Cumulative concentrations (project + background) were derived following the contemporaneous assessment approach. For each pollutant and averaging period, the coincident model prediction and corresponding background value were paired together to derive a cumulative concentration at each assessment location. For example, in the case of 24-hour average PM_{10}, at each assessment location the background concentration on the 1st January 2017 was paired with the model prediction on the 1st January 2017 and repeated for the entire modelling period.

Predicted cumulative concentrations and deposition rates from the five modelled scenarios for the amended mine development were then collated, and the maximum predicted results across the 89 assessment locations are presented in Table 7.2.

Table 7.2 Summary of highest predicted cumulative (background + project) concentrations and deposition levels across all assessment locations

Pollutant	Averaging period	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
TSP	Annual	µg/m³	36.8	38.6	38.9	40.0	38.6	90
PM_{10}	3rd highest 24-hour	µg/m³	40.9	43.4	43.1	46.1	43.2	50
	Annual	µg/m³	15.1	16.2	16.2	16.8	15.9	25
$PM_{2.5}$	24-hour maximum	µg/m³	15.7	16.2	16.2	17.5	16.1	25
	Annual	µg/m³	6.3	6.5	6.5	6.7	6.5	8
Dust deposition	Annual	g/m²/month	1.6	1.9	2.0	2.1	2.0	4
NO_2	1-hour maximum	µg/m³			171.7			246
	Annual	µg/m³			14.2			62

Note: Due to two existing exceptional dust storm events in 2017 (see Section 6.3.1 of Appendix M of the EIS), the third highest cumulative 24-hour average PM_{10} concentration is presented
Note: A single worst case scenario was modelled for NO_2 emissions based on year 6 diesel combustion.

Due to the dust storm event that influenced two days in the 2017 monitoring dataset that was used to define background air quality in the cumulative analysis, the 3rd highest cumulative 24-hour average PM_{10} concentration is reported in Table 7.2.

As shown the predicted concentrations and deposition rates for all pollutants and averaging periods are below the applicable NSW EPA assessment criteria. Relative to the results presented in Appendix M of the EIS, the following points are noted:

- For year 1, 2 and 4, the maximum cumulative results for all pollutants and averaging periods for the amended mine development are lower than the equivalent maximum cumulative results for the EIS project design.
- The maximum predicted cumulative 24-hour average PM_{10} concentration in Year 4 for the EIS project design was in exceedance of the applicable assessment criterion. This is not the case for the amended mine development results with the maximum cumulative result, occurring in year 6, below the applicable assessment criterion.
- Consistent with the incremental model predictions presented in Section 7.3, the predicted cumulative concentrations for year 8 are higher than the equivalent model predictions presented in Appendix M of the EIS. However, all concentrations are below applicable assessment criterion.
- The maximum predicted cumulative 1-hour average NO_2 concentration is slightly higher for the amended mine development relative to the results presented in Appendix M of the EIS, despite a lower annual diesel consumption rate for the amended mine development emission calculations. The maximum concentration for each iteration of the peak NO_2 modelling occurs at different assessment locations and is considered largely a function of the differences in mine plans between the two modelling exercises. Specifically, Appendix M of the EIS was based on the year 4 mine plan source configuration while the current modelling relates to the year 6 mine plan.

To illustrate cumulative 24-hour average PM_{10} concentrations at the most impacted assessment location, the daily-varying cumulative concentrations predicted at assessment location R28a during year 6 operations are illustrated in Figure 7.10.

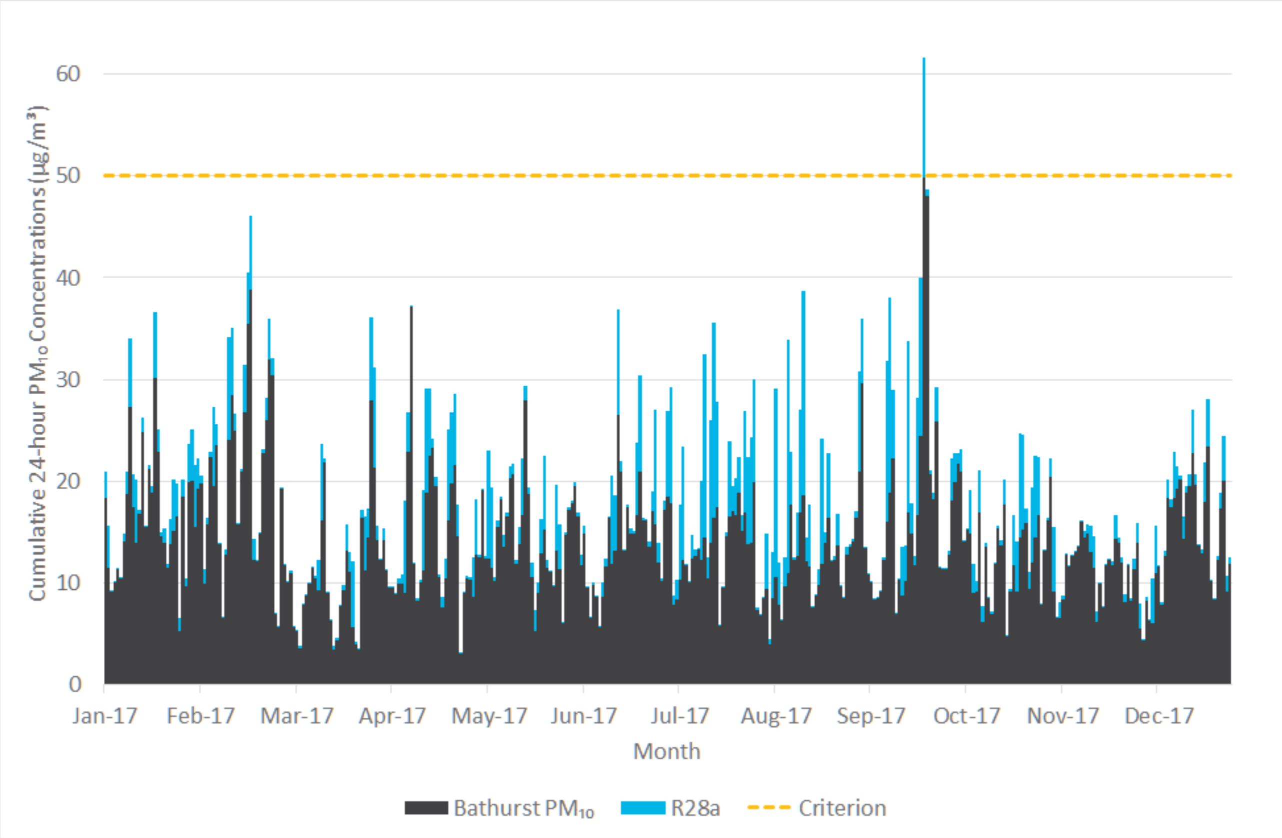


Figure 7.10 Daily-varying cumulative 24-hour average PM_{10} concentrations – Year 6 operations – assessment location R28a

7.5 Voluntary land acquisition criteria

The results presented in Section 7.3 and 7.3.2 demonstrate compliance with the relevant VLAMP criteria for both mitigation and acquisition. As stated, VLAMP criteria also apply if the development contributes to an exceedance on more than 25% of privately-owned land upon which a dwelling could be built under existing planning controls.

Analysis of the contour plots presented in Appendix D indicates that project-only 24-hour PM_{10} and $PM_{2.5}$ concentrations will not exceed 50 µg/m³ or 25 µg/m³ across more than 25% of any privately-owned land during any of the five modelled scenarios.

To assess against voluntary land acquisition criteria for cumulative annual average PM_{10}, $PM_{2.5}$, TSP or dust deposition, the relevant fixed background value from Chapter 5 was added to the incremental contour plots presented in Appendix D. This analysis highlighted that no exceedance of relevant VLAMP criteria across more than 25% of any privately-owned land would occur for any of the modelled scenarios.

7.6 Post-blast fume impacts

Blasting emissions were assessed in detail in Appendix M of the EIS. The modelling approach aimed to identify optimal blasting conditions for the minimisation of associated air quality impacts. The modelling identified that blasting events at the project should be restricted to between 8 am and 4 pm. It is noted that there are other environmental considerations, such as acoustics, relating to the timing of blasts that need to be accounted for.

Regis have advised that planned blasting is proposed during the middle of the day and is likely to be conducted on a one blast per day basis. Blasting will generally not be carried out on Sundays and public holidays.

No notable change in blasting operations is proposed under the amended development and the results of the EIS blasting modelling remain applicable. Consequently, no additional modelling has been undertaken for this assessment.

8 Mitigation and monitoring

8.1 Particulate matter emissions

The particulate matter emission mitigation measures and management practices proposed for the project are documented in Section 6.3.1. These controls were incorporated into the emissions calculations and dispersion modelling wherever an appropriate emission reduction factor was available. A best practice management analysis was undertaken, which demonstrated that the mitigation measures proposed are in compliance with accepted best practice for dust control.

8.2 Diesel combustion emissions

Consistent with the EIS, the following management practices will be implemented by Regis to minimise emissions from the combustion of diesel during the life of the project:

- where feasible, equipment compliant with a more recent emission standard than USEPA Tier 2 will be sourced;
- where feasible, electricity-powered mining equipment will be adopted;
- open cut pit haulage ramps will be designed to reduce the gradient of travel as much as feasible;
- haul roads will be routinely maintained to reduce truck tyre rolling resistance;
- the distance of material haulage to ROM pad and waste rock emplacements will be optimised to reduce haulage distances wherever feasible;
- all equipment will be routinely serviced to maintain manufacturers' emission specifications;
- idling of diesel equipment will be minimised wherever feasible; and
- low-sulphur diesel fuels and lubricants will be used where feasible.

8.3 Blast fume management

Consistent with the EIS, it is recommended that the risk of post-blast fume is mitigated through the implementation of the following measures, as appropriate:

- identify the key risk factors for blast fume at the site, and establish and implement site-specific measures to reduce blast fume events;
- prior to developing the project blasting procedure, a blast fume risk analysis will be conducted, considering factors likely to be encountered, such as ground conditions, occurrence of water (wet holes and depth of water), explosives products for use and prevailing and forecast meteorology, and the appropriate response actions to be taken;
- reduce the potential for fume by:
    - delaying blasting to avoid unfavourable weather conditions that are likely to cause or spread a blast fume, including unfavourable ground moisture conditions;

- selecting an explosive product that is correct for the conditions;
- monitoring the amount of hydrocarbon (diesel) in the product;
- preventing water ingress into blast holes;
- keeping sleep time (the amount of time between charging and firing of a blast) to a minimum, well within manufacturer recommended times;
- providing effective stemming; and
- loading the product using the appropriate techniques.

- restrict the blast area and the quantity of explosives to be used in areas prone to blast fume; and
- investigate and record causal factors for post-blast fume events.

8.4 Air quality monitoring

As documented in Appendix M of the EIS, Regis has established an air quality monitoring network at the project area comprising of a HVAS (PM_{10}), dust deposition gauges and a meteorological monitoring station. The monitoring locations will be reviewed prior to the commencement of operations.

Regis commits to the installation and maintenance of a real-time particulate matter monitoring network (PM_{10}) during the life of the project. The real-time network will feature real-time monitoring locations in the Kings Plains area at the southwest, central south and southeast of the project area. Additionally, monitoring locations will be established to the east and to the west of the project area. Specific monitoring locations will be finalised taking Australian Standard guidance, land access and mains power access into consideration. This network will provide Regis with comprehensive upwind and downwind monitoring based on the dominant wind directions. In combination with data from the existing meteorological monitoring station and project-specific trigger conditions, the real-time monitoring network will be used to inform reactive management practices to prevent adverse impacts at sensitive receptors.

Due to land access issues and the notable expense of real-time particulate matter monitoring equipment, specific locations of monitoring stations and the exact monitoring equipment options to be installed has not yet been finalised. If project approval is awarded, Regis commit to the detailed design of a real-time air quality monitoring network and will seek approval from the NSW EPA on the location and equipment options to be installed.

Daily and annual average PM_{10} concentrations and monthly average dust deposition results will be recorded and reported in annual environmental management reports (the Annual Review) and made available to the public through Regis's website.

Regis commits to the preparation of a detailed air quality management plan (AQMP) should project approval be received. The AQMP will detail key emission sources, baseline conditions (meteorology and air quality), mitigation methods, air quality monitoring network, roles and responsibilities of Regis personnel, actions in response to air quality issues and/or complaints, measures of compliance and reporting requirements.

The air quality monitoring network would be documented within the AQMP. The monitoring plan would detail the location of air quality and meteorological monitoring equipment, the relevant air quality impact assessment criteria for the project and reactive air quality trigger levels set for management purposes. The AQMP and monitoring plan would be submitted to DPIE and NSW EPA for approval prior to the commencement of construction for the project.

9 Greenhouse gas assessment

9.1 Introduction

The estimation of greenhouse gas (GHG) emissions for the project was based on the Australian Government Department of the Environment and Energy (DoEE) National Greenhouse Accounts Factors (NGAF) workbook (DoEE 2019). This is an update from Appendix M of the EIS which applied emission factors from the NGAF workbook 2018.

The methodologies in the NGAF workbook follow a simplified approach, equivalent to the 'Method 1' approach outlined in the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (DoE 2014). The Technical Guidelines are used for the purpose of reporting under the National Greenhouse and Energy Reporting Act 2007 (the NGER Act).

For accounting and reporting purposes, GHG emissions are defined as 'direct' and 'indirect' emissions. Direct emissions (also referred to as Scope 1 emissions) occur within the boundary of an organisation and as a result of that organisation's activities. Indirect emissions are generated as a consequence of an organisation's activities but are physically produced by the activities of another organisation (DoEE 2018). Indirect emissions are further defined as Scope 2 and Scope 3 emissions. Scope 2 emissions occur from the generation of the electricity purchased and consumed by an organisation. Scope 3 emissions occur from all other upstream and downstream activities, for example the downstream extraction and production of raw materials or the upstream use of products and services.

Scope 3 is an optional reporting category (Bhatia et al 2010) and should not be used to make comparisons between organisations, for example in benchmarking GHG intensity of products or services. Typically, only major sources of Scope 3 emissions are accounted and reported by organisations. Specific Scope 3 emission factors are provided in the NGAF workbook for the consumption of fossil fuels and purchased electricity, making it straightforward for these sources to be included in a GHG inventory, even though they are a relatively minor source.

9.2 Emission sources

The GHG emission sources included in this assessment are listed in Table 9.1, representing the most significant sources associated with the project. Emissions of GHGs have been quantified on an annual basis accounting for the construction, operational and rehabilitation phases of the project.

GHG emissions from the project are estimated using the methodologies outlined in the NGAF workbook, using fuel energy contents and scope 1, 2 and 3 emission factors for diesel, LPG, and electricity use in NSW.

Table 9.1 Scope 1, 2 and 3 emission sources

Scope 1	Scope 2	Scope 3
Direct emissions from fuel combustion (diesel) by onsite plant and equipment.	Indirect emissions associated with the consumption of purchased electricity	Indirect upstream emissions from the extraction, production and transport of diesel and petrol
Direct emissions from fuel combustion (LPG) by kiln and furnace at the processing plant		Indirect upstream emissions from electricity lost in delivery in the transmission and distribution network.

9.3 Excluded emissions

There are a number of GHG emissions that are considered minor relative to the emission sources listed in Section 9.2 and have been excluded from this GHG assessment.

These include:

- fugitive leaks from high voltage switch gear and refrigeration (Scope 1);
- land use change and land clearing (Scope 1);
- disposal of solid waste at landfill (Scope 3);
- transport of product to market (Scope 3); and
- travel of employees to and from the project (Scope 3).

In the case of land use change, it is considered that the GHG emissions generated by the changes to the land use in the establishment of the project will be offset by the rehabilitation of the site at the completion of the project. The majority of the land disturbed by the development of the project has already cleared for agricultural purposes and therefore vegetation clearing will be relatively minor. Final rehabilitated areas of the project will feature a mixture of agricultural land and native vegetation.

9.4 Activity data

Estimates of annual diesel and electricity consumption associated with the amended mine development have been provided by Regis. A summary of annual energy consumption is presented in Table 9.2. It is noted that year 1 contains construction-related activities, while years 12 and year 15 relate to a decrease in mining operations and an increase in site rehabilitation activities.

Table 9.2 Project annual energy consumption

Stage of project	Diesel (l)	LPG (l)	Electricity (kWh)
Year 1	8,720,269	-	-
Year 2	19,344,119	582,400	110,071,397
Year 3	20,895,728	582,400	162,721,994
Year 4	21,399,685	582,400	162,721,904
Year 5	21,584,415	582,400	163,167,765
Year 6	34,301,650	582,400	176,244,924
Year 7	27,659,751	582,400	180,802,214
Year 8	27,085,250	582,400	180,802,216
Year 9	17,523,900	582,400	181,297,564
Year 10	14,196,311	582,400	152,571,124
Year 11	9,655,453	582,400	152,571,124
Year 12	4,614,668	582,400	139,493,599
Year 13	2,840,000	582,400	-
Year 14	1,136,000	-	-
Year 15	1,136,000	-	-

9.5 Emission estimates

The following emission factors have been used to estimate GHG emissions from the project:

- diesel consumption on-site (Scope 1) – diesel oil factors from Table 3 of the NGAF workbook (2019);
- LPG consumption (Scope 1) – liquified natural gas factors from Table 2 of the NGAF workbook (2019);
- electricity consumption (Scope 2) – NSW Scope 2 emission factor from Table 5 of the NGAF workbook (2019);
- diesel consumption on-site (Scope 3) – diesel oil factor from Table 43 of the NGAF workbook (2019);
- LPG consumption on-site (Scope 3) – LPG factor from Table 43 of the NGAF workbook (2019); and
- electricity consumption (Scope 3) - NSW Scope 3 emission factor from Table 44 of the NGAF workbook (2019).

It is noted that these emission factors have been updated from those adopted for Appendix M of the EIS to reflect the most recent applicable GHG emission factors.

The estimated annual GHG emissions for each emission source are presented in Table 9.3.

Table 9.3 Estimated annual GHG emissions

Stage of project	Scope 1 (t CO_2-e/year)			Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)			
	Diesel	LPG	Total	Electricity	Diesel	LPG	Electricity	Total
Year 1	23,629.5	-	23,629.5	-	1,211.8	-	-	1,211.8
Year 2	52,417.1	759.3	53,176.4	89,157.8	2,688.1	53.0	9,906.4	12,647.5
Year 3	56,621.6	759.3	57,380.9	131,804.8	2,903.7	53.0	14,645.0	17,601.7
Year 4	57,987.2	759.3	58,746.4	131,804.7	2,973.7	53.0	14,645.0	17,671.7
Year 5	58,487.7	759.3	59,247.0	132,165.9	2,999.4	53.0	14,685.1	17,737.5
Year 6	92,947.9	759.3	93,707.1	142,758.4	4,766.6	53.0	15,862.0	20,681.6
Year 7	74,950.2	759.3	75,709.5	146,449.8	3,843.6	53.0	16,272.2	20,168.8
Year 8	73,393.4	759.3	74,152.7	146,449.8	3,763.8	53.0	16,272.2	20,089.0
Year 9	47,484.9	759.3	48,244.1	146,851.0	2,435.1	53.0	16,316.8	18,804.9
Year 10	38,468.0	759.3	39,227.3	123,582.6	1,972.7	53.0	13,731.4	15,757.2
Year 11	26,163.6	759.3	26,922.9	123,582.6	1,341.7	53.0	13,731.4	15,126.2
Year 12	12,504.5	759.3	13,263.7	112,989.8	641.3	53.0	12,554.4	13,248.7
Year 13	7,695.6	759.3	8,454.9	-	394.6	53.0	-	447.7
Year 14	3,078.2	-	3,078.2	-	157.9	-	-	157.9
Year 15	3,078.2	-	3,078.2	-	157.9	-	-	157.9
Average	**41,927.2**	**607.4**	**42,534.6**	**95,173.2**	**2,150.1**	**42.4**	**10,574.8**	**12,767.3**
Total	**628,907.6**	**9,111.4**	**638,018.9**	**1,427,597.3**	**32,251.7**	**636.5**	**158,621.9**	**191,510.1**

The significance of project GHG emissions relative to state and national GHG emissions is made by comparing annual average GHG emissions against the most recent available total GHG emissions inventories (calendar year 2018[3]) for NSW (131,684.9 kt CO_2-e) and Australia (537,446.4 kt CO_2-e).

Annual average GHG emissions (combined Scope 1, 2 and 3) generated by the project represent approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018.

It is noted that the annual average GHG emissions have increased slightly from the EIS mine development GHG assessment. This is primarily due to the fact that the cumulative life of mine diesel combustion totals are projected to be higher for the amended mine development relative to the EIS mine development projections. The cumulative diesel consumption rates are presented in Figure 9.1.

3 http://ageis.climatechange.gov.au/

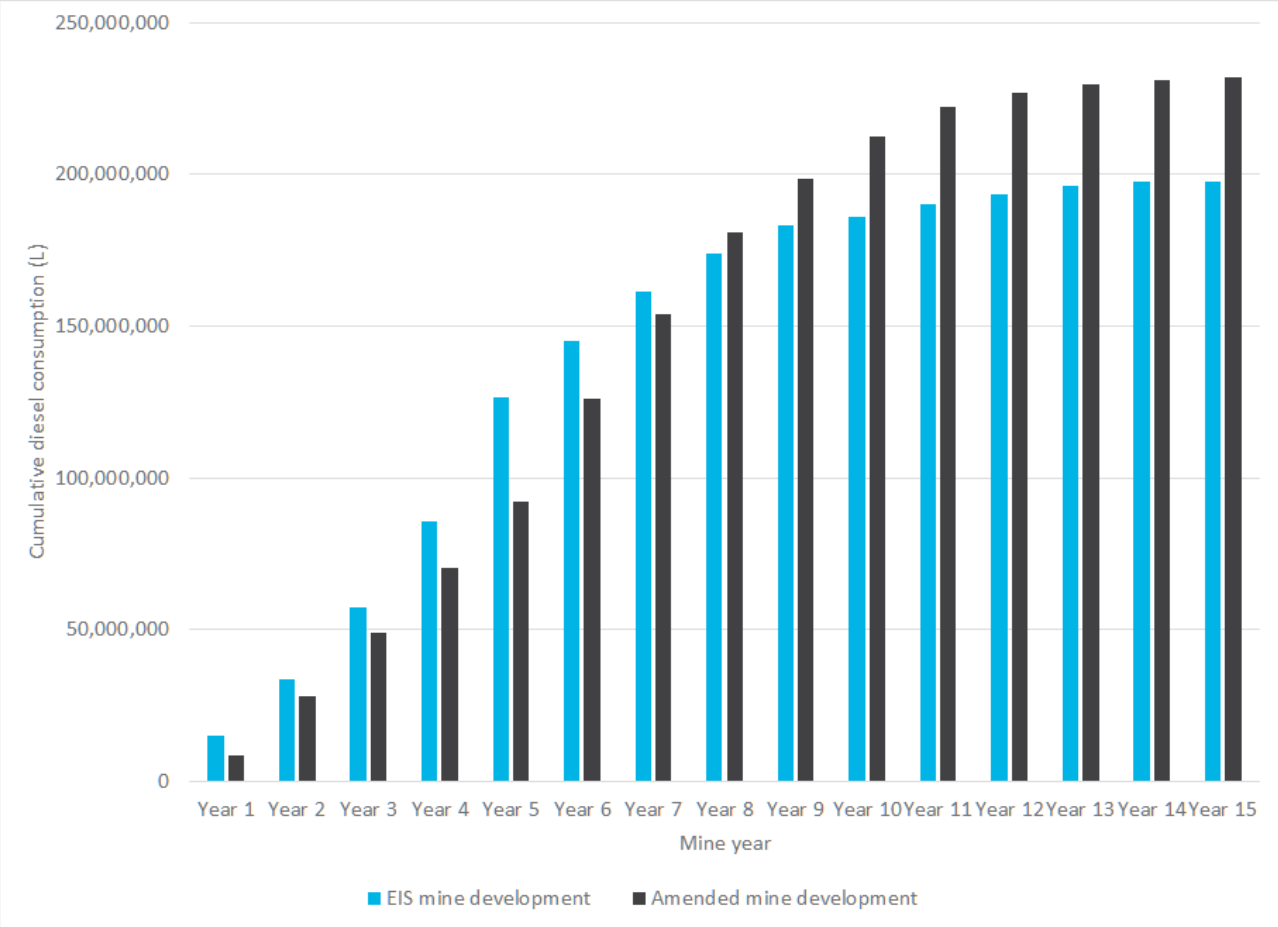


Figure 9.1 Cumulative diesel consumption rates by mine year – EIS mine development vs amended mine development

The contribution of the project to projected climate change, and the associated environmental impacts, would be in proportion with its contribution to global greenhouse gas emissions.

9.6 Emission management

Consistent with the EIS, the GHG emissions from the amended mine development are principally associated with on-site energy consumption, specifically diesel combustion and consumption of purchased electricity. The proposed mining development features conventional drill, blast and haul techniques, which is largely dependent on the use of diesel-powered equipment. Regis is currently investigating the feasibility of electricity-powered fleet. It is noted that the use of an electric powered fleet would ultimately lead to a reduction in the amount of diesel combustion related particulate matter and NO_x emissions and therefore the results presented are conservative.

Ultimately, measures and practices designed to improve energy efficiency, will assist with the management of project GHG emissions. The diesel combustion management strategies listed in Section 8.2 will equally assist with the reduction of associated GHG emissions.

In order to minimise GHG emissions, the following recommendations are made:

- adopt the use of energy efficient lighting technologies and hot water and air conditioning systems wherever practical;

- use of alternative energy sources where feasible, such as solar power;
- conduct periodic audits and reviews on the amounts of materials used, amount of mine waste and non-mine waste generated and disposed; and
- source materials locally where feasible to minimise emissions generated from upstream activities.

In general, opportunities to improve energy efficiency will be investigated on an ongoing basis throughout the life of the project.

The calculated annual average Scope 1 and 2 emissions from the project are greater than the NGER Scheme facility reporting threshold of 25,000 tpa CO_2-e. Consequently, Regis will measure energy consumption, and calculate and report Scope 1 and 2 GHG emissions in accordance with the requirements of the NGER Act.

10 Conclusions

An air quality impact and GHG assessment was undertaken for the amended mine development to determine the potential changes to emissions and impacts from those presented in Appendix M of the EIS. The key changes from the EIS mine development presented in the EIS that have implications for air quality include:

- realignment of the site access road;
- revision of the mine and waste rock emplacement schedule; and
- optimisation of the pit design allowing for a reduction in the pit amenity bund.

Air pollutant emissions were quantified for five stages of the amended mine development (year 1, year 2, year 4, year 6 and year 8). The five emission stages are representative of the progressive development of the amended mine development. When compared to the emissions presented in Appendix M of the EIS, the annual emissions for mine years 1, 2 and 4 have decreased for the amended mine development, while Year 8 emissions are higher due to a higher level of waste rock movement in the amended mine development at the comparable mine stage.

Dispersion modelling was undertaken for the five emission stages in the development of the amended mine development. Atmospheric dispersion modelling was undertaken using the US-EPA regulatory model, AERMOD. Hourly meteorological observations from 2017, collected primarily by the onsite meteorological station, were used as inputs into the dispersion modelling process.

The results of the modelling show that, for all assessed stages of the project development and operation, the predicted concentrations and deposition rates for particulate matter (TSP, PM_{10}, $PM_{2.5}$, dust deposition, metals and metalloids) and gaseous pollutants (NO_2) are below the applicable impact assessment criteria at neighbouring assessment locations. Cumulative impacts were assessed by combining modelled project impacts with recorded ambient background levels. Despite a range of conservative assumptions in the emission calculations and dispersion modelling techniques, the cumulative results also demonstrated compliance with applicable impact assessment criteria.

The design of the project incorporates a range of dust mitigation measures. A review of dust control measures was undertaken for the project, and this identified that the proposed mitigation and management measures will be in accordance with accepted industry best practice. On the basis of the modelling predictions, the proposed mitigation measures will effectively control operational emissions to minimise impacts on the surrounding environment.

To supplement the mitigation measures, Regis commits to the installation and maintenance of a real-time particulate matter monitoring network (PM_{10}) during the life of the project. The real-time network will feature real-time monitoring locations in the Kings Plains area at the southwest, central south and southeast of the project area. In combination with data from the existing meteorological monitoring station and project-specific trigger conditions, the real-time monitoring network will be used to inform reactive management practices to prevent adverse impacts at sensitive receptors.

An updated GHG assessment was also undertaken for the amended mine development. Annual average GHG emissions (combined Scope 1, 2 and 3) generated by the project represent approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018.

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Abbreviations

AERMOD	AMS/US-EPA regulatory model
AHD	Australian height datum
Approved Methods for Modelling	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*
Ag	Silver
ANE	Ammonium nitrate emulsion
AQS	Air quality station
As	Arsenic
AWS	Automatic weather station
Ba	Barium
Be	Beryllium
BoM	Bureau of Meteorology
CO_2-e	Carbon dioxide equivalent
CO	Carbon monoxide
Cd	Cadmium
Cr	Chromium
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cu	Copper
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
DoEE	Department of the Environment and Energy
EPA	Environment Protection Authority
FTE	Full-time equivalent
GHG	Greenhouse gas
HCN	Hydrogen cyanide
Hg	Mercury
HVAS	High volume air sampler
LPG	Liquid petroleum gas
Mn	Manganese
Mtpa	Million tonnes per annum

NGAF	National Greenhouse Accounts Factors
Ni	Nickel
NO_x	Oxides of nitrogen
NPI	National Pollution Inventory
O_3	Ozone
OEH	Office of Environment and Heritage
Pb	Lead
PM_{10}	Particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
ROM	Run-of-mine
Sb	Antimony
SO_2	Sulphur dioxide
TAPM	The Air Pollution Model
TSF	Tailings storage facility
US-EPA	United States Environmental Protection Agency
VLAMP	Voluntary Land Acquisition and Mitigation Policy
VOC	Volatile organic compounds
Zn	Zinc


Appendix A

Assessment locations




A.1 Assessment locations

As stated in Chapter 2, 89 individual private residences have been selected as assessment locations for the dispersion modelling undertaken in this AQIA. The details of these assessment locations are presented in Table A.1

Table A.1 Assessment locations

Assessment location ID	Easting (m, MGA 55S)	Northing (m, MGA 55S)	Elevation (m, AHD)
R01	716348	6297846	960
R02	716792	6298310	970
R03	717952	6298177	990
R04	718739	6298128	980
R05	719288	6297828	986
R06	719366	6292570	970
R07	719897	6293856	990
R08	720175	6290492	965
R09	719854	6290003	969
R10	719793	6290405	978
R11	719609	6290265	990
R12	719147	6290295	995
R13	718837	6288912	961
R14	718823	6290061	1,025
R15	718065	6290538	1,001
R16	717636	6290749	966
R17	717238	6290803	941
R18	716920	6290390	975
R19	716623	6290659	941
R20	716560	6290490	945
R21	716537	6290612	940
R22	716299	6290200	925
R23	716324	6290562	950
R24	716354	6290635	947
R25	716409	6290712	939
R26	716385	6290760	938
P27*	716321	6290770	940
R28	716331	6290835	936
R28a	716388	6290973	1,050
R29	716189	6290744	937
R30	716196	6290885	935

Table A.1 Assessment locations

Assessment location ID	Easting (m, MGA 55S)	Northing (m, MGA 55S)	Elevation (m, AHD)
R31	716118	6290768	929
R32	715655	6290652	918
R33	715467	6290816	911
R34	714856	6290821	925
R35	714566	6290941	914
R36	714467	6290779	917
R37	714332	6290853	910
R38	714435	6291193	925
R39	714142	6290386	922
R40	714134	6290835	905
R41	713891	6290416	925
R42	713793	6290933	895
R43	713785	6291222	895
R44	713466	6290491	920
R45	713516	6290684	905
R46	713504	6290879	895
R47	713412	6291327	886
R48	713439	6291427	891
R49	713032	6290869	885
R50	712510	6290313	885
R51	711195	6289940	870
R52	710805	6290115	880
R53	710822	6290218	884
R54	711159	6290258	878
R55	710711	6290277	889
R56	710824	6290311	886
R57	710774	6290450	890
R58	711457	6290635	919
R59	711365	6290898	920
R60	711229	6291435	925
R61	711087	6292011	925
R62	711141	6292012	925
R63	711370	6292057	909
R64	711111	6292250	915

Table A.1 Assessment locations

Assessment location ID	Easting (m, MGA 55S)	Northing (m, MGA 55S)	Elevation (m, AHD)
R65	710773	6292278	935
R66	711308	6292437	903
R67	711454	6292457	898
R68	711164	6292868	905
R69	710866	6292894	905
R70	711641	6292962	905
R71	711671	6293059	905
R72	711324	6293089	901
R73	711288	6293167	897
R74	711481	6293491	895
R75	712857	6293911	885
R76	713548	6294259	905
R77	711533	6294724	900
R78	712198	6295202	890
R79	711342	6295417	900
R80	712226	6296709	910
R81	712527	6296713	903
R82	712925	6296570	905
R83	713066	6296599	914
R84	713182	6296059	930
R85	713818	6296881	940
R86	714076	6296950	945
R87	714168	6297004	946
R88	714321	6296680	950

Note *: assessment location P27 is now Regis-owned.


Appendix B

Emissions inventory background




B.1 Introduction

Air emission sources associated with the various phases of the project were identified and quantified through the application of accepted published emission estimation factors, collated from a combination of United States Environmental Protection Agency (US-EPA) AP-42 Air Pollutant Emission Factors and NPI emission estimation manuals.

Particulate matter emissions were quantified for various particle size fractions. The emission and dispersion of TSP emissions was simulated to predict dust deposition rates. Coarse and fine particulate matter (PM_{10} and $PM_{2.5}$) were estimated using ratios for the different particle size fractions available within the literature (principally the US-EPA AP-42), as documented in subsequent sections. Emissions of NO_x resulting from (diesel) fuel combustion were also determined. Emissions of metals and metalloids were estimated based on the content within relevant material and calculated TSP emissions.

B.2 Particulate matter emission factors applied

The emission factors and input assumptions for each identified emission source are presented in Table B.1 through to Table B.5 for the four identified emission scenarios.

Table B.1 Year 1 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Dozer stripping topsoil	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	5,621.0	Moisture content (%)	5.0	Silt content (%)	15.0					8.27	2.06	0.87	kg/hour
Loading to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	752,584.1	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Haulage to topsoil storage	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	17,367.3	Road silt content (%)	4.6	Haul distance (km)	0.9	Loads per year	9,648.51	Ave Truck Weight (t)	117.90	3.85	0.97	0.10	kg/VKT
Truck unloading of topsoil	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	752,584.1	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Drill	AP-42 11.9 - Drilling factor	Holes per year	25,494.9	Holes/blast	141.6							0.59	0.31	0.05	kg/hole
Blast	AP-42 11.9 - Blasting Equation	Blasts per year	180.0	Area/blast (m^2)	2,832.8							33.17	17.25	1.00	kg/blast
Blasted waste rock to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	11,601,446.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to waste emplacement - north - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	21,209.4	Road silt content (%)	4.6	Haul distance (km)	0.3	Loads per year	35,348.99	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste emplacement - north - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	155,535.5	Road silt content (%)	4.6	Haul distance (km)	2.2	Loads per year	35,348.99	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste emplacement - south - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	1,918.4	Road silt content (%)	4.6	Haul distance (km)	0.3	Loads per year	3,197.31	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT

Table B.1 Year 1 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Haulage to waste emplacement - south - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	7,673.5	Road silt content (%)	4.6	Haul distance (km)	1.2	Loads per year	3,197.31	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste emplacement - infrastructure - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	8,369.4	Road silt content (%)	4.6	Haul distance (km)	0.3	Loads per year	13,948.93	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste emplacement - infrastructure - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	78,114.0	Road silt content (%)	4.6	Haul distance (km)	2.8	Loads per year	13,948.93	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Blasted ore to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,165,817.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to ROM pad - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	5,880.0	Road silt content (%)	4.6	Haul distance (km)	0.3	Loads per year	9,800.08	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to ROM pad - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	33,320.3	Road silt content (%)	4.6	Haul distance (km)	1.7	Loads per year	9,800.08	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Truck unloading of waste rock - north	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	7,812,126.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - south	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	706,605.2	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - infrastructure	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	3,082,714.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne

Table B.1 Year 1 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Dozer on waste rock emplacement	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	12,264.0	Moisture content (%)	3.3	Silt content (%)	10.0					8.73	2.01	0.92	kg/hour
Truck unloading ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,165,817.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading direct to ROM hopper	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	0.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
FEL rehandle at ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	0.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Grader	AP-42 11.9 - Grading equation	VKT per year	51,100.0	Number of units	2.0	Travel speed (km/hr)	5.0					0.19	0.14	0.01	kg/VKT
Road trucks entering/leaving site	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	26,144.0	Road silt content (%)	4.6	Haul distance (km)	4.3	Loads per year	3,040.00	Ave Truck Weight (t)	30.00	2.08	0.53	0.05	kg/VKT
Topsoil cleared area - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	149.3									850.00	425.00	63.75	kg/ha/year
Topsoil storage piles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	123.9									850.00	425.00	63.75	kg/ha/year
Main pit - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	40.6									850.00	425.00	63.75	kg/ha/year

Table B.1 Year 1 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Cleared waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	18.0									850.00	425.00	63.75	kg/ha/year
Active waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	60.1									850.00	425.00	63.75	kg/ha/year
ROM Pad stockpiles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	26.9									850.00	425.00	63.75	kg/ha/year

Table B.2 Year 2 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Dozer stripping topsoil	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	5,621.0	Moisture content (%)	5.0	Silt content (%)	15.0					8.27	2.06	0.87	kg/hour
Loading to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	681,850.9	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Haulage to topsoil storage	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	12,238.4	Road silt content (%)	4.6	Haul distance (km)	0.7	Loads per year	8,741.68	Ave Truck Weight (t)	117.90	3.85	0.97	0.10	kg/VKT
Truck unloading of topsoil	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	681,850.9	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Drill	AP-42 11.9 - Drilling factor	Holes per year	53,420.9	Holes/blast	296.8							0.59	0.31	0.05	kg/hole
Blast	AP-42 11.9 - Blasting Equation	Blasts per year	180.0	Area/blast (m^2)	5,935.7							100.61	52.32	3.02	kg/blast
Blasted waste rock to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	24,366,434.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to waste dump - north - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	81,656.5	Road silt content (%)	4.6	Haul distance (km)	0.9	Loads per year	45,364.74	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - north - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	244,969.6	Road silt content (%)	4.6	Haul distance (km)	2.7	Loads per year	45,364.74	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - central - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	26,588.6	Road silt content (%)	4.6	Haul distance (km)	0.9	Loads per year	14,771.45	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT

Table B.2 Year 2 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Haulage to waste dump - central - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	53,177.2	Road silt content (%)	4.6	Haul distance (km)	1.8	Loads per year	14,771.45	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	106,147.5	Road silt content (%)	4.6	Haul distance (km)	1.3	Loads per year	40,825.97	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	187,799.5	Road silt content (%)	4.6	Haul distance (km)	2.3	Loads per year	40,825.97	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	16,727.8	Road silt content (%)	4.6	Haul distance (km)	0.9	Loads per year	9,293.20	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	39,031.4	Road silt content (%)	4.6	Haul distance (km)	2.1	Loads per year	9,293.20	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Blasted ore to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	6,893,607.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to ROM pad - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	56,147.0	Road silt content (%)	4.6	Haul distance (km)	0.9	Loads per year	31,192.79	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to ROM pad - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	124,771.2	Road silt content (%)	4.6	Haul distance (km)	2.0	Loads per year	31,192.79	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Truck unloading of waste rock - north	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	10,025,607.1	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - central	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	3,264,491.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne

Table B.2 Year 2 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Truck unloading of waste rock - south	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	9,022,539.2	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - infrastructure	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,053,796.5	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Dozer on waste rock emplacement	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	12,264.0	Moisture content (%)	3.3	Silt content (%)	10.0					8.73	2.01	0.92	kg/hour
Truck unloading ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	4,480,844.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading direct to ROM hopper	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,412,762.5	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
FEL rehandle at ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,367,373.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Primary Crusher	AP-42 11.24 Primary Crusher - low moisture ore	Tonnes per year	4,780,136.0									0.20	0.02	0.00	kg/tonne

Table B.2 Year 2 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Secondary crusher	AP-42 11.24 Secondary Crusher - low moisture ore	Tonnes per year	3,186,757.3									0.60	0.05	0.01	kg/tonne
Tertiary crusher	AP-42 11.24 Tertiary Crusher - low moisture ore	Tonnes per year	9,560,272.0									1.40	0.08	0.01	kg/tonne
Grinding	AP-42 11.24 Dry Grinding - no air conveying - low moisture ore	Tonnes per year	4,780,136.0									1.20	0.16	0.03	kg/tonne
Grader	AP-42 11.9 - Grading equation	VKT per year	51,100.0	Number of units	2.0	Travel speed (km/hr)	5.0					0.19	0.14	0.01	kg/VKT
Road trucks entering/leaving site	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	2,476.8	Road silt content (%)	4.6	Haul distance (km)	4.3	Loads per year	288.00	Ave Truck Weight (t)	30.00	2.08	0.53	0.05	kg/VKT
Topsoil cleared area - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	116.1									850.00	425.00	63.75	kg/ha/year
Topsoil storage piles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	75.3									850.00	425.00	63.75	kg/ha/year
Main pit - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	41.8									850.00	425.00	63.75	kg/ha/year
Cleared waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	35.5									850.00	425.00	63.75	kg/ha/year

Table B.2 Year 2 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Active waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	146.3									850.00	425.00	63.75	kg/ha/year
ROM Pad stockpiles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	26.9									850.00	425.00	63.75	kg/ha/year
Rehabilitated areas - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	57.4									850.00	425.00	63.75	kg/ha/year
TSF wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	17.7									850.00	425.00	63.75	kg/ha/year

Table B.3 Year 4 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Dozer stripping topsoil	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	5,621.0	Moisture content (%)	5.0	Silt content (%)	15.0					8.27	2.06	0.87	kg/hour
Loading to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	452,110.1	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Haulage to topsoil storage	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	9,274.1	Road silt content (%)	4.6	Haul distance (km)	0.8	Loads per year	5,796.28	Ave Truck Weight (t)	117.90	3.85	0.97	0.10	kg/VKT
Truck unloading of topsoil	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	452,110.1	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Drill	AP-42 11.9 - Drilling factor	Holes per year	52,510.1	Holes/blast	291.7							0.59	0.31	0.05	kg/hole
Blast	AP-42 11.9 - Blasting Equation	Blasts per year	180.0	Area/blast (m^2)	5,834.5							98.04	50.98	2.94	kg/blast
Blasted waste rock to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	22,802,137.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to waste dump - north - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	2,909.5	Road silt content (%)	4.6	Haul distance (km)	0.6	Loads per year	2,424.55	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - north - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	11,152.9	Road silt content (%)	4.6	Haul distance (km)	2.3	Loads per year	2,424.55	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - central - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	28,855.5	Road silt content (%)	4.6	Haul distance (km)	0.6	Loads per year	24,046.24	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT

Table B.3 Year 4 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Haulage to waste dump - central - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	100,994.2	Road silt content (%)	4.6	Haul distance (km)	2.1	Loads per year	24,046.24	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	69,599.2	Road silt content (%)	4.6	Haul distance (km)	0.6	Loads per year	57,999.34	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	162,398.1	Road silt content (%)	4.6	Haul distance (km)	1.4	Loads per year	57,999.34	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	93,534.8	Road silt content (%)	4.6	Haul distance (km)	2.5	Loads per year	18,706.96	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	138,431.5	Road silt content (%)	4.6	Haul distance (km)	3.7	Loads per year	18,706.96	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Blasted ore to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	8,543,547.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to ROM pad - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	193,292.9	Road silt content (%)	4.6	Haul distance (km)	2.5	Loads per year	38,658.58	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to ROM pad - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	123,707.5	Road silt content (%)	4.6	Haul distance (km)	1.6	Loads per year	38,658.58	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Truck unloading of waste rock - north	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	535,825.2	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - central	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	5,314,219.5	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne

Table B.3 Year 4 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Truck unloading of waste rock - south	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	12,817,853.2	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - infrastructure	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	4,134,239.1	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Dozer on waste rock emplacement	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	12,264.0	Moisture content (%)	3.3	Silt content (%)	10.0					8.73	2.01	0.92	kg/hour
Truck unloading ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	5,553,305.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading direct to ROM hopper	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,990,241.5	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
FEL rehandle at ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	4,028,935.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Primary Crusher	AP-42 11.24 Primary Crusher - low moisture ore	Tonnes per year	7,019,177.0									0.20	0.02	0.00	kg/tonne

Table B.3 Year 4 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Secondary crusher	AP-42 11.24 Secondary Crusher - low moisture ore	Tonnes per year	4,679,451.3									0.60	0.05	0.01	kg/tonne
Tertiary crusher	AP-42 11.24 Tertiary Crusher - low moisture ore	Tonnes per year	14,038,354.0									1.40	0.08	0.01	kg/tonne
Grinding	AP-42 11.24 Dry Grinding - no air conveying - low moisture ore	Tonnes per year	7,019,177.0									1.20	0.16	0.03	kg/tonne
Grader	AP-42 11.9 - Grading equation	VKT per year	51,100.0	Number of units	2.0	Travel speed (km/hr)	5.0	0.00	0.00	0.00	0.00	0.19	0.14	0.01	kg/VKT
Road trucks entering/leaving site	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	2,476.8	Road silt content (%)	4.6	Haul distance (km)	4.3	Loads per year	288.00	Ave Truck Weight (t)	30.00	2.08	0.53	0.05	kg/VKT
Topsoil cleared area - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	100.5									850.00	425.00	63.75	kg/ha/year
Topsoil storage piles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	11.6									850.00	425.00	63.75	kg/ha/year
Main pit - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	65.7									850.00	425.00	63.75	kg/ha/year
Cleared waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	0.0									850.00	425.00	63.75	kg/ha/year
Active waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	200.8									850.00	425.00	63.75	kg/ha/year

Table B.3 Year 4 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
ROM Pad stockpiles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	26.9									850.00	425.00	63.75	kg/ha/year
Rehabilitated areas - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	144.3									850.00	425.00	63.75	kg/ha/year
TSF wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	34.6									850.00	425.00	63.75	kg/ha/year

Table B.4 Year 6 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Dozer stripping topsoil	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	5,621.0	Moisture content (%)	5.0	Silt content (%)	15.0					8.27	2.06	0.87	kg/hour
Loading to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	326,132.9	Average wind speed (m/s)	6.0	Moisture content (%)	5.0					0.00121	0.00057	0.00009	kg/tonne
Haulage to topsoil storage	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	6,689.9	Road silt content (%)	4.6	Haul distance (km)	0.8	Loads per year	4,181.19	Ave Truck Weight (t)	117.90	3.85	0.97	0.10	kg/VKT
Truck unloading of topsoil	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	326,132.9	Average wind speed (m/s)	6.0	Moisture content (%)	5.0	0.00	0.00	0.00	0.00	0.00121	0.00057	0.00009	kg/tonne
Drill	AP-42 11.9 - Drilling factor	Holes per year	80,539.6	Holes/blast	447.4							0.59	0.31	0.05	kg/hole
Blast	AP-42 11.9 - Blasting Equation	Blasts per year	180.0	Area/blast (m^2)	8,948.8							186.24	96.84	5.59	kg/blast
Blasted waste rock to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	41,871,647.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to waste dump - north - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	36,058.1	Road silt content (%)	4.6	Haul distance (km)	1.1	Loads per year	16,390.06	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - north - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	78,672.3	Road silt content (%)	4.6	Haul distance (km)	2.4	Loads per year	16,390.06	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - central - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	176,504.8	Road silt content (%)	4.6	Haul distance (km)	1.2	Loads per year	73,543.68	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT

Table B.4 Year 6 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Haulage to waste dump - central - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	220,631.0	Road silt content (%)	4.6	Haul distance (km)	1.5	Loads per year	73,543.68	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	238,873.7	Road silt content (%)	4.6	Haul distance (km)	1.2	Loads per year	99,530.73	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - south - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	258,779.9	Road silt content (%)	4.6	Haul distance (km)	1.3	Loads per year	99,530.73	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	0.0	Road silt content (%)	4.6	Haul distance (km)	0.0	Loads per year	0.00	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - infrastructure - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	0.0	Road silt content (%)	4.6	Haul distance (km)	0.0	Loads per year	0.00	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Blasted ore to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,491,942.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to ROM pad - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	58,633.9	Road silt content (%)	4.6	Haul distance (km)	2.6	Loads per year	11,275.76	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to ROM pad - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	36,082.4	Road silt content (%)	4.6	Haul distance (km)	1.6	Loads per year	11,275.76	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Truck unloading of waste rock - north	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	3,622,203.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3	0.00	0.00	0.00	0.00	0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - central	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	16,253,153.1	Average wind speed (m/s)	6.0	Moisture content (%)	3.3	0.00	0.00	0.00	0.00	0.00216	0.00102	0.00015	kg/tonne

Table B.4 Year 6 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Truck unloading of waste rock - south	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	21,996,290.6	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading of waste rock - infrastructure	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	0.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Dozer on waste rock emplacement	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	12,264.0	Moisture content (%)	3.3	Silt content (%)	10.0					8.73	2.01	0.92	kg/hour
Truck unloading ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	1,619,762.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading direct to ROM hopper	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	872,179.7	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
FEL rehandle at ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	6,127,819.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Primary Crusher	AP-42 11.24 Primary Crusher - low moisture ore	Tonnes per year	6,999,999.0									0.20	0.02	0.00	kg/tonne

Table B.4 Year 6 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Secondary crusher	AP-42 11.24 Secondary Crusher - low moisture ore	Tonnes per year	4,666,666.0									0.60	0.05	0.01	kg/tonne
Tertiary crusher	AP-42 11.24 Tertiary Crusher - low moisture ore	Tonnes per year	13,999,998.0									1.40	0.08	0.01	kg/tonne
Grinding	AP-42 11.24 Dry Grinding - no air conveying - low moisture ore	Tonnes per year	6,999,999.0									1.20	0.16	0.03	kg/tonne
Grader	AP-42 11.9 - Grading equation	VKT per year	51,100.0	Number of units	2.0	Travel speed (km/hr)	5.0					0.19	0.14	0.01	kg/VKT
Road trucks entering/leaving site	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	2,476.8	Road silt content (%)	4.6	Haul distance (km)	4.3	Loads per year	288.00	Ave Truck Weight (t)	30.00	2.08	0.53	0.05	kg/VKT
Topsoil cleared area - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	72.5									850.00	425.00	63.75	kg/ha/year
Topsoil storage piles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	11.6									850.00	425.00	63.75	kg/ha/year
Main pit - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	65.7									850.00	425.00	63.75	kg/ha/year
Cleared waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	0.0									850.00	425.00	63.75	kg/ha/year
Active waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	165.3									850.00	425.00	63.75	kg/ha/year

Table B.4 Year 6 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
ROM Pad stockpiles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	26.9									850.00	425.00	63.75	kg/ha/year
Rehabilitated areas - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	149.3									850.00	425.00	63.75	kg/ha/year
Established rehab - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	29.8									850.00	425.00	63.75	kg/ha/year
TSF wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	50.3									850.00	425.00	63.75	kg/ha/year

Table B.5 Year 8 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Drill	AP-42 11.9 - Drilling factor	Holes per year	46,218.8	Holes/blast	256.8							0.59	0.31	0.05	kg/hole
Blast	AP-42 11.9 - Blasting Equation	Blasts per year	180.0	Area/blast (m^2)	5,135.4							80.96	42.10	2.43	kg/blast
Blasted waste rock to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	20,411,950.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to waste dump - central - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	443,336.5	Road silt content (%)	4.6	Haul distance (km)	2.4	Loads per year	92,361.76	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to waste dump - central - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	277,085.3	Road silt content (%)	4.6	Haul distance (km)	1.5	Loads per year	92,361.76	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Blasted ore to haul truck	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	6,994,118.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Haulage to ROM pad - watering	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	164,567.5	Road silt content (%)	4.6	Haul distance (km)	2.6	Loads per year	31,647.59	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Haulage to ROM pad - chemical	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	101,272.3	Road silt content (%)	4.6	Haul distance (km)	1.6	Loads per year	31,647.59	Ave Truck Weight (t)	273.50	5.62	1.42	0.14	kg/VKT
Truck unloading of waste rock - central	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	20,411,950.0	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Dozer on waste rock emplacement	AP-42 11.9 - Bulldozer on Material Other Than Coal	Hours per year	12,264.0	Moisture content (%)	3.3	Silt content (%)	10.0					8.73	2.01	0.92	kg/hour

Table B.5 Year 8 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Truck unloading ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	4,546,176.7	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Truck unloading direct to ROM hopper	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	2,447,941.3	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
FEL rehandle at ROM pad	AP-42 13.2.4 - Materials Handling Equation / NPI Mining Equation 10	Tonnes per year	4,001,929.7	Average wind speed (m/s)	6.0	Moisture content (%)	3.3					0.00216	0.00102	0.00015	kg/tonne
Primary Crusher	AP-42 11.24 Primary Crusher - low moisture ore	Tonnes per year	6,449,871.0									0.20	0.02	0.00	kg/tonne
Secondary crusher	AP-42 11.24 Secondary Crusher - low moisture ore	Tonnes per year	4,299,914.0									0.60	0.05	0.01	kg/tonne
Tertiary crusher	AP-42 11.24 Tertiary Crusher - low moisture ore	Tonnes per year	12,899,742.0									1.40	0.08	0.01	kg/tonne
Grinding	AP-42 11.24 Dry Grinding - no air conveying - low moisture ore	Tonnes per year	6,449,871.0									1.20	0.16	0.03	kg/tonne
Grader	AP-42 11.9 - Grading equation	VKT per year	25,550.0	Number of units	1.0	Travel speed (km/hr)	5.0					0.19	0.14	0.01	kg/VKT

Table B.5 Year 8 particulate matter emissions inventory

Emission source	Emission factor source	Activity Rate	Unit	Parameter 1	Value	Parameter 2	Value	Parameter 3	Value	Parameter 4	Value	TSP EF	PM_{10} EF	$PM_{2.5}$ EF	EF Unit
Road trucks entering/leaving site	AP-42 13.2.2 - Unpaved Road Equation	VKT per year	2,476.8	Road silt content (%)	4.6	Haul distance (km)	4.3	Loads per year	288.00	Ave Truck Weight (t)	30.00	2.08	0.53	0.05	kg/VKT
Topsoil cleared area - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	33.1									850.00	425.00	63.75	kg/ha/year
Main pit - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	65.7									850.00	425.00	63.75	kg/ha/year
Cleared waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	0.0									850.00	425.00	63.75	kg/ha/year
Active waste rock emplacement - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	139.6									850.00	425.00	63.75	kg/ha/year
ROM Pad stockpiles - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	26.9									850.00	425.00	63.75	kg/ha/year
Rehabilitated areas - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	184.9									850.00	425.00	63.75	kg/ha/year
Established rehab - wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	77.2									850.00	425.00	63.75	kg/ha/year
TSF wind erosion	AP-42 11.9 - Wind erosion of exposed areas factor	Area (ha)	56.0									850.00	425.00	63.75	kg/ha/year

B.3 Haul road activity calculations

The NSW EPA requested additional detail on how activity rates for unpaved road haulage emissions were calculated. Table B.6 provides a specific breakdown on the activity rates (tonnes of material, haul truck capacity, haul route distance and annual kilometres travelled) for each emissions scenario.

With regards to sensitivity to rates of activity, the following is noted:

- projected annual material extracted by type (topsoil, waste rock and ore) were used to calculate annual kilometres travelled, with the peak years of material extraction accounted for in the modelled scenarios;
- the material processing and extraction rate is anticipated to be continuous, with little day to day variation in haulage or processing; and
- the truck unloading points on the waste rock emplacement in each scenario were selected with the intention of maximise haulage distance and predicting continual worst-case haulage lengths (ie no accounting for shorter haulage distances).

Table B.6 Haulage calculations

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
Topsoil removal and loading to haul truck	Area of topsoil removal	m^2	1,672,409	1,515,224	1,004,689	724,740	0
	Depth of topsoil removal	m	0.3	0.3	0.3	0.3	0.3
	Density of topsoil	t/m3	1.5	1.5	1.5	1.5	1.5
	Amount of topsoil removed	tonnes	752,584	681,851	452,110	326,133	0
Haulage to topsoil storage	Capacity of haul truck	tonnes	78	78	78	78	78
	Loads per year	loads per year	9,649	8,742	5,796	4,181	0
	One-way distance of haulage	km	0.9	0.7	0.8	0.8	0
	Annual VKT per year	km/year	17,367	12,238	9,274	6,690	0
Blasted waste rock to haul truck	Amount of waste rock	tonnes	11,601,446	24,366,434	22,802,137	41,871,647	20,411,950
Haulage to waste dump	Capacity of haul truck	tonnes	221	221	221	221	221
	Loads per year	loads/year	52,495	110,255	103,177	189,464	92,362
	Amount to North Dump	%	67%	41%	2%	9%	0%

Table B.6 Haulage calculations

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
	Amount to Central Dump	%	0%	13%	23%	39%	100%
	Amount to South Dump	%	6%	37%	56%	53%	0%
	Amount to Infrastructure areas	%	27%	8%	18%	0%	0%
	One-way distance of haulage to North Dump - water	km	0.3	0.9	0.6	1.1	0
	One-way distance of haulage to North Dump - chem	km	2.2	2.7	2.3	2.4	0
	One-way distance of haulage to Central Dump - water	km	0	0.9	0.6	1.2	2.4
	One-way distance of haulage to Central Dump - chem	km	0	1.8	2.1	1.5	1.5
	One-way distance of haulage to South Dump - water	km	0.3	1.3	0.6	1.2	0
	One-way distance of haulage to South Dump - chem	km	1.2	2.3	1.4	1.3	0
	One-way distance of haulage to Infrastructure areas - water	km	0.3	0.9	2.5	0	0
	One-way distance of haulage to Infrastructure areas - chem	km	2.8	2.1	3.7	0	0

Table B.6 Haulage calculations

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
	Annual VKT per year - North Dump	km/year	176,745	285,798	12,608	96,701	0
	Annual VKT per year - Central Dump	km/year	0	66,472	115,422	308,883	498,754
	Annual VKT per year - South Dump	km/year	9,592	240,873	197,198	378,217	0
	Annual VKT per year - Infrastructure areas	km/year	86,483	47,395	185,199	0	0
Blasted ore to haul truck	Amount of ore	tonnes	2,165,817	6,893,607	8,543,547	2,491,942	6,994,118
Haulage to ROM Pad	Capacity of haul truck	tonnes	221	221	221	221	221
	Loads per year	tonnes	9,800	31,193	38,659	11,276	31,648
	One-way distance of haulage - water	km	0	1	3	3	3
	One-way distance of haulage - chemical	km	1.7	2.0	1.6	1.6	1.6
	Annual VKT per year	km/year	39,200	180,918	317,000	94,716	265,840

Notes: VKT – vehicle kilometre travelled

B.5 Project-related input data and particulate matter emission estimates

The material property inputs used in the emission estimates are summarised in Table B.7. It was assumed that the waste rock and ROM ore had similar characteristics at the point of extraction, which is retained through the entire mine process.

Table B.7 Material property inputs for emission estimation (all scenarios)

Material properties	Units	Value	Source of information
Moisture content of waste and ore	%	3.3	Average of site-specific samples
Moisture content of topsoil	%	15	Assumed from similar project experience
Silt content of waste and ore	%	10	NPI default
Silt content of topsoil	%	15	Assumed from similar project experience
Silt content of unpaved roads	%	4.6	ACARP Report C20023 (Pacific Environment 2014) - average of uncontrolled haul roads

B.6 Metals emissions

In order to understand the likely metal concentrations in the material to be handled and stored during the operation of the project, geochemistry assay profiles for waste rock, ore and tailings material were provided by Regis for review. Metals emissions were then generated using the following steps:

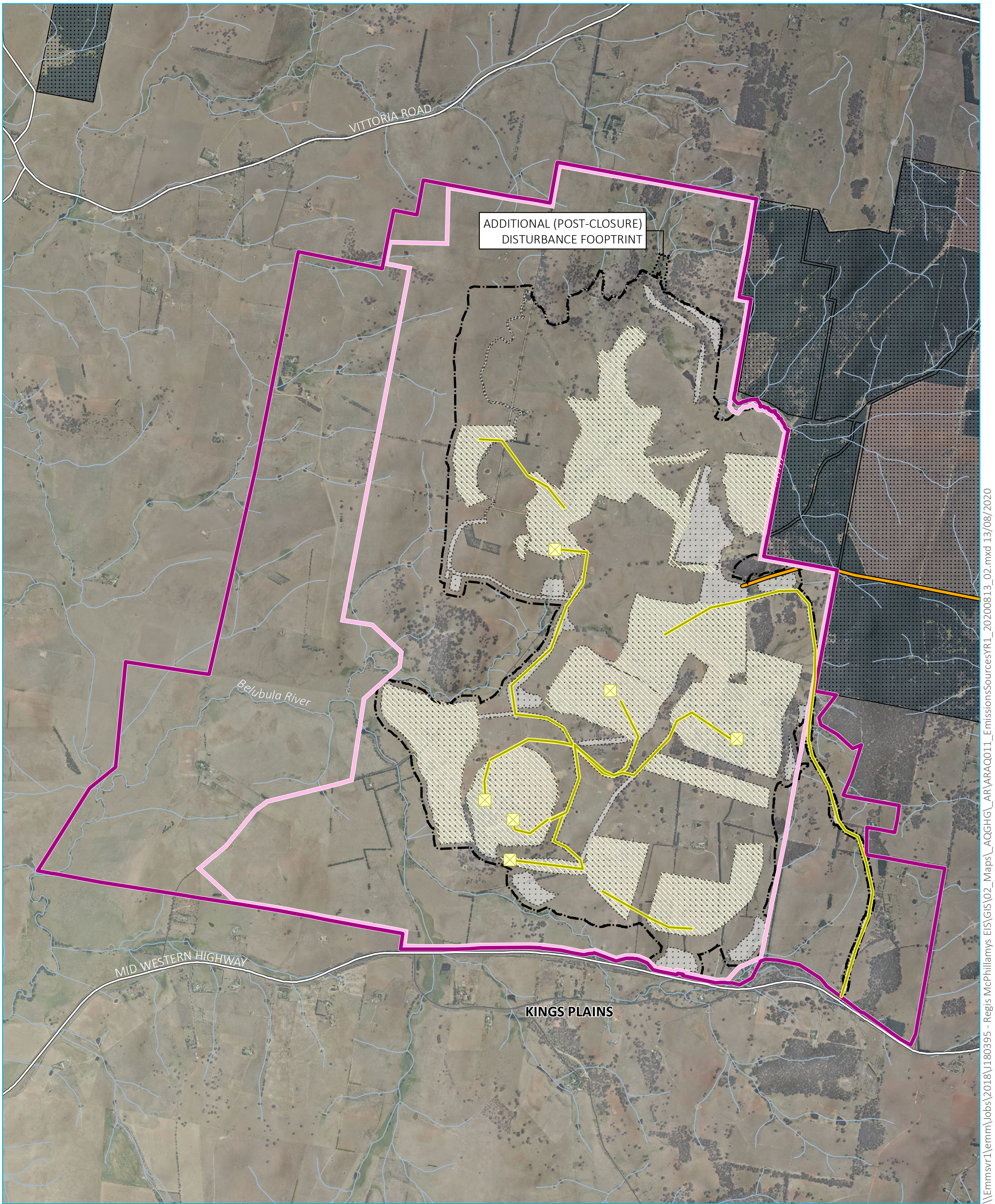
- indicative metals profiles for waste rock, ore and tailings were derived from the following:
  - for tailings material, the maximum concentration for each element across provided assays for oxide, transition and fresh tailings was selected; and
  - for waste rock and ore material, the 90th percentile metal concentration for each element was selected.
- for each material type, the element concentration was converted to a percentage value of total material amount;
- for each modelling scenario, annual TSP emissions by source were grouped by waste rock, ore and tailings;
- the percentage of element by material type was applied to the TSP emissions by corresponding material type to derive an annual emission rate of each metal;
- a weighted average scaling factor was derived for each element and each modelling scenario; and
- predicted 1-hour average TSP concentrations were scaled by the corresponding derived scaling factors to determine concentrations of individual metals at site boundary and individual private assessment locations.

The use of the 90th percentile concentration is adopted to increase the level of conservatism in the modelling. For tailings, no change was considered necessary as the maximum concentration across three tailings profiles was adopted.

The profiles for waste rock, ore and tailings are presented in Table B.8.

Table B.8 Metal concentration profiles for waste rock, ore and tailings

Element	Waste rock		Ore		Tailings
	Median (mg/kg)	90th percentile (mg/kg)	Median (mg/kg)	90th percentile (mg/kg)	Maximum (mg/kg)
Ag	0.26	1.46	0.46	2.47	0.89
As	41	172	53	196	160
Ba	70	160	70	120	190
Be	0.12	0.30	0.07	0.12	0.15
Cd	0.11	3.67	0.08	2.57	2.50
Cr	9	76	2	7	175
Cu	207	510	430	1,446	635
Fe	59,300	74,660	70,900	87,240	70,600
Hg	0.02	0.50	0.04	0.34	0.36
Mg	14,900	23,800	13,200	22,920	20,000
Mn	1,290	3,580	1,670	3,300	1,840
Ni	7.7	38.6	5.3	8.0	90.0
Pb	13.0	115.5	18.6	64.3	209.0
Sb	1.25	3.24	1.44	2.66	2.90
Se	2.20	12.30	6.80	15.42	7.50
Zn	96.0	1,160.0	88	545.2	707



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Mine development general arrangement - Year 1
- Pipeline

Emission source
- Volume
- Line volume
- Area

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Emission source locations – Year 1

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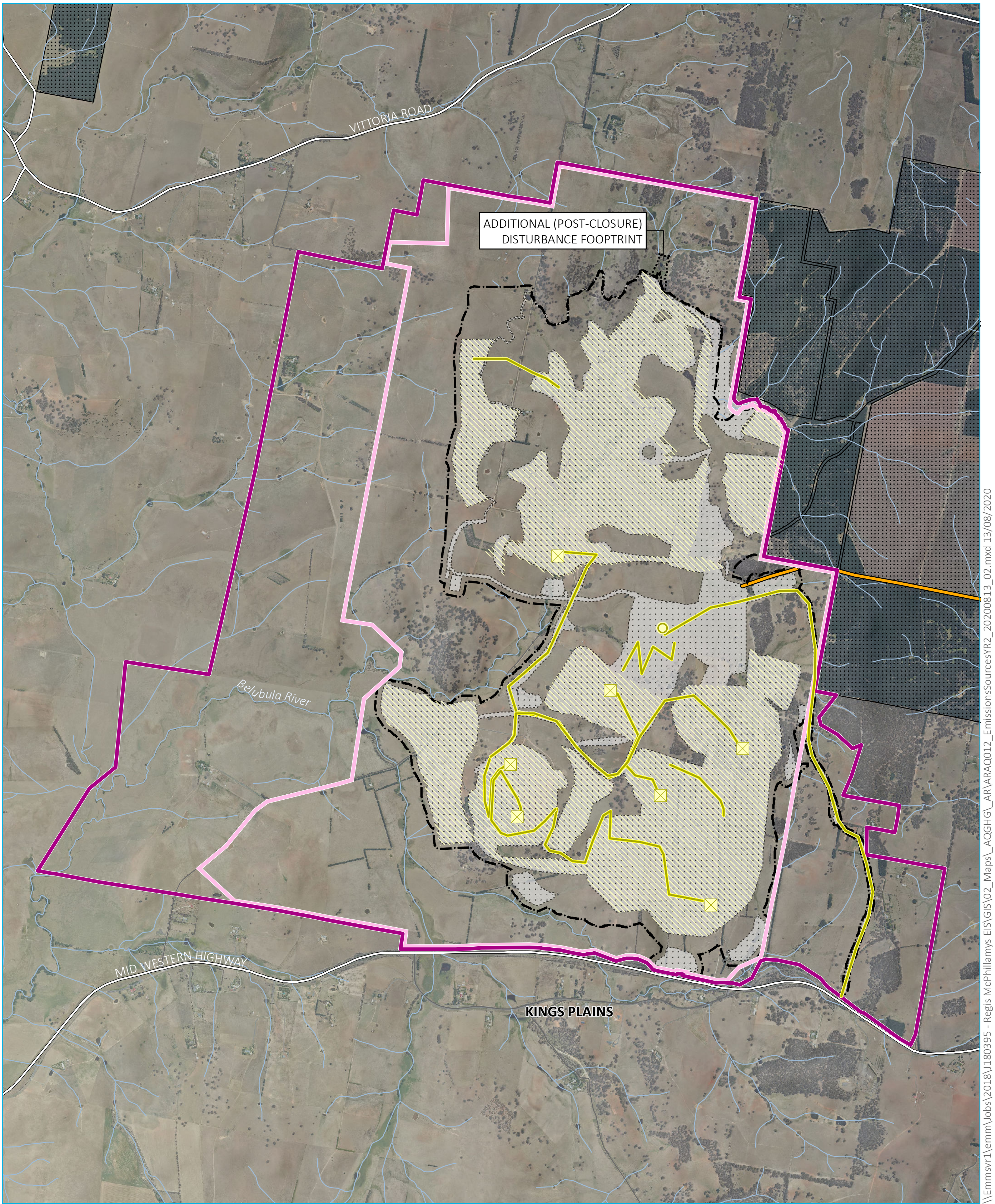
Figure B.1



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Mine development general arrangement - Year 2
- Pipeline

Emission source
- Point
- Volume
- Line volume
- Area

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Emission source locations – Year 2

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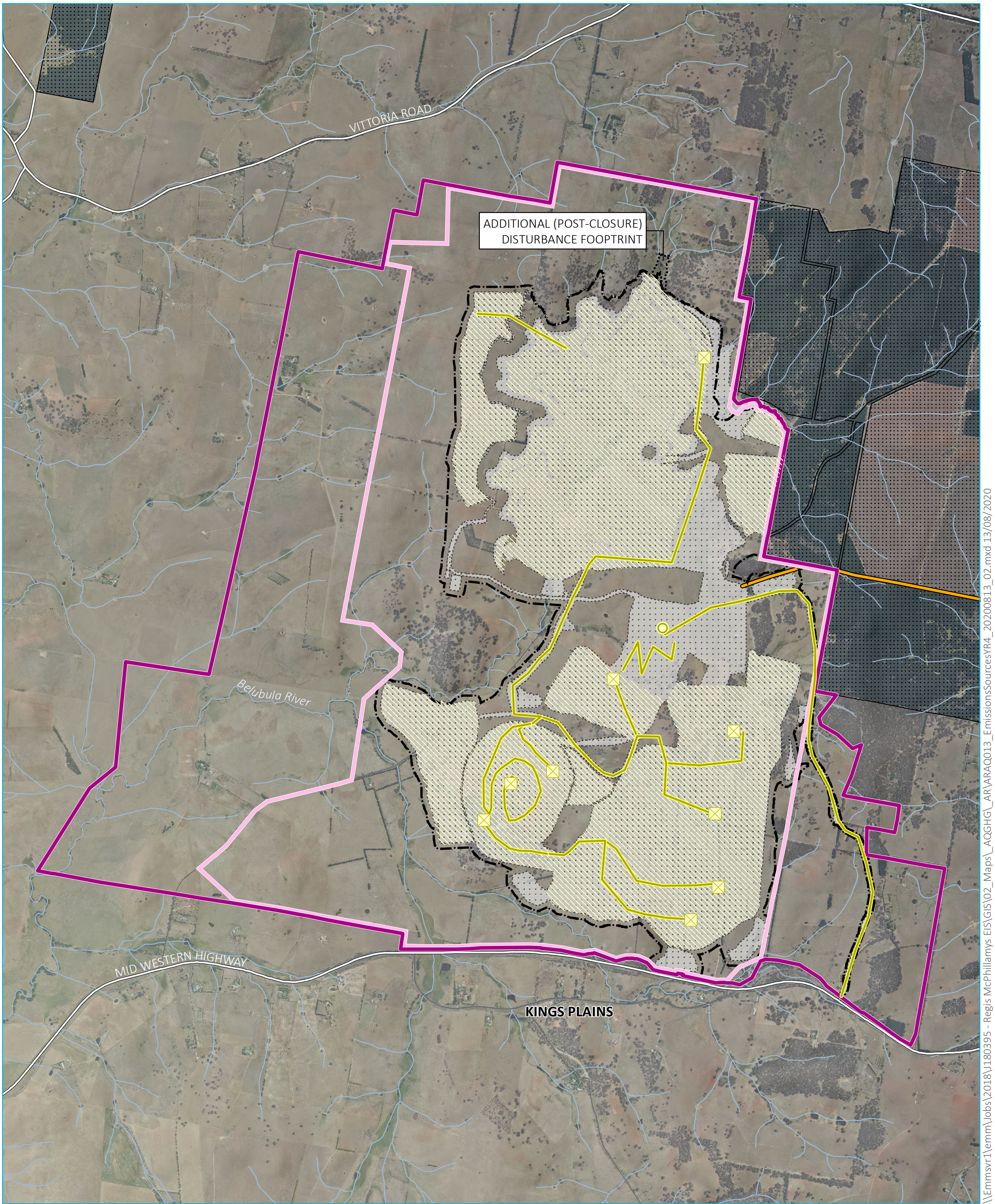
Figure B.2

REGIS RESOURCES LTD
EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Mine development general arrangement - Year 4
- Pipeline

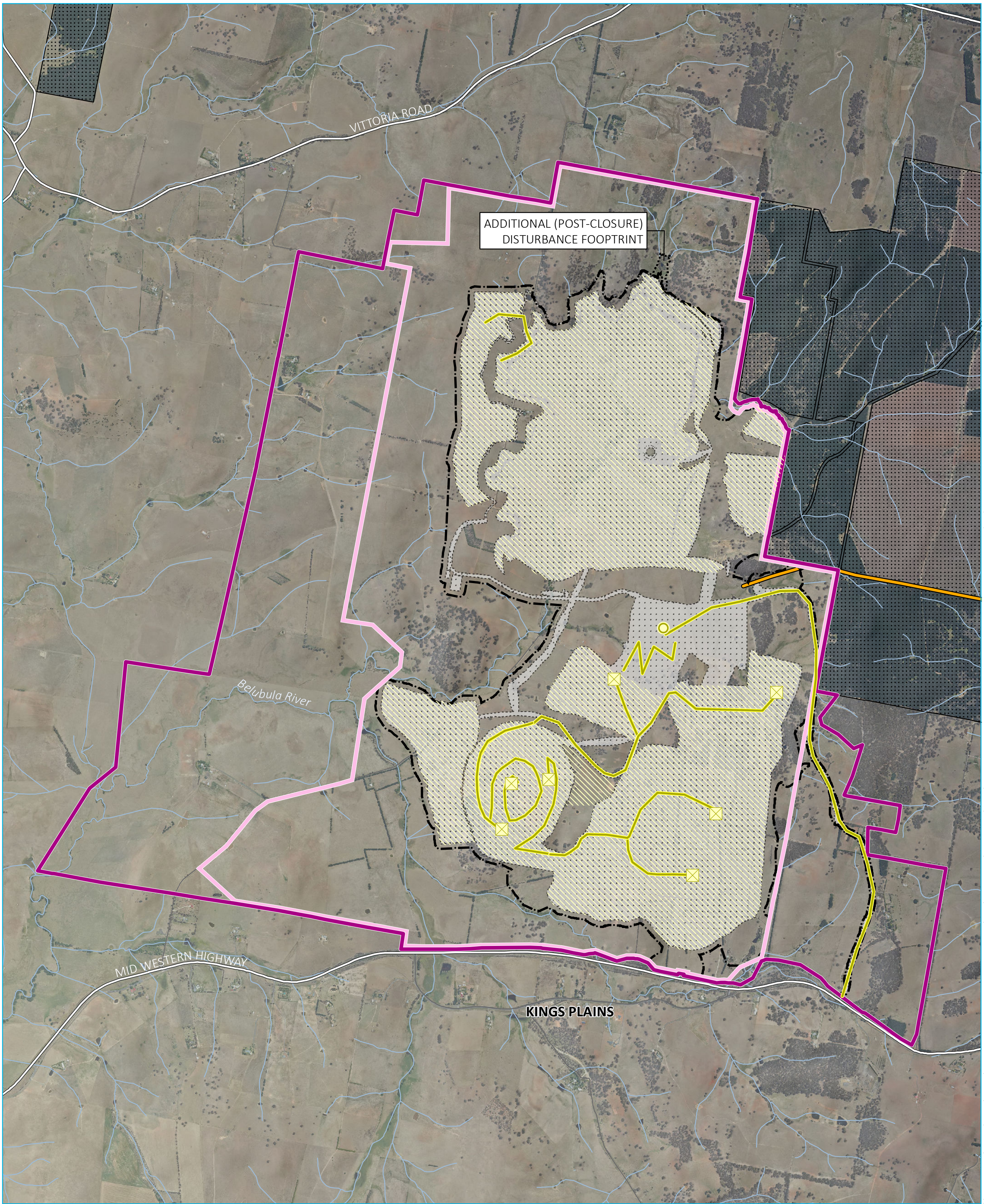
Emission source
- Point
- Volume
- Line volume
- Area

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Emission source locations – Year 4

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure B.3

REGIS RESOURCES LTD
EMM creating opportunities



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ014_EmissionsSourcesYR6_20200813_02.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

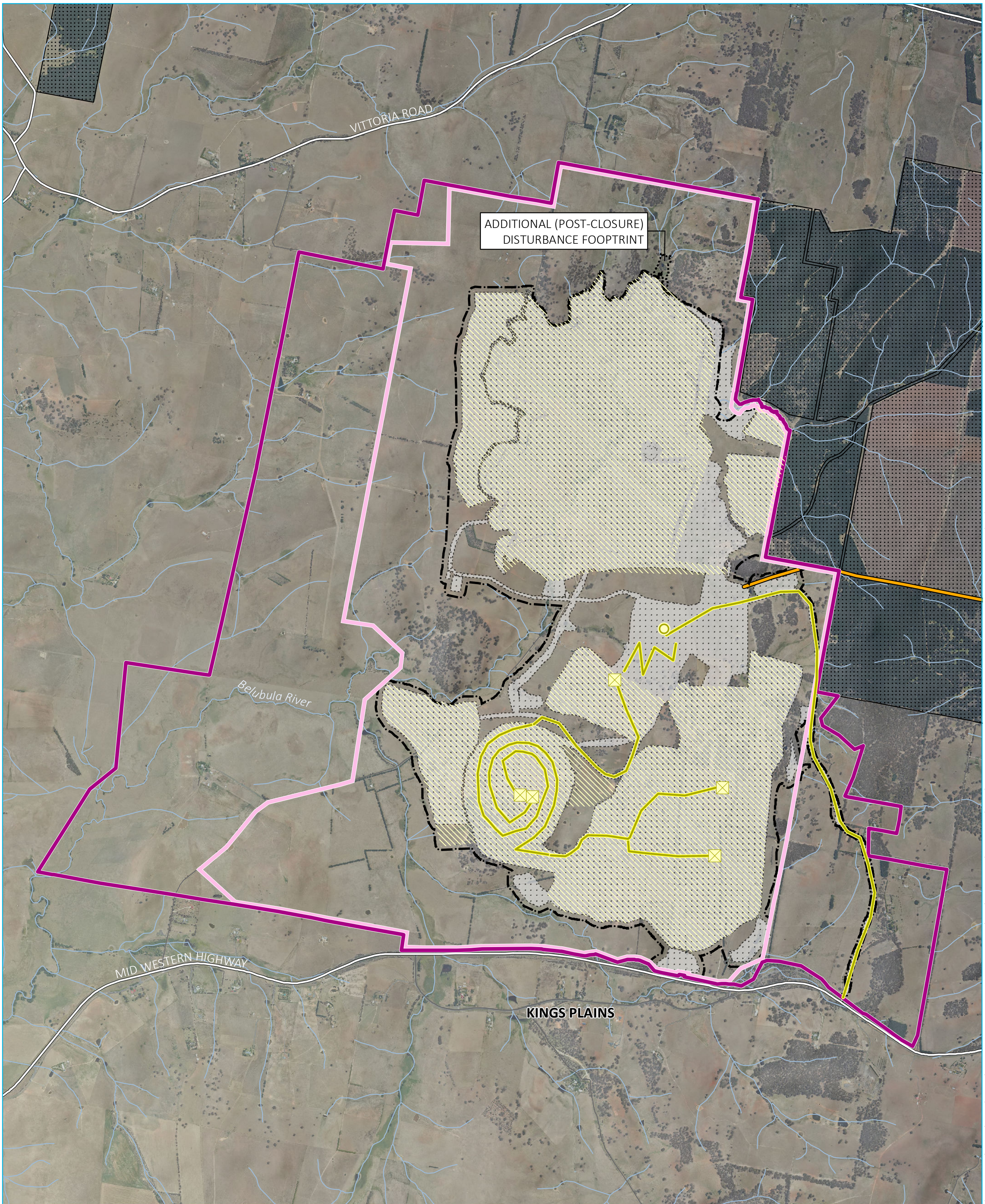
Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Mine development general arrangement - Year 6
- Pipeline

Emission source
- Point
- Volume
- Line volume
- Area

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Emission source locations – Year 6

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure B.4



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Mine development general arrangement - Year 8
- Pipeline

Emission source

- Point
- Volume
- Line volume
- Area

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Emission source locations – Year 8

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure B.5

REGIS RESOURCES LTD
EMM creating opportunities


Appendix C

Predicted incremental and cumulative concentrations - all assessment locations




Table C.1 Incremental and cumulative annual average TSP concentration – all scenarios

Receptor ID	Incremental annual average TSP concentration (µg/m³)					Cumulative annual average TSP concentration (µg/m³) – criterion 90 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R02	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R03	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R04	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R05	0.1	0.3	0.4	0.3	0.3	35.4	35.6	35.7	35.6	35.6
R06	0.9	1.8	1.9	2.3	1.7	36.2	37.1	37.2	37.6	37.0
R07	0.8	1.5	1.5	1.7	1.3	36.1	36.8	36.8	37.0	36.6
R08	0.3	0.6	0.7	0.7	0.6	35.6	35.9	36.0	36.0	35.9
R09	0.3	0.6	0.6	0.7	0.6	35.6	35.9	35.9	36.0	35.9
R10	0.4	0.7	0.7	0.8	0.6	35.7	36.0	36.0	36.1	35.9
R11	0.4	0.7	0.8	0.9	0.7	35.7	36.0	36.1	36.2	36.0
R12	0.5	0.9	0.9	1.1	0.8	35.8	36.2	36.2	36.4	36.1
R13	0.3	0.8	0.8	0.9	0.7	35.6	36.1	36.1	36.2	36.0
R14	0.4	0.9	1.0	1.2	0.9	35.7	36.2	36.3	36.5	36.2
R15	0.8	1.8	1.9	2.3	1.7	36.1	37.1	37.2	37.6	37.0
R16	1.1	2.8	3.0	3.4	2.4	36.4	38.1	38.3	38.7	37.7
R17	1.2	2.7	3.0	3.7	2.4	36.5	38.0	38.3	39.0	37.7
R18	0.7	1.7	1.8	2.2	1.6	36.0	37.0	37.1	37.5	36.9
R19	1.0	2.3	2.4	3.2	2.3	36.3	37.6	37.7	38.5	37.6
R20	0.8	1.9	2.0	2.5	1.8	36.1	37.2	37.3	37.8	37.1
R21	0.9	2.1	2.3	2.9	2.1	36.2	37.4	37.6	38.2	37.4
R22	0.5	1.3	1.4	1.5	1.1	35.8	36.6	36.7	36.8	36.4
R23	0.8	1.8	1.9	2.2	1.7	36.1	37.1	37.2	37.5	37.0
R24	0.9	2.1	2.2	2.6	1.9	36.2	37.4	37.5	37.9	37.2
R25	1.0	2.3	2.5	3.1	2.3	36.3	37.6	37.8	38.4	37.6
R26	1.1	2.4	2.7	3.3	2.4	36.4	37.7	38.0	38.6	37.7
P27	1.1	2.4	2.6	3.1	2.3	36.4	37.7	37.9	38.4	37.6
R28	1.2	2.6	2.9	3.5	2.5	36.5	37.9	38.2	38.8	37.8
R28a	1.5	3.3	3.6	4.7	3.3	36.8	38.6	38.9	40.0	38.6
R29	1.0	2.2	2.4	2.6	1.9	36.3	37.5	37.7	37.9	37.2
R30	1.2	2.6	2.9	3.3	2.4	36.5	37.9	38.2	38.6	37.7
R31	1.0	2.1	2.4	2.6	1.9	36.3	37.4	37.7	37.9	37.2
R32	0.6	1.3	1.4	2.0	1.3	35.9	36.6	36.7	37.3	36.6

Table C.1 Incremental and cumulative annual average TSP concentration – all scenarios

Receptor ID	Incremental annual average TSP concentration (µg/m³)					Cumulative annual average TSP concentration (µg/m³) – criterion 90 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R33	0.6	1.6	1.7	2.5	1.6	35.9	36.9	37.0	37.8	36.9
R34	0.6	1.5	1.6	2.0	1.4	35.9	36.8	36.9	37.3	36.7
R35	0.6	1.6	1.8	2.1	1.5	35.9	36.9	37.1	37.4	36.8
R36	0.5	1.4	1.5	1.8	1.3	35.8	36.7	36.8	37.1	36.6
R37	0.5	1.4	1.5	1.8	1.3	35.8	36.7	36.8	37.1	36.6
R38	0.7	1.8	1.9	2.3	1.7	36.0	37.1	37.2	37.6	37.0
R39	0.4	1.0	1.0	1.2	0.9	35.7	36.3	36.3	36.5	36.2
R40	0.5	1.3	1.4	1.7	1.2	35.8	36.6	36.7	37.0	36.5
R41	0.3	0.9	1.0	1.1	0.9	35.6	36.2	36.3	36.4	36.2
R42	0.4	1.2	1.3	1.6	1.2	35.7	36.5	36.6	36.9	36.5
R43	0.5	1.4	1.5	1.8	1.4	35.8	36.7	36.8	37.1	36.7
R44	0.3	0.8	0.9	1.1	0.8	35.6	36.1	36.2	36.4	36.1
R45	0.3	1.0	1.0	1.2	0.9	35.6	36.3	36.3	36.5	36.2
R46	0.4	1.1	1.1	1.4	1.0	35.7	36.4	36.4	36.7	36.3
R47	0.4	1.3	1.4	1.6	1.3	35.7	36.6	36.7	36.9	36.6
R48	0.5	1.3	1.4	1.7	1.3	35.8	36.6	36.7	37.0	36.6
R49	0.3	0.9	0.9	1.1	0.9	35.6	36.2	36.2	36.4	36.2
R50	0.2	0.6	0.6	0.8	0.6	35.5	35.9	35.9	36.1	35.9
R51	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R52	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R53	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R54	0.2	0.4	0.4	0.5	0.4	35.5	35.7	35.7	35.8	35.7
R55	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R56	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R57	0.1	0.4	0.4	0.5	0.4	35.4	35.7	35.7	35.8	35.7
R58	0.2	0.5	0.5	0.6	0.5	35.5	35.8	35.8	35.9	35.8
R59	0.2	0.5	0.6	0.6	0.5	35.5	35.8	35.9	35.9	35.8
R60	0.2	0.6	0.7	0.8	0.6	35.5	35.9	36.0	36.1	35.9
R61	0.3	0.8	0.8	1.0	0.8	35.6	36.1	36.1	36.3	36.1
R62	0.3	0.8	0.8	1.0	0.8	35.6	36.1	36.1	36.3	36.1
R63	0.3	0.9	0.9	1.1	0.9	35.6	36.2	36.2	36.4	36.2
R64	0.3	0.9	0.9	1.1	0.9	35.6	36.2	36.2	36.4	36.2
R65	0.3	0.8	0.8	1.0	0.8	35.6	36.1	36.1	36.3	36.1

Table C.1 Incremental and cumulative annual average TSP concentration – all scenarios

Receptor ID	Incremental annual average TSP concentration (µg/m³)					Cumulative annual average TSP concentration (µg/m³) – criterion 90 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R66	0.4	1.0	1.1	1.3	1.1	35.7	36.3	36.4	36.6	36.4
R67	0.4	1.1	1.1	1.4	1.1	35.7	36.4	36.4	36.7	36.4
R68	0.4	1.1	1.1	1.3	1.1	35.7	36.4	36.4	36.6	36.4
R69	0.4	1.0	1.0	1.2	1.0	35.7	36.3	36.3	36.5	36.3
R70	0.5	1.3	1.3	1.5	1.3	35.8	36.6	36.6	36.8	36.6
R71	0.5	1.2	1.3	1.5	1.2	35.8	36.5	36.6	36.8	36.5
R72	0.5	1.1	1.1	1.3	1.1	35.8	36.4	36.4	36.6	36.4
R73	0.5	1.1	1.1	1.3	1.1	35.8	36.4	36.4	36.6	36.4
R74	0.5	1.0	1.0	1.2	1.0	35.8	36.3	36.3	36.5	36.3
R75	0.6	1.3	1.3	1.4	1.1	35.9	36.6	36.6	36.7	36.4
R76	0.6	1.3	1.2	1.1	0.9	35.9	36.6	36.5	36.4	36.2
R77	0.3	0.7	0.7	0.7	0.5	35.6	36.0	36.0	36.0	35.8
R78	0.3	0.6	0.6	0.6	0.5	35.6	35.9	35.9	35.9	35.8
R79	0.3	0.5	0.5	0.5	0.4	35.6	35.8	35.8	35.8	35.7
R80	0.1	0.3	0.4	0.4	0.3	35.4	35.6	35.7	35.7	35.6
R81	0.1	0.3	0.4	0.4	0.3	35.4	35.6	35.7	35.7	35.6
R82	0.1	0.4	0.4	0.4	0.3	35.4	35.7	35.7	35.7	35.6
R83	0.1	0.4	0.4	0.4	0.3	35.4	35.7	35.7	35.7	35.6
R84	0.2	0.5	0.6	0.5	0.4	35.5	35.8	35.9	35.8	35.7
R85	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R86	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R87	0.1	0.3	0.3	0.3	0.2	35.4	35.6	35.6	35.6	35.5
R88	0.1	0.4	0.4	0.3	0.3	35.4	35.7	35.7	35.6	35.6

Table C.2 Maximum incremental and 3rd highest cumulative 24-hour average PM_{10} concentration – all scenarios

Receptor ID	Maximum incremental 24-hour average PM_{10} concentration (µg/m³)					3rd highest cumulative 24-hour average PM_{10} concentration (µg/m³) – criterion 50 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	2.8	4.2	4.2	4.2	3.5	38.9	39.0	39.0	39.0	39.0
R02	2.2	3.6	3.9	3.8	3.0	38.9	39.0	39.0	39.0	39.0
R03	1.3	2.4	2.3	1.9	1.4	38.8	38.8	38.8	38.8	38.8

Table C.2 Maximum incremental and 3rd highest cumulative 24-hour average PM_{10} concentration – all scenarios

Receptor ID	Maximum incremental 24-hour average PM_{10} concentration (µg/m³)					3rd highest cumulative 24-hour average PM_{10} concentration (µg/m³) – criterion 50 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R04	1.4	3.0	3.1	2.8	1.9	38.8	38.8	38.8	38.8	38.8
R05	1.3	3.6	3.0	3.2	2.3	38.8	38.9	38.9	38.9	38.8
R06	5.7	8.0	7.0	8.8	6.8	39.3	39.9	39.8	40.1	39.6
R07	5.0	6.2	5.9	6.7	5.4	39.1	39.3	39.3	39.3	39.2
R08	2.6	4.3	4.2	4.6	3.4	38.9	38.9	38.9	38.9	38.9
R09	4.0	5.1	5.0	5.5	3.8	38.9	39.0	39.0	39.0	39.0
R10	4.3	4.9	4.6	5.1	3.9	38.9	39.0	39.0	39.0	38.9
R11	4.4	5.8	5.3	6.2	4.4	39.0	39.0	39.0	39.0	39.0
R12	3.9	6.9	6.3	7.1	5.7	39.0	39.1	39.1	39.1	39.1
R13	2.8	5.3	4.6	5.1	4.0	39.0	39.2	39.1	39.2	39.1
R14	2.8	5.8	6.6	8.4	6.4	39.0	39.2	39.3	39.3	39.2
R15	5.9	11.5	8.8	13.1	7.3	39.6	40.0	39.9	40.1	39.7
R16	6.2	15.1	16.3	15.6	12.7	39.9	40.8	41.2	41.1	40.6
R17	7.0	14.6	15.1	18.1	10.4	40.1	42.1	42.0	42.1	41.0
R18	4.9	10.4	9.8	12.7	8.2	39.8	41.3	41.4	41.8	40.8
R19	6.0	12.7	11.5	17.2	10.8	40.1	42.1	42.0	44.2	42.0
R20	5.7	12.4	10.6	15.6	10.3	40.0	42.0	41.8	43.8	41.8
R21	5.9	13.1	11.5	17.3	11.4	40.1	42.2	42.0	44.4	42.1
R22	6.0	12.1	11.0	12.1	8.7	39.9	41.6	41.7	42.5	41.3
R23	6.6	13.8	10.0	13.1	9.6	40.3	42.2	41.9	43.6	41.8
R24	6.9	14.8	11.0	15.3	11.0	40.3	42.4	42.0	44.1	42.1
R25	6.8	15.2	12.3	18.3	12.6	40.3	42.5	42.2	44.8	42.4
R26	7.1	16.0	12.8	18.9	13.1	40.4	42.6	42.4	45.0	42.6
P27	7.7	16.7	12.6	17.7	12.6	40.5	42.7	42.4	44.7	42.5
R28	7.8	17.3	13.3	19.2	13.6	40.6	42.9	42.6	45.2	42.8
R28a	8.0	17.2	14.5	22.9	15.2	40.6	43.2	43.1	46.1	43.2
R29	9.1	16.6	12.3	14.9	10.5	40.6	42.8	42.5	43.8	42.1
R30	9.9	18.6	13.5	17.4	12.6	40.9	43.4	42.9	44.7	42.7
R31	9.6	16.4	13.4	15.1	9.9	40.6	42.8	42.7	43.5	42.0
R32	4.0	9.5	9.0	12.6	7.7	40.3	41.8	41.5	43.7	41.7
R33	4.8	11.2	11.3	17.5	10.8	40.6	42.6	42.9	45.1	42.5
R34	4.6	12.0	11.7	18.0	10.9	39.6	41.6	41.3	42.5	39.5

Table C.2 Maximum incremental and 3rd highest cumulative 24-hour average PM_{10} concentration – all scenarios

Receptor ID	Maximum incremental 24-hour average PM_{10} concentration (µg/m³)					3rd highest cumulative 24-hour average PM_{10} concentration (µg/m³) – criterion 50 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R35	5.9	12.8	13.0	22.2	13.4	39.1	40.0	39.9	43.2	39.1
R36	4.7	11.1	10.7	18.5	11.2	39.1	39.6	39.5	41.6	39.1
R37	5.7	12.0	14.4	20.2	11.8	39.0	39.2	40.9	41.1	39.0
R38	8.8	16.1	16.3	16.2	13.2	39.0	40.8	**42.8**	42.3	39.7
R39	3.1	8.0	7.7	12.0	8.1	39.0	39.2	39.1	38.9	38.9
R40	5.8	11.6	14.5	18.7	10.9	38.9	39.0	41.0	39.3	38.9
R41	3.8	8.8	10.2	12.8	8.4	38.9	38.9	38.9	38.9	38.9
R42	4.9	13.0	13.4	13.3	8.1	38.9	39.0	39.0	39.1	39.0
R43	4.2	13.1	13.4	9.4	6.6	38.9	39.1	39.1	39.2	39.1
R44	4.4	9.1	8.6	11.4	7.3	38.8	38.9	38.9	38.9	38.9
R45	4.4	10.7	11.2	11.8	6.9	38.9	38.9	38.9	39.0	38.9
R46	4.0	11.6	11.9	10.3	6.8	38.9	39.0	39.0	39.0	39.0
R47	2.5	8.9	8.0	7.2	4.7	38.9	39.1	39.1	39.2	39.1
R48	2.3	8.2	7.3	8.5	5.4	39.0	39.2	39.2	39.3	39.2
R49	2.6	9.0	8.4	6.7	5.0	38.9	39.0	39.0	39.0	39.0
R50	2.5	7.7	7.4	7.3	4.9	38.8	38.9	38.9	38.9	38.9
R51	1.3	4.2	3.7	3.6	3.0	38.8	38.9	38.9	38.9	38.9
R52	0.9	3.0	2.6	2.5	2.3	38.8	38.9	38.9	38.9	38.9
R53	0.9	2.8	2.4	2.6	2.1	38.9	38.9	38.9	38.9	38.9
R54	1.1	3.5	2.8	2.7	2.5	38.9	38.9	38.9	38.9	38.9
R55	0.8	2.5	2.2	2.7	1.8	38.9	38.9	38.9	38.9	38.9
R56	0.9	2.7	2.3	2.7	1.9	38.9	38.9	38.9	38.9	38.9
R57	0.8	2.3	1.9	2.8	1.8	38.9	38.9	38.9	39.0	38.9
R58	1.1	3.1	2.6	3.2	2.1	38.9	38.9	38.9	39.0	38.9
R59	1.0	2.5	2.4	3.4	2.2	38.9	39.0	39.0	39.0	39.0
R60	1.1	3.4	3.5	4.7	3.0	38.9	39.0	39.0	39.1	39.0
R61	1.3	3.8	3.7	4.1	2.8	38.9	39.0	39.0	39.0	39.0
R62	1.3	3.9	3.8	4.2	2.9	38.9	39.0	39.0	39.0	39.0
R63	1.4	4.2	4.1	4.9	3.2	38.9	39.0	39.0	39.0	39.0
R64	1.3	3.8	3.7	4.4	2.7	38.9	38.9	38.9	38.9	38.9
R65	1.3	3.4	3.0	3.7	2.4	38.9	38.9	38.9	38.9	38.9
R66	1.4	4.1	4.0	4.8	3.2	38.9	38.9	38.9	38.9	38.9

Table C.2 Maximum incremental and 3rd highest cumulative 24-hour average PM_{10} concentration – all scenarios

Receptor ID	Maximum incremental 24-hour average PM_{10} concentration (µg/m³)					3rd highest cumulative 24-hour average PM_{10} concentration (µg/m³) – criterion 50 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R67	1.5	4.3	4.1	5.3	3.5	38.9	38.9	38.9	38.9	38.9
R68	1.9	5.2	5.0	7.1	5.0	38.8	38.9	38.9	38.8	38.8
R69	1.7	4.7	4.6	6.7	4.6	38.8	38.9	38.9	38.8	38.8
R70	2.1	5.9	5.4	7.2	5.2	38.8	38.9	38.9	38.8	38.8
R71	2.1	5.5	5.2	6.7	5.3	38.8	38.9	38.9	38.8	38.8
R72	1.9	5.2	4.9	6.5	4.9	38.8	38.9	38.9	38.8	38.8
R73	1.9	4.9	4.8	6.2	4.9	38.8	38.9	38.9	38.8	38.8
R74	2.3	4.7	4.3	4.8	3.9	38.8	38.9	38.9	38.9	38.8
R75	2.3	6.7	6.1	8.0	5.3	38.9	38.9	38.9	38.9	38.9
R76	3.5	9.6	8.6	9.7	6.1	38.9	38.9	38.9	38.9	38.9
R77	1.4	4.0	3.6	4.7	3.0	38.8	38.8	38.9	38.8	38.8
R78	1.5	4.2	4.4	4.9	3.2	38.8	38.8	38.8	38.8	38.8
R79	1.3	2.8	2.4	3.0	2.0	38.8	38.8	38.8	38.8	38.8
R80	1.2	3.9	3.6	3.9	2.5	38.8	38.8	38.8	38.8	38.8
R81	1.3	4.3	3.8	4.6	2.7	38.8	38.8	38.8	38.8	38.8
R82	1.5	4.6	4.2	4.8	2.9	38.8	38.8	38.8	38.8	38.8
R83	1.6	4.6	4.2	4.6	2.9	38.8	38.8	38.8	38.8	38.8
R84	1.9	5.7	4.8	4.8	3.1	38.8	38.8	38.8	38.8	38.8
R85	1.8	4.0	3.1	3.0	2.3	38.8	38.8	38.8	38.8	38.8
R86	1.7	3.6	2.9	2.7	2.0	38.8	38.8	38.8	38.8	38.8
R87	1.5	3.1	2.7	2.5	1.8	38.8	38.8	38.8	38.8	38.8
R88	1.9	3.6	3.1	2.8	2.1	38.8	38.8	38.8	38.8	38.8

Table C.3 Incremental and cumulative annual average PM_{10} concentration – all scenarios

Receptor ID	Incremental annual average PM_{10} concentration (µg/m³)					Cumulative annual average PM_{10} concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.3	14.2
R02	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.2	14.2
R03	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.2	14.2
R04	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.3	14.2

Table C.3 Incremental and cumulative annual average PM_{10} concentration – all scenarios

Receptor ID	Incremental annual average PM_{10} concentration (µg/m³)					Cumulative annual average PM_{10} concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R05	0.1	0.2	0.2	0.2	0.2	14.2	14.3	14.3	14.3	14.3
R06	0.6	1.1	1.0	1.2	0.9	14.7	15.1	15.1	15.3	15.0
R07	0.5	0.8	0.7	0.9	0.6	14.6	14.9	14.8	15.0	14.7
R08	0.2	0.4	0.4	0.4	0.3	14.3	14.5	14.5	14.5	14.4
R09	0.2	0.4	0.4	0.4	0.3	14.3	14.5	14.4	14.5	14.4
R10	0.2	0.4	0.4	0.5	0.3	14.3	14.5	14.5	14.5	14.4
R11	0.2	0.4	0.4	0.5	0.3	14.3	14.5	14.5	14.5	14.4
R12	0.3	0.5	0.5	0.6	0.4	14.4	14.6	14.6	14.7	14.5
R13	0.2	0.5	0.5	0.5	0.4	14.3	14.6	14.5	14.6	14.5
R14	0.3	0.5	0.5	0.6	0.4	14.3	14.6	14.6	14.7	14.5
R15	0.5	1.0	1.0	1.3	0.9	14.6	15.1	15.1	15.3	15.0
R16	0.7	1.7	1.7	1.9	1.3	14.8	15.8	15.8	16.0	15.4
R17	0.8	1.7	1.8	2.2	1.4	14.9	15.8	15.9	16.2	15.5
R18	0.4	1.0	1.0	1.2	0.9	14.5	15.1	15.1	15.3	14.9
R19	0.7	1.5	1.5	1.9	1.3	14.8	15.6	15.5	15.9	15.3
R20	0.6	1.2	1.2	1.5	1.0	14.6	15.3	15.3	15.5	15.1
R21	0.6	1.4	1.4	1.7	1.2	14.7	15.5	15.5	15.8	15.3
R22	0.4	0.9	0.9	1.0	0.7	14.5	14.9	15.0	15.0	14.8
R23	0.5	1.2	1.2	1.3	0.9	14.6	15.3	15.2	15.4	15.0
R24	0.6	1.3	1.3	1.5	1.1	14.7	15.4	15.4	15.6	15.1
R25	0.7	1.5	1.5	1.8	1.2	14.8	15.6	15.6	15.9	15.3
R26	0.7	1.6	1.6	1.9	1.3	14.8	15.7	15.7	16.0	15.4
P27	0.7	1.6	1.6	1.9	1.3	14.8	15.7	15.7	15.9	15.4
R28	0.8	1.7	1.7	2.1	1.4	14.9	15.8	15.8	16.2	15.5
R28a	1.0	2.1	2.1	2.7	1.8	15.1	16.2	16.2	16.8	15.9
R29	0.7	1.4	1.4	1.6	1.1	14.8	15.5	15.5	15.7	15.2
R30	0.8	1.7	1.7	2.0	1.4	14.9	15.8	15.8	16.1	15.4
R31	0.7	1.4	1.5	1.6	1.1	14.8	15.5	15.6	15.7	15.2
R32	0.4	0.9	1.0	1.3	0.8	14.5	15.0	15.0	15.4	14.9
R33	0.5	1.1	1.1	1.6	1.0	14.6	15.2	15.2	15.7	15.1
R34	0.5	1.1	1.0	1.3	0.8	14.6	15.1	15.1	15.3	14.9
R35	0.4	1.1	1.1	1.3	0.9	14.5	15.2	15.2	15.4	15.0
R36	0.4	1.0	1.0	1.1	0.7	14.5	15.0	15.0	15.2	14.8

Table C.3 Incremental and cumulative annual average PM_{10} concentration – all scenarios

Receptor ID	Incremental annual average PM_{10} concentration (µg/m³)					Cumulative annual average PM_{10} concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R37	0.4	1.0	1.0	1.1	0.8	14.5	15.1	15.1	15.2	14.9
R38	0.5	1.2	1.2	1.4	0.9	14.6	15.3	15.3	15.4	15.0
R39	0.3	0.7	0.7	0.8	0.5	14.4	14.8	14.8	14.8	14.6
R40	0.3	0.9	0.9	1.0	0.7	14.4	15.0	15.0	15.1	14.8
R41	0.3	0.6	0.6	0.7	0.5	14.3	14.7	14.7	14.8	14.6
R42	0.3	0.8	0.8	1.0	0.7	14.4	14.9	14.9	15.1	14.8
R43	0.3	0.9	1.0	1.1	0.8	14.4	15.0	15.1	15.2	14.9
R44	0.2	0.6	0.6	0.7	0.5	14.3	14.7	14.7	14.7	14.5
R45	0.2	0.7	0.7	0.8	0.5	14.3	14.7	14.8	14.8	14.6
R46	0.3	0.7	0.7	0.8	0.6	14.3	14.8	14.8	14.9	14.7
R47	0.3	0.8	0.9	1.0	0.7	14.4	14.9	14.9	15.1	14.8
R48	0.3	0.9	0.9	1.1	0.7	14.4	15.0	15.0	15.1	14.8
R49	0.2	0.6	0.6	0.7	0.5	14.3	14.7	14.7	14.8	14.6
R50	0.2	0.4	0.4	0.5	0.4	14.2	14.5	14.5	14.6	14.4
R51	0.1	0.3	0.3	0.3	0.2	14.2	14.3	14.4	14.4	14.3
R52	0.1	0.3	0.3	0.3	0.2	14.2	14.3	14.3	14.4	14.3
R53	0.1	0.3	0.3	0.3	0.2	14.2	14.3	14.3	14.4	14.3
R54	0.1	0.3	0.3	0.4	0.3	14.2	14.4	14.4	14.4	14.3
R55	0.1	0.3	0.3	0.3	0.2	14.2	14.3	14.3	14.4	14.3
R56	0.1	0.3	0.3	0.3	0.2	14.2	14.4	14.3	14.4	14.3
R57	0.1	0.3	0.3	0.3	0.2	14.2	14.4	14.4	14.4	14.3
R58	0.1	0.3	0.3	0.4	0.3	14.2	14.4	14.4	14.5	14.4
R59	0.1	0.4	0.4	0.4	0.3	14.2	14.4	14.4	14.5	14.4
R60	0.2	0.4	0.4	0.5	0.3	14.2	14.5	14.5	14.5	14.4
R61	0.2	0.5	0.5	0.6	0.4	14.3	14.6	14.6	14.7	14.5
R62	0.2	0.5	0.5	0.6	0.4	14.3	14.6	14.6	14.7	14.5
R63	0.2	0.6	0.6	0.7	0.5	14.3	14.6	14.7	14.7	14.6
R64	0.2	0.6	0.6	0.7	0.5	14.3	14.6	14.6	14.7	14.6
R65	0.2	0.5	0.5	0.6	0.4	14.3	14.6	14.6	14.6	14.5
R66	0.3	0.6	0.6	0.8	0.6	14.4	14.7	14.7	14.8	14.6
R67	0.3	0.7	0.7	0.8	0.6	14.4	14.8	14.8	14.9	14.7
R68	0.3	0.7	0.7	0.8	0.6	14.4	14.8	14.7	14.8	14.7
R69	0.3	0.6	0.6	0.7	0.5	14.3	14.7	14.7	14.8	14.6

Table C.3 Incremental and cumulative annual average PM_{10} concentration – all scenarios

Receptor ID	Incremental annual average PM_{10} concentration (µg/m³)					Cumulative annual average PM_{10} concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R70	0.3	0.8	0.8	0.9	0.6	14.4	14.9	14.8	14.9	14.7
R71	0.3	0.8	0.7	0.8	0.6	14.4	14.8	14.8	14.9	14.7
R72	0.3	0.7	0.7	0.8	0.6	14.4	14.8	14.7	14.8	14.7
R73	0.3	0.7	0.6	0.7	0.6	14.4	14.7	14.7	14.8	14.7
R74	0.3	0.6	0.6	0.7	0.5	14.4	14.7	14.7	14.7	14.6
R75	0.4	0.8	0.7	0.8	0.6	14.4	14.9	14.8	14.9	14.7
R76	0.4	0.8	0.8	0.7	0.5	14.5	14.9	14.8	14.7	14.6
R77	0.2	0.4	0.4	0.4	0.3	14.3	14.5	14.5	14.5	14.4
R78	0.2	0.4	0.4	0.4	0.3	14.3	14.5	14.5	14.5	14.4
R79	0.2	0.3	0.3	0.3	0.2	14.3	14.4	14.4	14.4	14.3
R80	0.1	0.2	0.2	0.2	0.2	14.2	14.3	14.3	14.3	14.3
R81	0.1	0.2	0.2	0.2	0.2	14.2	14.3	14.3	14.3	14.3
R82	0.1	0.3	0.3	0.3	0.2	14.2	14.4	14.4	14.3	14.3
R83	0.1	0.3	0.3	0.2	0.2	14.2	14.3	14.4	14.3	14.3
R84	0.2	0.4	0.4	0.3	0.2	14.2	14.4	14.5	14.4	14.3
R85	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.3	14.2
R86	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.3	14.2
R87	0.1	0.2	0.2	0.2	0.1	14.2	14.3	14.3	14.3	14.2
R88	0.1	0.3	0.3	0.2	0.2	14.2	14.3	14.4	14.3	14.2

Table C.4 Maximum incremental and cumulative 24-hour average $PM_{2.5}$ concentrations – all scenarios

Receptor ID	Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³)					Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	0.6	0.9	1.0	0.9	0.7	15.3	15.3	15.3	15.3	15.3
R02	0.5	0.9	0.8	0.9	0.7	15.3	15.3	15.3	15.3	15.3
R03	0.4	0.7	0.6	0.6	0.4	15.3	15.3	15.3	15.3	15.3
R04	0.4	0.8	0.8	0.9	0.6	15.3	15.3	15.3	15.3	15.3
R05	0.4	1.1	0.9	1.0	0.7	15.3	15.3	15.3	15.3	15.3
R06	1.3	1.9	1.5	2.0	1.5	15.3	15.3	15.3	15.3	15.3
R07	1.0	1.2	1.1	1.7	1.1	15.3	15.3	15.3	15.3	15.3

Table C.4 Maximum incremental and cumulative 24-hour average $PM_{2.5}$ concentrations – all scenarios

Receptor ID	Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³)					Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R08	0.6	1.0	0.9	1.0	0.8	15.3	15.3	15.3	15.3	15.3
R09	1.1	1.3	1.0	1.1	0.9	15.3	15.3	15.3	15.3	15.3
R10	1.2	1.2	1.0	1.1	0.9	15.3	15.3	15.3	15.3	15.3
R11	1.2	1.4	1.1	1.3	1.0	15.3	15.3	15.3	15.3	15.3
R12	0.9	1.4	1.4	1.7	1.4	15.3	15.3	15.3	15.3	15.3
R13	0.6	1.6	1.2	1.6	1.1	15.3	15.3	15.3	15.3	15.3
R14	0.6	1.3	1.5	2.0	1.7	15.3	15.3	15.3	15.3	15.3
R15	1.3	2.5	2.0	2.9	1.9	15.3	15.3	15.4	15.4	15.4
R16	1.3	3.7	3.7	4.0	3.4	15.3	15.4	15.4	15.4	15.4
R17	1.5	3.7	3.3	4.2	2.4	15.4	15.4	15.4	15.4	15.4
R18	1.0	2.3	2.0	2.8	1.8	15.3	15.4	15.4	15.4	15.4
R19	1.4	2.8	2.4	3.6	2.4	15.4	15.4	15.4	15.4	15.4
R20	1.3	2.7	2.2	3.3	2.2	15.4	15.4	15.4	15.4	15.4
R21	1.3	2.9	2.3	3.6	2.4	15.4	15.4	15.4	15.4	15.4
R22	1.4	2.6	2.2	2.6	1.9	15.4	15.4	15.4	15.4	15.4
R23	1.3	2.7	1.9	2.9	2.0	15.4	15.5	15.5	15.4	15.4
R24	1.4	2.9	2.1	3.2	2.2	15.4	15.5	15.5	15.5	15.4
R25	1.5	3.2	2.4	3.8	2.6	15.4	15.5	15.5	15.5	15.4
R26	1.5	3.3	2.5	3.9	2.6	15.5	15.5	15.5	15.5	15.5
P27	1.6	3.4	2.4	3.6	2.5	15.5	15.5	15.5	15.5	15.5
R28	1.6	3.5	2.5	3.8	2.7	15.5	15.6	15.6	15.6	15.5
R28a	1.6	3.6	2.8	4.5	3.0	15.5	15.7	15.8	15.7	15.6
R29	1.9	3.3	2.3	3.4	2.2	15.4	15.6	15.6	15.6	15.5
R30	2.0	3.7	2.5	3.8	2.4	15.5	15.7	15.7	15.6	15.5
R31	2.0	3.2	2.4	3.5	2.2	15.5	15.6	15.6	15.6	15.5
R32	1.1	2.6	2.1	3.2	2.1	15.4	15.6	15.6	15.6	15.5
R33	1.3	3.1	2.7	4.0	2.6	15.4	15.6	15.6	16.3	15.7
R34	1.3	2.7	2.4	4.4	2.7	15.4	15.7	15.7	16.7	15.8
R35	1.5	3.0	2.7	5.2	3.2	15.5	15.8	15.8	17.5	16.0
R36	1.3	2.6	2.3	4.5	2.8	15.5	15.7	15.7	16.8	15.9
R37	1.5	2.8	3.0	4.8	2.8	15.5	15.8	15.8	17.1	15.9
R38	2.0	3.5	3.4	3.7	3.1	15.7	16.0	16.0	16.4	16.1
R39	1.1	2.0	1.8	3.1	2.0	15.4	15.6	15.6	15.9	15.7

Table C.4 Maximum incremental and cumulative 24-hour average $PM_{2.5}$ concentrations – all scenarios

Receptor ID	Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³)					Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R40	1.5	2.6	3.1	4.4	2.5	15.5	15.8	15.8	16.7	15.9
R41	1.1	2.0	2.3	3.2	2.0	15.4	15.7	15.7	15.9	15.7
R42	1.2	3.0	3.0	3.3	2.0	15.6	15.9	15.9	16.2	15.9
R43	1.1	3.1	3.1	2.4	1.7	15.6	16.0	16.1	16.2	15.9
R44	1.2	2.1	1.9	2.9	1.7	15.5	15.7	15.7	16.0	15.8
R45	1.2	2.5	2.5	3.0	1.8	15.5	15.8	15.8	16.1	15.8
R46	1.1	2.8	2.8	2.7	1.8	15.5	15.9	15.9	16.1	15.8
R47	0.7	2.3	2.1	2.2	1.3	15.5	16.0	16.1	16.1	16.0
R48	0.7	2.1	2.0	2.1	1.4	15.5	16.0	16.2	16.2	16.0
R49	0.8	2.3	2.2	1.9	1.4	15.5	15.8	15.9	16.0	15.8
R50	0.7	2.0	2.0	2.1	1.4	15.5	15.7	15.7	15.9	15.7
R51	0.4	1.3	1.1	1.3	0.9	15.4	15.6	15.6	15.7	15.6
R52	0.3	1.0	0.8	0.9	0.5	15.4	15.6	15.6	15.7	15.6
R53	0.3	0.9	0.8	1.0	0.6	15.4	15.6	15.6	15.6	15.6
R54	0.4	1.1	0.9	1.0	0.6	15.4	15.6	15.6	15.7	15.6
R55	0.3	0.9	0.7	1.0	0.6	15.4	15.6	15.6	15.6	15.6
R56	0.3	0.9	0.8	1.0	0.6	15.4	15.6	15.6	15.6	15.6
R57	0.3	0.8	0.7	1.0	0.6	15.4	15.6	15.6	15.6	15.5
R58	0.4	1.0	0.8	1.0	0.6	15.4	15.6	15.7	15.6	15.6
R59	0.4	0.8	0.8	0.9	0.6	15.4	15.6	15.6	15.6	15.5
R60	0.3	0.9	0.9	1.2	0.8	15.4	15.5	15.6	15.7	15.6
R61	0.4	1.0	0.9	1.1	0.8	15.5	15.8	15.8	16.0	15.7
R62	0.4	1.0	0.9	1.1	0.8	15.5	15.8	15.8	16.0	15.7
R63	0.4	1.0	1.0	1.3	0.9	15.5	15.9	15.9	16.1	15.8
R64	0.4	0.9	0.9	1.1	0.7	15.6	15.9	15.9	16.0	15.8
R65	0.4	0.9	0.8	1.0	0.6	15.6	15.9	15.8	15.9	15.7
R66	0.4	1.0	1.0	1.3	0.8	15.6	16.0	16.1	16.1	15.8
R67	0.4	1.0	1.0	1.4	0.9	15.6	16.1	16.1	16.1	15.8
R68	0.4	1.1	1.1	1.7	1.2	15.6	16.0	15.9	15.9	15.7
R69	0.4	1.0	1.1	1.6	1.2	15.6	15.9	15.9	15.9	15.7
R70	0.5	1.3	1.2	1.6	1.2	15.6	16.1	16.0	16.0	15.8
R71	0.5	1.2	1.2	1.5	1.1	15.6	16.1	16.0	16.0	15.8
R72	0.4	1.2	1.1	1.5	1.1	15.6	16.0	15.9	15.9	15.8

Table C.4 Maximum incremental and cumulative 24-hour average $PM_{2.5}$ concentrations – all scenarios

Receptor ID	Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³)					Maximum incremental 24-hour average $PM_{2.5}$ concentration (µg/m³) – criterion 25 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R73	0.4	1.1	1.1	1.4	1.1	15.6	16.0	15.9	15.9	15.7
R74	0.5	1.1	1.0	1.2	0.8	15.5	15.9	15.9	16.0	15.8
R75	0.6	1.6	1.6	2.0	1.5	15.6	16.2	16.1	16.1	15.8
R76	0.8	2.0	1.9	2.3	1.5	15.6	16.0	15.8	15.6	15.6
R77	0.4	1.0	0.9	1.2	0.8	15.5	15.8	15.8	15.7	15.6
R78	0.4	1.0	1.1	1.3	0.9	15.5	15.5	15.5	15.4	15.4
R79	0.4	0.8	0.7	0.8	0.5	15.5	15.5	15.5	15.4	15.4
R80	0.4	1.1	1.0	1.1	0.7	15.3	15.3	15.4	15.4	15.3
R81	0.4	1.1	1.1	1.3	0.8	15.3	15.3	15.4	15.4	15.3
R82	0.4	1.2	1.1	1.3	0.8	15.3	15.3	15.5	15.4	15.3
R83	0.5	1.2	1.1	1.3	0.8	15.3	15.3	15.5	15.4	15.3
R84	0.6	1.5	1.2	1.3	0.9	15.3	15.4	15.5	15.4	15.3
R85	0.5	1.2	0.9	0.9	0.7	15.3	15.3	15.4	15.3	15.3
R86	0.6	1.0	0.8	0.8	0.6	15.3	15.3	15.4	15.3	15.3
R87	0.6	0.9	0.7	0.7	0.5	15.3	15.3	15.4	15.3	15.3
R88	0.6	1.0	1.4	0.8	0.6	15.3	15.3	15.4	15.3	15.3

Table C.5 Incremental and cumulative annual average $PM_{2.5}$ concentration – all scenarios

Receptor ID	Incremental annual average $PM_{2.5}$ concentration (µg/m³)					Cumulative annual average $PM_{2.5}$ concentration (µg/m³) – criterion 8 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R02	<0.1	<0.1	0.1	<0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R03	<0.1	<0.1	<0.1	<0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R04	<0.1	0.1	0.1	<0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R05	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R06	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R07	0.1	0.2	0.2	0.2	0.2	6.2	6.3	6.2	6.3	6.2
R08	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R09	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R10	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2

Table C.5 Incremental and cumulative annual average $PM_{2.5}$ concentration – all scenarios

Receptor ID	Incremental annual average $PM_{2.5}$ concentration (µg/m³)					Cumulative annual average $PM_{2.5}$ concentration (µg/m³) – criterion 8 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R11	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R12	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R13	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R14	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R15	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R16	0.2	0.4	0.4	0.5	0.3	6.2	6.5	6.5	6.5	6.4
R17	0.2	0.4	0.4	0.5	0.3	6.3	6.5	6.5	6.6	6.4
R18	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R19	0.2	0.3	0.3	0.4	0.3	6.2	6.4	6.4	6.5	6.4
R20	0.1	0.3	0.3	0.3	0.2	6.2	6.4	6.3	6.4	6.3
R21	0.1	0.3	0.3	0.4	0.3	6.2	6.4	6.4	6.5	6.3
R22	0.1	0.2	0.2	0.2	0.2	6.2	6.3	6.3	6.3	6.2
R23	0.1	0.3	0.3	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R24	0.1	0.3	0.3	0.4	0.2	6.2	6.4	6.4	6.4	6.3
R25	0.2	0.3	0.3	0.4	0.3	6.2	6.4	6.4	6.5	6.4
R26	0.2	0.4	0.3	0.4	0.3	6.3	6.4	6.4	6.5	6.4
P27	0.2	0.3	0.3	0.4	0.3	6.3	6.4	6.4	6.5	6.4
R28	0.2	0.4	0.4	0.5	0.3	6.3	6.5	6.4	6.5	6.4
R28a	0.2	0.5	0.4	0.6	0.4	6.3	6.5	6.5	6.7	6.5
R29	0.2	0.3	0.3	0.4	0.3	6.2	6.4	6.4	6.5	6.3
R30	0.2	0.4	0.4	0.5	0.3	6.3	6.5	6.4	6.5	6.4
R31	0.2	0.3	0.3	0.4	0.3	6.2	6.4	6.4	6.5	6.3
R32	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R33	0.1	0.3	0.3	0.4	0.2	6.2	6.3	6.3	6.5	6.3
R34	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R35	0.1	0.3	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R36	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.3	6.3
R37	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R38	0.1	0.3	0.3	0.3	0.2	6.2	6.4	6.3	6.4	6.3
R39	0.1	0.2	0.2	0.2	0.1	6.2	6.2	6.2	6.3	6.2
R40	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.3	6.3
R41	0.1	0.2	0.1	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R42	0.1	0.2	0.2	0.2	0.2	6.2	6.3	6.3	6.3	6.2

Table C.5 Incremental and cumulative annual average $PM_{2.5}$ concentration – all scenarios

Receptor ID	Incremental annual average $PM_{2.5}$ concentration (µg/m³)					Cumulative annual average $PM_{2.5}$ concentration (µg/m³) – criterion 8 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R43	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.4	6.3
R44	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.2	6.2
R45	0.1	0.2	0.2	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R46	0.1	0.2	0.2	0.2	0.1	6.1	6.2	6.3	6.3	6.2
R47	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.3	6.3
R48	0.1	0.2	0.2	0.3	0.2	6.2	6.3	6.3	6.3	6.3
R49	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R50	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R51	<0.1	0.1	0.1	0.1	0.1	6.1	6.1	6.2	6.2	6.1
R52	<0.1	0.1	0.1	0.1	0.1	6.1	6.1	6.1	6.2	6.1
R53	<0.1	0.1	0.1	0.1	0.1	6.1	6.1	6.2	6.2	6.1
R54	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R55	<0.1	0.1	0.1	0.1	0.1	6.1	6.1	6.1	6.2	6.1
R56	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R57	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R58	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R59	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R60	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R61	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.2	6.2
R62	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.2	6.2
R63	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R64	0.1	0.1	0.1	0.2	0.1	6.1	6.2	6.2	6.2	6.2
R65	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R66	0.1	0.2	0.2	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R67	0.1	0.2	0.2	0.2	0.2	6.2	6.2	6.3	6.3	6.2
R68	0.1	0.2	0.2	0.2	0.1	6.2	6.2	6.2	6.3	6.2
R69	0.1	0.2	0.2	0.2	0.1	6.1	6.2	6.2	6.3	6.2
R70	0.1	0.2	0.2	0.2	0.2	6.2	6.3	6.3	6.3	6.2
R71	0.1	0.2	0.2	0.2	0.2	6.2	6.3	6.3	6.3	6.2
R72	0.1	0.2	0.2	0.2	0.1	6.2	6.2	6.2	6.3	6.2
R73	0.1	0.2	0.2	0.2	0.1	6.2	6.2	6.2	6.3	6.2
R74	0.1	0.2	0.2	0.2	0.1	6.2	6.2	6.2	6.2	6.2
R75	0.1	0.2	0.2	0.2	0.1	6.2	6.3	6.3	6.3	6.2

Table C.5 Incremental and cumulative annual average $PM_{2.5}$ concentration – all scenarios

Receptor ID	Incremental annual average $PM_{2.5}$ concentration (µg/m³)					Cumulative annual average $PM_{2.5}$ concentration (µg/m³) – criterion 8 µg/m³				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R76	0.1	0.2	0.2	0.2	0.1	6.2	6.3	6.3	6.3	6.2
R77	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R78	0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.2
R79	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R80	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R81	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R82	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R83	<0.1	0.1	0.1	0.1	<0.1	6.1	6.2	6.2	6.1	6.1
R84	<0.1	0.1	0.1	0.1	0.1	6.1	6.2	6.2	6.2	6.1
R85	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R86	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R87	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.1	6.1	6.1
R88	<0.1	0.1	0.1	0.1	<0.1	6.1	6.1	6.2	6.1	6.1

Table C.6 Incremental and cumulative annual average dust deposition rates – all scenarios

Receptor ID	Incremental annual average dust deposition rate (g/m²/month) – criterion 2 g/m²/month					Cumulative annual average dust deposition rate (g/m²/month) – criterion 4 g/m²/month				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R01	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R02	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R03	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R04	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R05	<0.1	<0.1	0.1	<0.1	<0.1	1.4	1.4	1.5	1.4	1.4
R06	0.2	0.3	0.4	0.4	0.4	1.6	1.7	1.8	1.8	1.8
R07	0.1	0.3	0.3	0.3	0.3	1.5	1.7	1.7	1.7	1.7
R08	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5
R09	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5
R10	0.1	0.1	0.1	0.2	0.1	1.5	1.5	1.5	1.6	1.5
R11	0.1	0.1	0.2	0.2	0.1	1.5	1.5	1.6	1.6	1.5
R12	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R13	0.1	0.1	0.1	0.2	0.1	1.5	1.5	1.5	1.6	1.5

Table C.6 Incremental and cumulative annual average dust deposition rates – all scenarios

Receptor ID	Incremental annual average dust deposition rate (g/m²/month) – criterion 2 g/m²/month					Cumulative annual average dust deposition rate (g/m²/month) – criterion 4 g/m²/month				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R14	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R15	0.2	0.4	0.4	0.4	0.4	1.6	1.8	1.8	1.8	1.8
R16	0.2	0.5	0.6	0.6	0.5	1.6	1.9	2.0	2.0	1.9
R17	0.2	0.4	0.5	0.6	0.4	1.6	1.8	1.9	2.0	1.8
R18	0.1	0.3	0.3	0.4	0.3	1.5	1.7	1.7	1.8	1.7
R19	0.2	0.3	0.4	0.5	0.4	1.6	1.7	1.8	1.9	1.8
R20	0.1	0.3	0.3	0.4	0.3	1.5	1.7	1.7	1.8	1.7
R21	0.1	0.3	0.4	0.5	0.4	1.5	1.7	1.8	1.9	1.8
R22	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R23	0.1	0.3	0.3	0.3	0.3	1.5	1.7	1.7	1.7	1.7
R24	0.1	0.3	0.3	0.4	0.3	1.5	1.7	1.7	1.8	1.7
R25	0.2	0.3	0.4	0.5	0.4	1.6	1.7	1.8	1.9	1.8
R26	0.2	0.4	0.4	0.5	0.4	1.6	1.8	1.8	1.9	1.8
P27	0.2	0.4	0.4	0.5	0.4	1.6	1.8	1.8	1.9	1.8
R28	0.2	0.4	0.5	0.5	0.4	1.6	1.8	1.9	1.9	1.8
R28a	0.2	0.5	0.6	0.7	0.6	1.6	1.9	2.0	2.1	2.0
R29	0.1	0.3	0.4	0.4	0.3	1.5	1.7	1.8	1.8	1.7
R30	0.2	0.4	0.5	0.5	0.4	1.6	1.8	1.9	1.9	1.8
R31	0.1	0.3	0.4	0.4	0.3	1.5	1.7	1.8	1.8	1.7
R32	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R33	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R34	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R35	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R36	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R37	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R38	0.1	0.2	0.3	0.4	0.3	1.5	1.6	1.7	1.8	1.7
R39	<0.1	0.1	0.1	0.2	0.1	1.4	1.5	1.5	1.6	1.5
R40	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R41	<0.1	0.1	0.1	0.2	0.1	1.4	1.5	1.5	1.6	1.5
R42	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R43	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R44	<0.1	0.1	0.1	0.2	0.1	1.4	1.5	1.5	1.6	1.5
R45	<0.1	0.1	0.1	0.2	0.2	1.4	1.5	1.5	1.6	1.6

Table C.6 Incremental and cumulative annual average dust deposition rates – all scenarios

Receptor ID	Incremental annual average dust deposition rate (g/m²/month) – criterion 2 g/m²/month					Cumulative annual average dust deposition rate (g/m²/month) – criterion 4 g/m²/month				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R46	0.1	0.1	0.2	0.2	0.2	1.5	1.5	1.6	1.6	1.6
R47	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R48	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R49	<0.1	0.1	0.1	0.2	0.1	1.4	1.5	1.5	1.6	1.5
R50	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R51	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R52	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R53	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R54	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R55	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R56	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R57	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R58	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R59	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R60	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R61	0.1	0.1	0.2	0.2	0.2	1.5	1.5	1.6	1.6	1.6
R62	0.1	0.1	0.2	0.2	0.2	1.5	1.5	1.6	1.6	1.6
R63	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R64	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R65	0.1	0.1	0.2	0.2	0.2	1.5	1.5	1.6	1.6	1.6
R66	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R67	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R68	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R69	0.1	0.2	0.2	0.3	0.2	1.5	1.6	1.6	1.7	1.6
R70	0.1	0.2	0.3	0.3	0.3	1.5	1.6	1.7	1.7	1.7
R71	0.1	0.2	0.3	0.3	0.3	1.5	1.6	1.7	1.7	1.7
R72	0.1	0.2	0.2	0.3	0.3	1.5	1.6	1.6	1.7	1.7
R73	0.1	0.2	0.2	0.3	0.3	1.5	1.6	1.6	1.7	1.7
R74	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R75	0.1	0.2	0.3	0.3	0.2	1.5	1.6	1.7	1.7	1.6
R76	0.1	0.2	0.2	0.2	0.2	1.5	1.6	1.6	1.6	1.6
R77	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5
R78	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5

Table C.6 Incremental and cumulative annual average dust deposition rates – all scenarios

Receptor ID	Incremental annual average dust deposition rate (g/m²/month) – criterion 2 g/m²/month					Cumulative annual average dust deposition rate (g/m²/month) – criterion 4 g/m²/month				
	Year 1	Year 2	Year 4	Year 6	Year 8	Year 1	Year 2	Year 4	Year 6	Year 8
R79	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R80	<0.1	<0.1	0.1	0.1	<0.1	1.4	1.4	1.5	1.5	1.4
R81	<0.1	<0.1	0.1	0.1	<0.1	1.4	1.4	1.5	1.5	1.4
R82	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R83	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R84	<0.1	0.1	0.1	0.1	0.1	1.4	1.5	1.5	1.5	1.5
R85	<0.1	<0.1	0.1	<0.1	<0.1	1.4	1.4	1.5	1.4	1.4
R86	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R87	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.4	1.4	1.4
R88	<0.1	<0.1	0.1	0.1	<0.1	1.4	1.4	1.5	1.5	1.4

Table C.7 Maximum incremental and cumulative 1-hour average and annual NO_2 concentration – all scenarios

Receptor ID	Maximum incremental 1-hour average NO_2 concentration (µg/m³) – criterion 246 µg/m³		Annual average NO_2 concentration (µg/m³) – criterion 62 µg/m³	
	Incremental	Cumulative	Incremental	Cumulative
R01	86.4	108.9	0.6	9.1
R02	80.2	102.7	0.5	9.0
R03	65.6	112.6	0.4	9.0
R04	71.6	110.4	0.5	9.0
R05	63.6	100.9	0.6	9.1
R06	105.3	146.7	2.0	10.5
R07	92.7	128.4	1.6	10.1
R08	85.1	116.5	0.8	9.3
R09	102.5	123.5	0.8	9.4
R11	98.0	118.2	0.9	9.4
R12	107.6	124.2	1.0	9.5
R13	105.1	110.8	1.1	9.6
R14	77.8	116.8	1.0	9.5
R15	114.8	126.8	1.9	10.4
R16	139.2	144.9	3.0	11.6
R17	137.5	161.0	4.3	12.8

Table C.7 Maximum incremental and cumulative 1-hour average and annual NO_2 concentration – all scenarios

Receptor ID	Maximum incremental 1-hour average NO_2 concentration (µg/m³) – criterion 246 µg/m³		Annual average NO_2 concentration (µg/m³) – criterion 62 µg/m³	
	Incremental	Cumulative	Incremental	Cumulative
R18	107.8	156.9	2.8	11.4
R19	120.8	163.1	4.0	12.6
R20	116.5	160.2	3.3	11.8
R21	118.1	162.7	3.8	12.3
R22	108.0	155.0	2.3	10.8
R23	116.3	161.0	3.0	11.5
R24	116.3	162.2	3.4	11.9
R25	118.0	163.7	4.0	12.5
R26	119.1	164.1	4.2	12.7
P27	118.7	163.3	4.1	12.6
R28	120.2	164.4	4.5	13.0
R28a	124.4	167.9	5.6	14.2
R29	118.9	163.2	3.6	12.1
R30	122.0	166.6	4.4	12.9
R31	120.0	164.1	3.6	12.1
R32	119.7	166.5	3.1	11.6
R33	137.9	164.3	3.7	12.3
R34	134.5	159.5	3.1	11.6
R35	131.1	163.1	3.2	11.7
R36	131.7	163.7	2.8	11.3
R37	124.3	150.9	2.9	11.4
R38	149.6	170.3	3.3	11.8
R39	122.0	151.6	2.1	10.6
R40	124.6	148.8	2.7	11.2
R41	109.1	141.0	2.0	10.5
R42	147.3	168.0	2.6	11.1
R43	139.8	171.7	2.9	11.4
R44	111.8	135.2	1.8	10.4
R45	119.3	140.7	2.1	10.6
R46	146.9	167.5	2.3	10.8
R47	123.8	145.9	2.7	11.2
R48	131.8	161.8	2.8	11.3

Table C.7 Maximum incremental and cumulative 1-hour average and annual NO_2 concentration – all scenarios

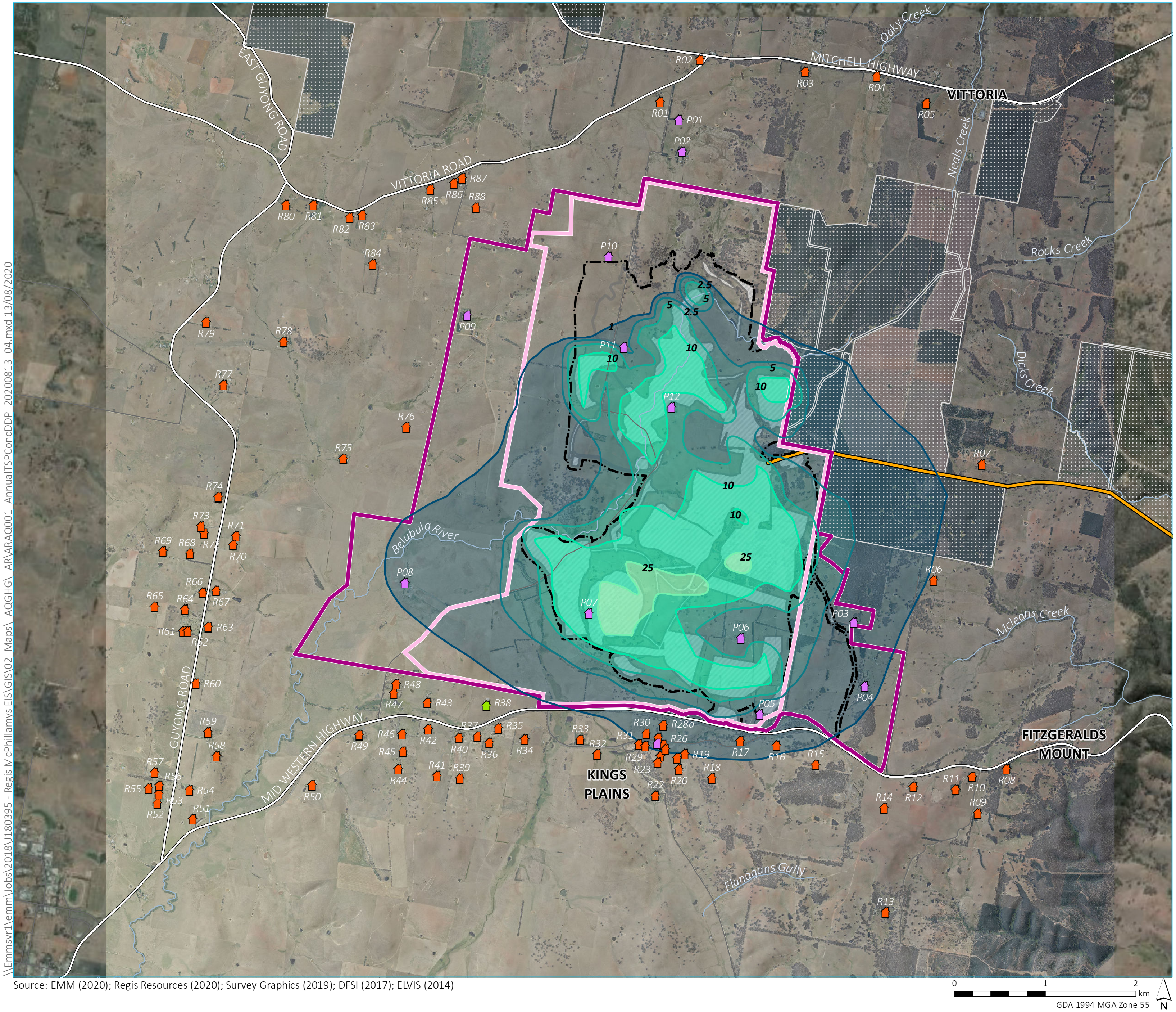
Receptor ID	Maximum incremental 1-hour average NO_2 concentration (µg/m³) – criterion 246 µg/m³		Annual average NO_2 concentration (µg/m³) – criterion 62 µg/m³	
	Incremental	Cumulative	Incremental	Cumulative
R49	138.8	159.5	2.1	10.6
R50	115.7	137.0	1.5	10.0
R51	114.8	135.5	1.1	9.6
R52	109.2	131.7	1.0	9.6
R53	107.8	133.6	1.1	9.6
R54	111.9	133.7	1.2	9.7
R55	104.0	133.7	1.0	9.6
R56	104.9	134.1	1.1	9.6
R57	98.0	132.7	1.1	9.6
R58	89.9	131.3	1.2	9.7
R59	98.3	122.7	1.2	9.7
R60	101.4	130.7	1.4	9.9
R61	98.8	125.4	1.7	10.2
R62	99.4	126.5	1.7	10.2
R63	104.9	129.9	1.9	10.4
R64	95.6	122.4	1.8	10.3
R65	84.7	113.9	1.6	10.1
R66	94.2	143.5	2.1	10.6
R67	96.8	148.7	2.2	10.7
R68	103.9	156.6	1.9	10.4
R69	103.0	155.6	1.8	10.3
R70	100.1	150.7	2.1	10.6
R71	97.3	145.2	2.0	10.5
R72	97.4	146.8	1.9	10.4
R73	96.1	144.4	1.8	10.3
R74	95.3	128.4	1.6	10.2
R75	109.0	132.9	1.9	10.5
R76	123.6	134.9	1.7	10.2
R77	94.0	119.4	1.1	9.7
R78	111.1	123.4	1.1	9.6
R79	93.3	125.2	0.9	9.4
R80	86.8	94.5	0.7	9.2

Table C.7 Maximum incremental and cumulative 1-hour average and annual NO_2 concentration – all scenarios

Receptor ID	Maximum incremental 1-hour average NO_2 concentration (µg/m³) – criterion 246 µg/m³		Annual average NO_2 concentration (µg/m³) – criterion 62 µg/m³	
	Incremental	Cumulative	Incremental	Cumulative
R81	87.7	114.7	0.7	9.2
R82	84.9	121.6	0.7	9.3
R83	85.0	122.6	0.7	9.2
R84	85.1	111.4	0.8	9.3
R85	76.9	86.0	0.5	9.0
R86	73.8	89.8	0.5	9.0
R87	72.6	91.8	0.5	9.0
R88	76.3	93.4	0.6	9.1

Appendix D

Predicted incremental isopleth plots



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\AQ001_AnnualTSPConcDDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average TSP concentrations
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³

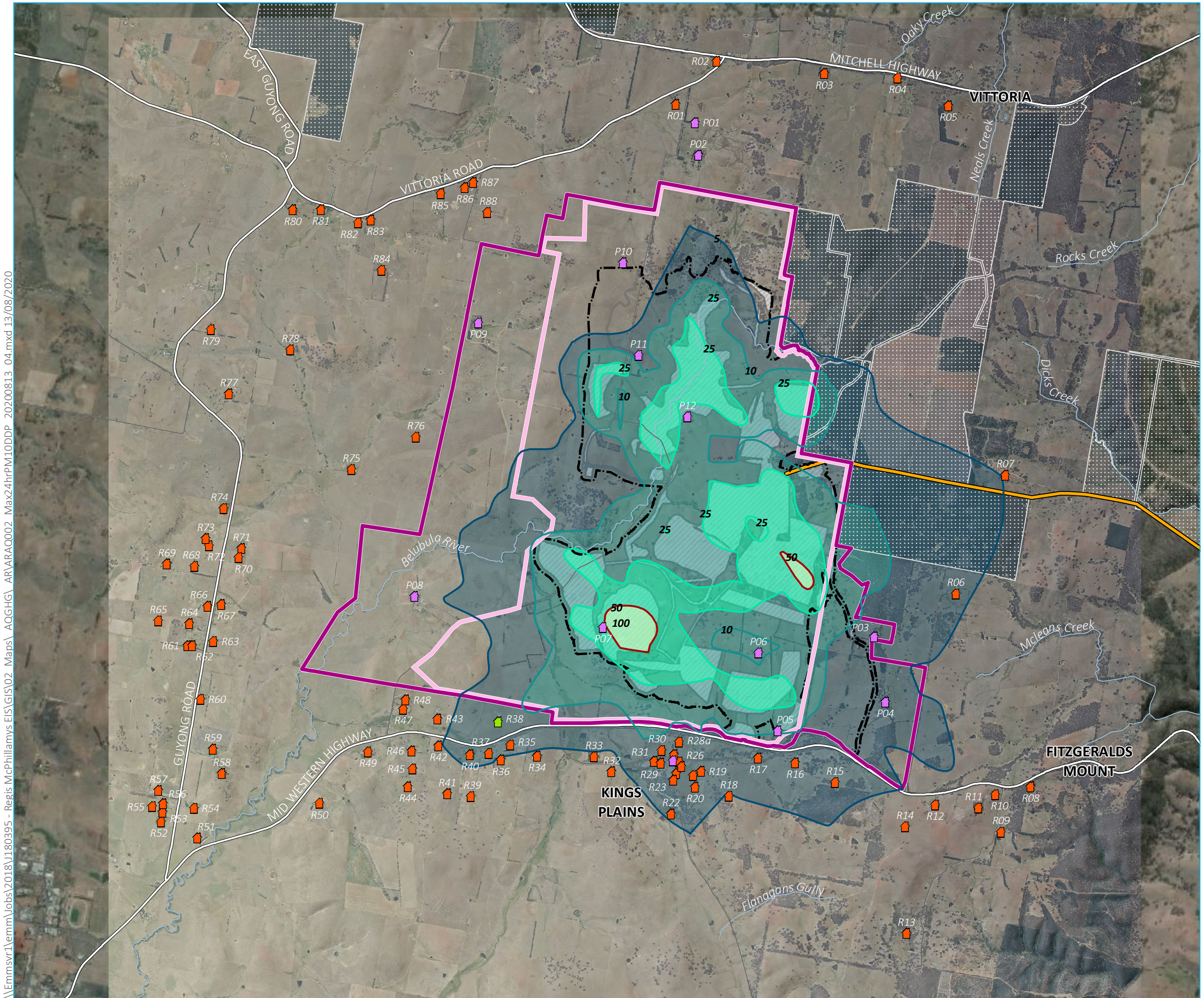
Annual average TSP concentration range
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 45 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average TSP concentrations (µg/m³) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.1

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average PM_{10} concentrations
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³
- 50 µg/m³ (incremental VLAMP mitigation criteria)
- 100 µg/m³

Maximum 24-hour average PM_{10} concentration range
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 50 µg/m³
- 50 - 100 µg/m³
- > 100 µg/m³

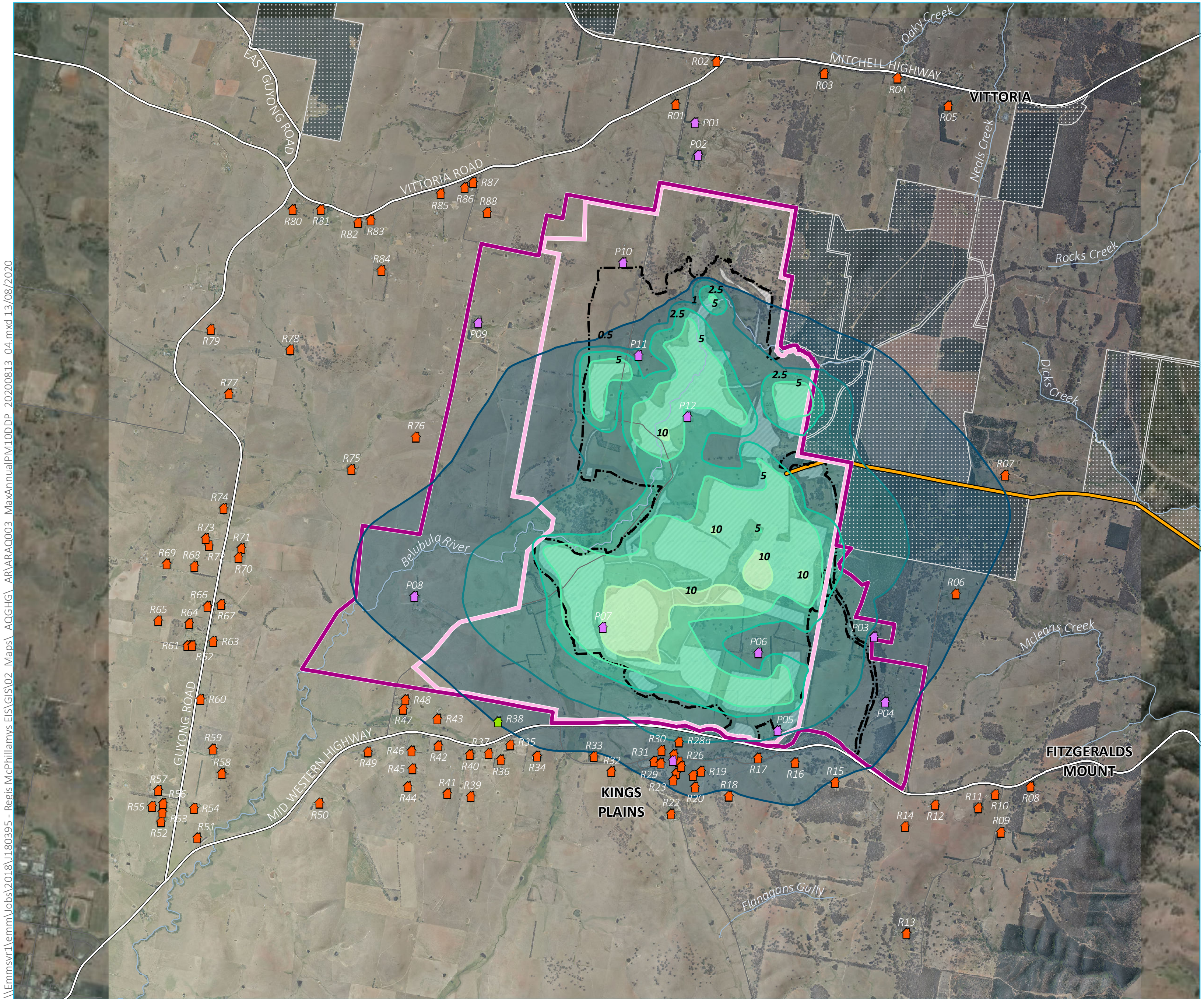
Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Maximum predicted 24-hour average PM_{10} concentrations (µg/m³) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.2

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ002_Max24hrPM10DDP_20200813_04.mxd 13/08/2020



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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average PM_{10} concentrations
- 0.5 µg/m³
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³

Annual average PM_{10} concentration range
- 0.5 - 1 µg/m³
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average PM_{10} concentrations (µg/m³) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.3

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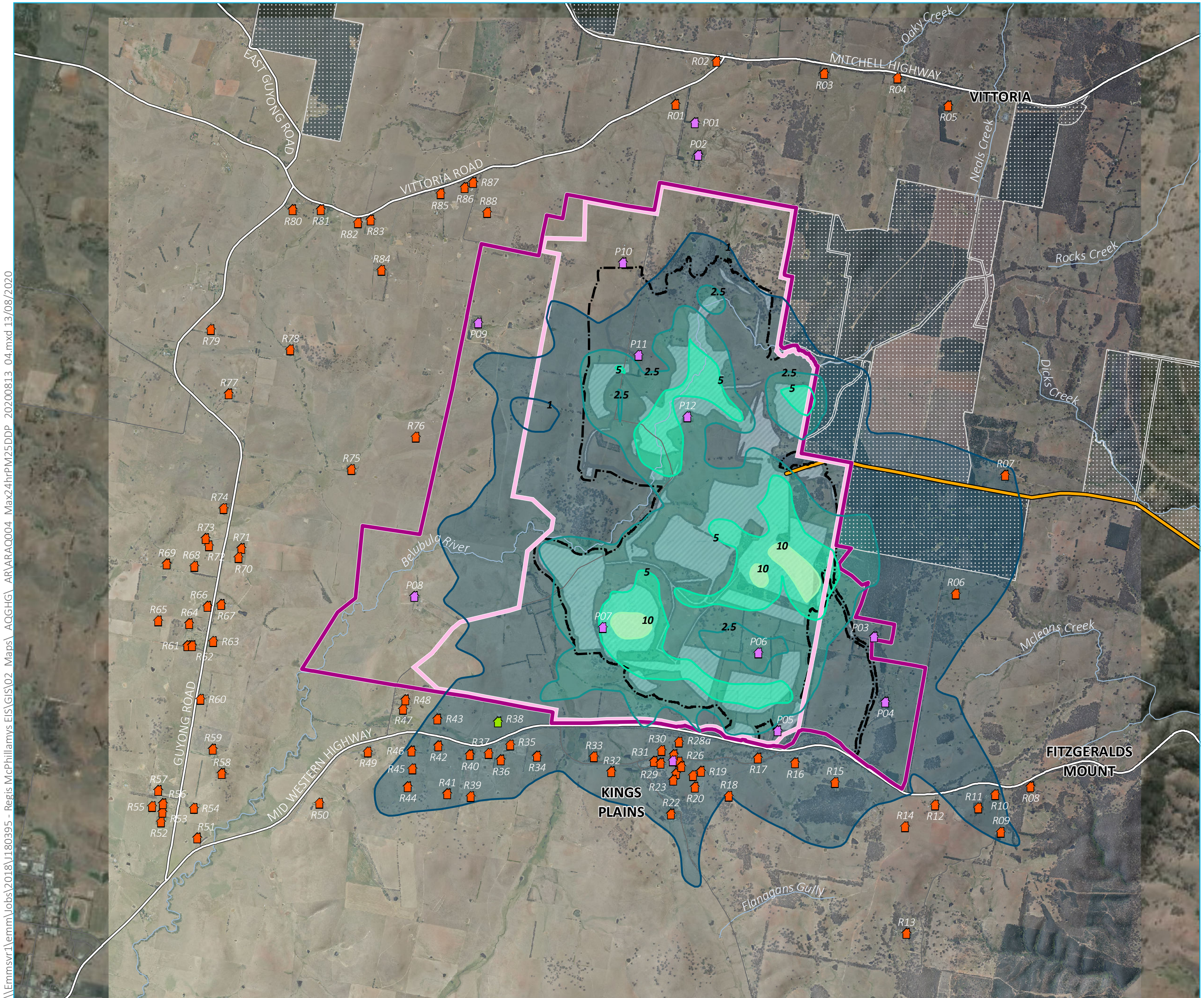
EMM creating opportunities

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ004_Max24hrPM25DDP_20200813_04.mxd 13/08/2020



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

N

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average $PM_{2.5}$ concentrations

- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³

Maximum 24-hour average $PM_{2.5}$ concentration range

- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³

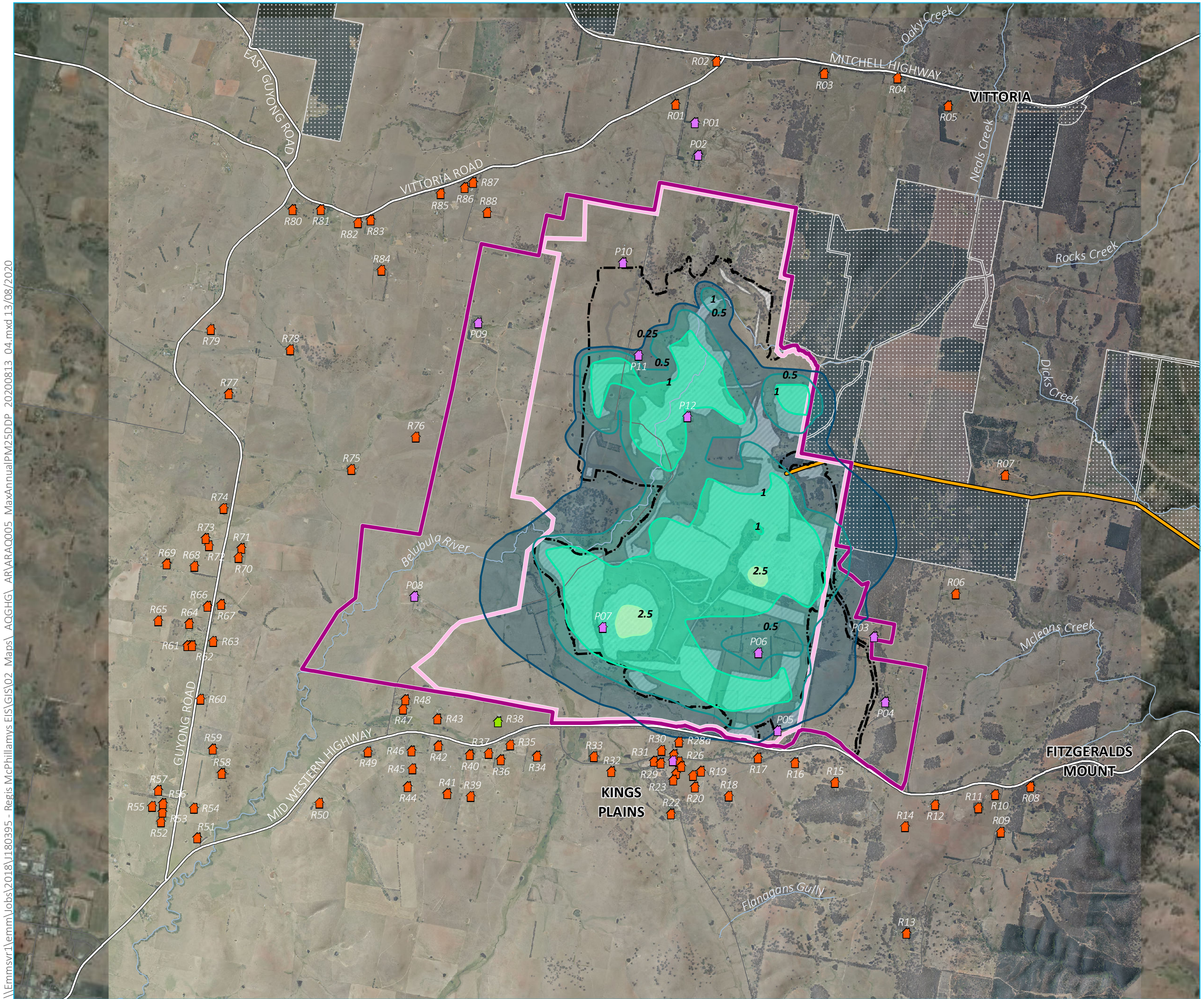
Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m³) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.4

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average $PM_{2.5}$ concentrations
- 0.25 µg/m³
- 0.5 µg/m³
- 1 µg/m³
- 2.5 µg/m³

Annual average $PM_{2.5}$ concentration range
- 0.25 - 0.5 µg/m³
- 0.5 - 1 µg/m³
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

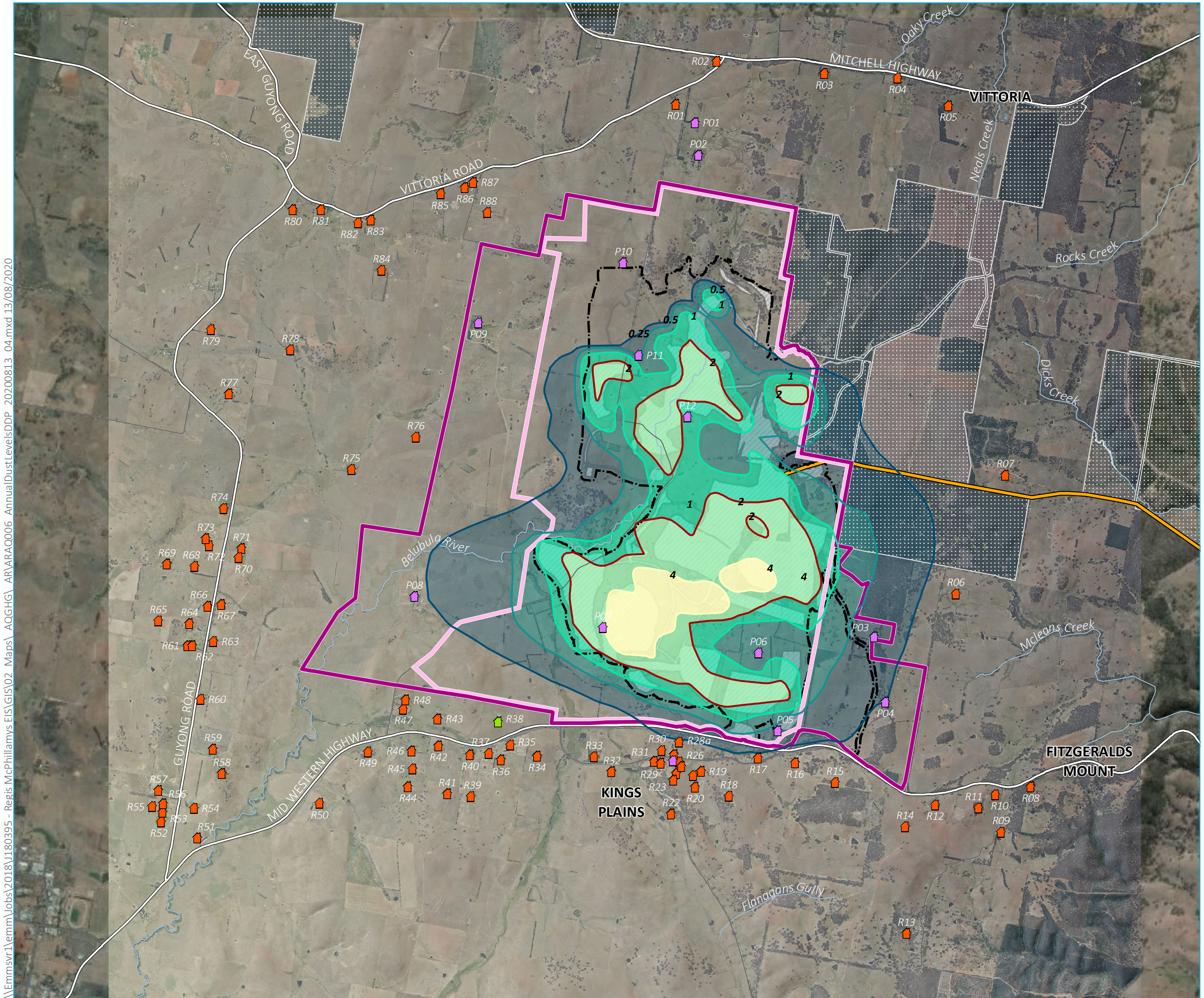
Predicted annual average $PM_{2.5}$ concentrations (µg/m³) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.5

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ005_MaxAnnualPM25DDP_20200813_04.mxd 13/08/2020

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average dust deposition levels
- 0.25 g/m²/month
- 0.5 g/m²/month
- 1 g/m²/month
- 2 g/m²/month (incremental VLAMP mitigation criteria)
- 4 g/m²/month

Annual average dust deposition level range
- 0.25 - 0.5 g/m²/month
- 0.5 - 1 g/m²/month
- 1 - 2 g/m²/month
- 2 - 4 g/m²/month
- > 4 g/m²/month

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

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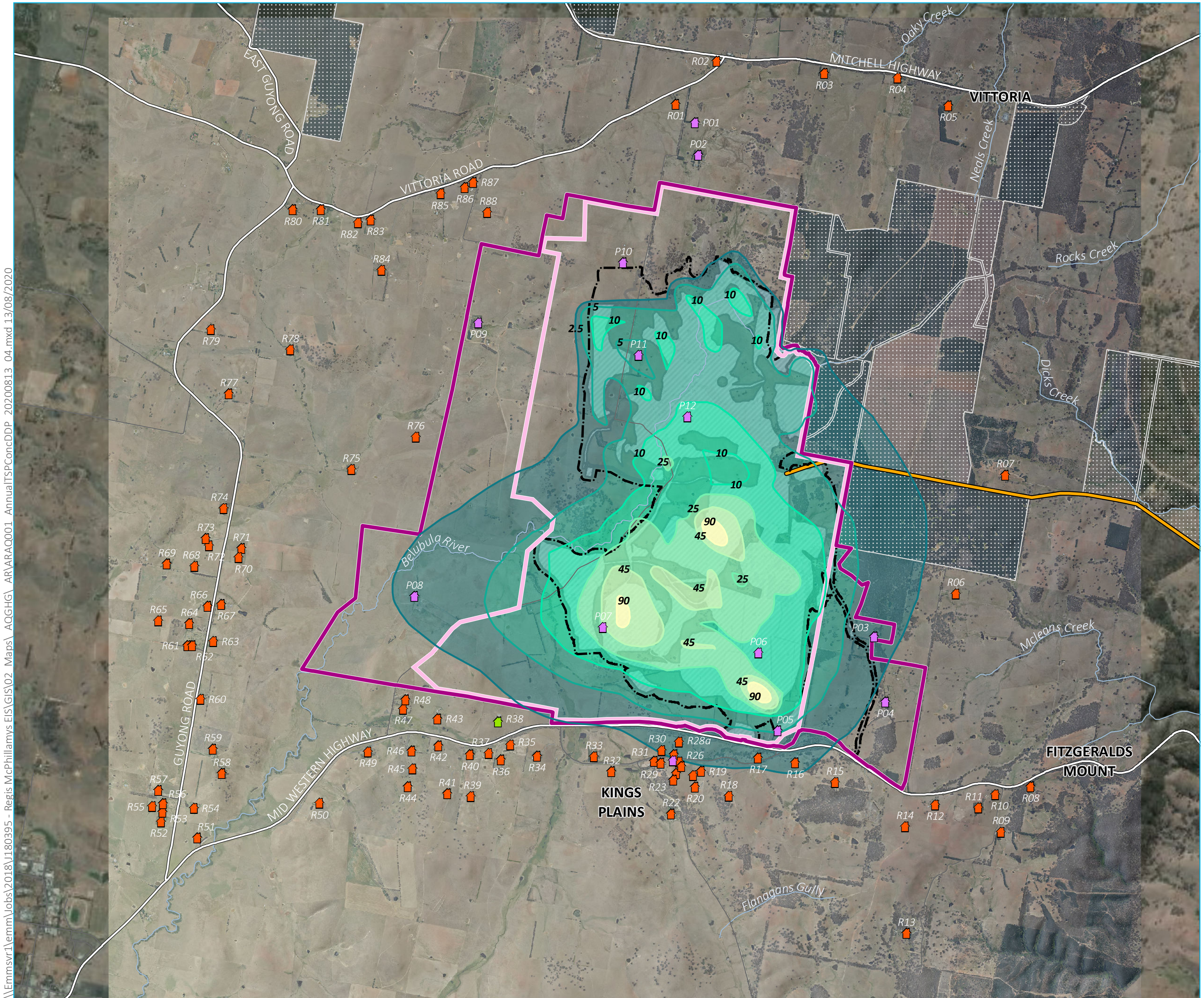
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ006_AnnualDustLevelsDDP_20200813_04.mxd 13/08/2020

Predicted annual average dust deposition levels (g/m²/month) – Year 1 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.6

REGIS RESOURCES LTD
EMM creating opportunities



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ001_AnnualTSPConcDDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average TSP concentrations
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³
- 45 µg/m³
- 90 µg/m³

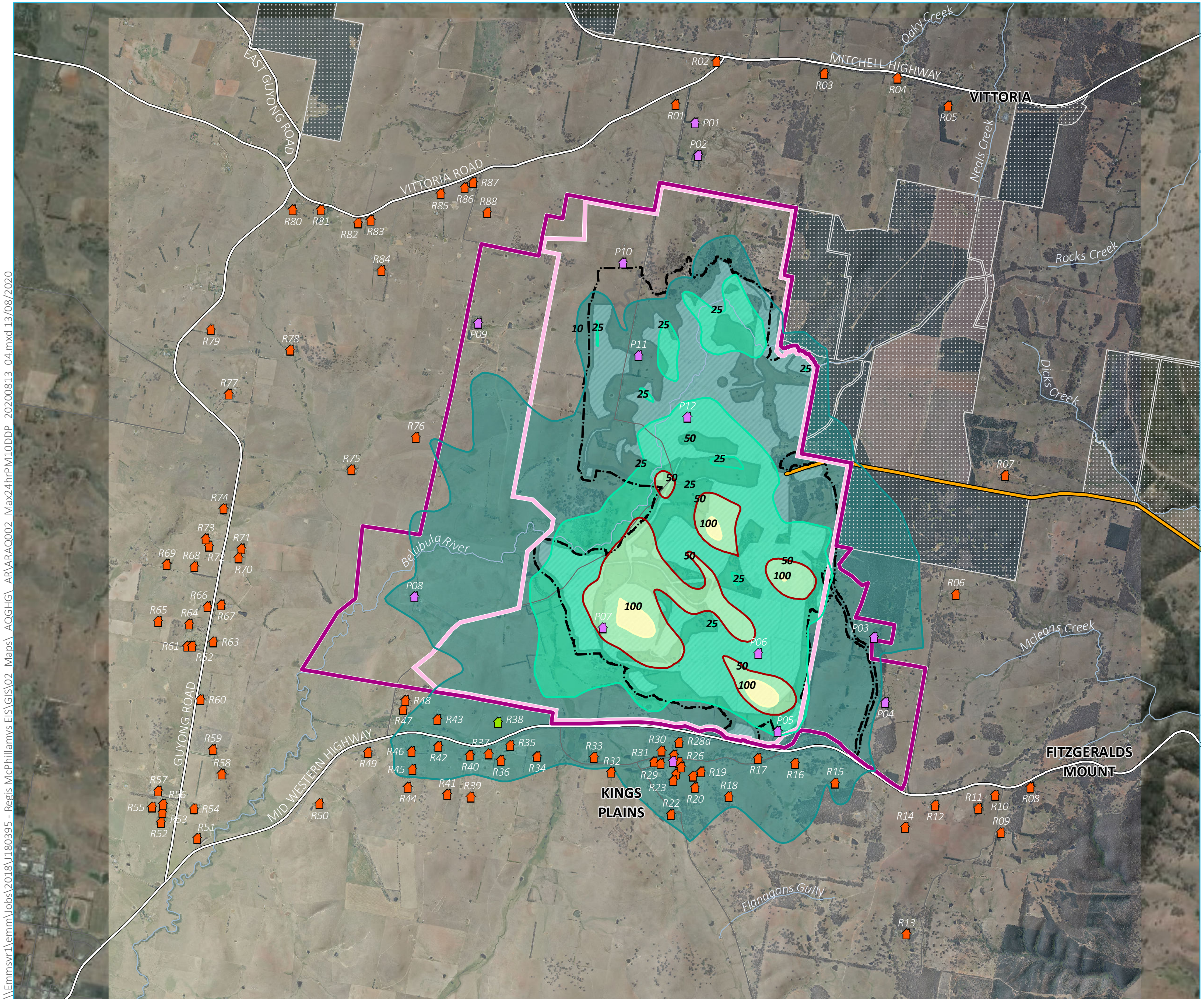
Annual average TSP concentration range
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 45 µg/m³
- 45 - 90 µg/m³
- > 90 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average TSP concentrations (µg/m³) – Year 2 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.7

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average PM_{10} concentrations
- 10 µg/m³
- 25 µg/m³
- 50 µg/m³ (incremental VLAMP mitigation criteria)
- 100 µg/m³

Maximum 24-hour average PM_{10} concentration range
- 10 - 25 µg/m³
- 25 - 50 µg/m³
- 50 - 100 µg/m³
- > 100 µg/m³

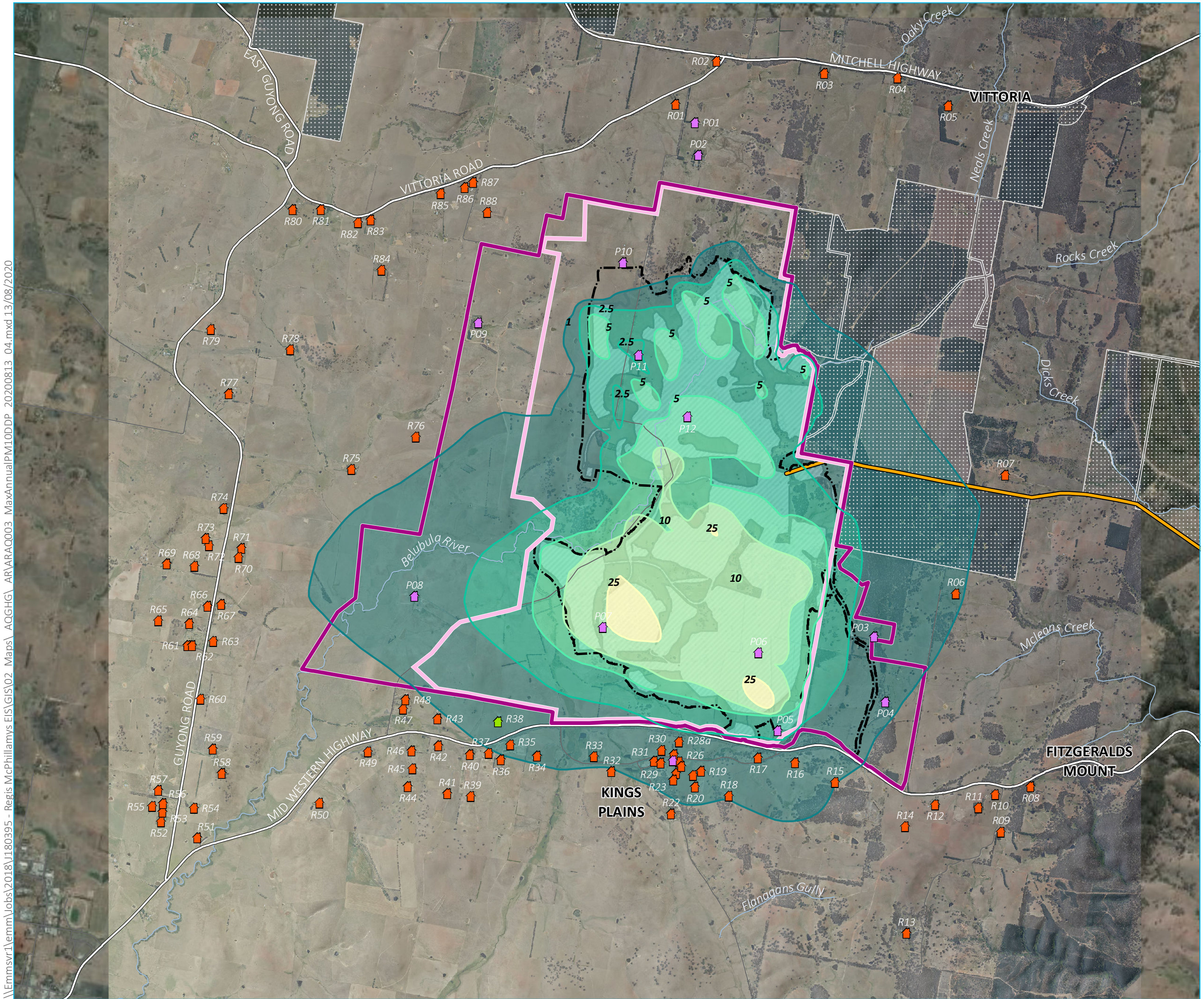
Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

Maximum predicted 24-hour average PM_{10} concentrations (µg/m³) – Year 2 operations only

McPhillamys Gold Project
Amendment report – revised air quality and greenhouse gas assessment
Figure D.8

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02 Maps\ AQGHG\ AR\ARAQ002 Max24hrPM10DDP 20200813 04.mxd 13/08/2020



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average PM_{10} concentrations
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³

Annual average PM_{10} concentration range
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- > 25 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average PM_{10} concentrations (µg/m³) – Year 2 operations only

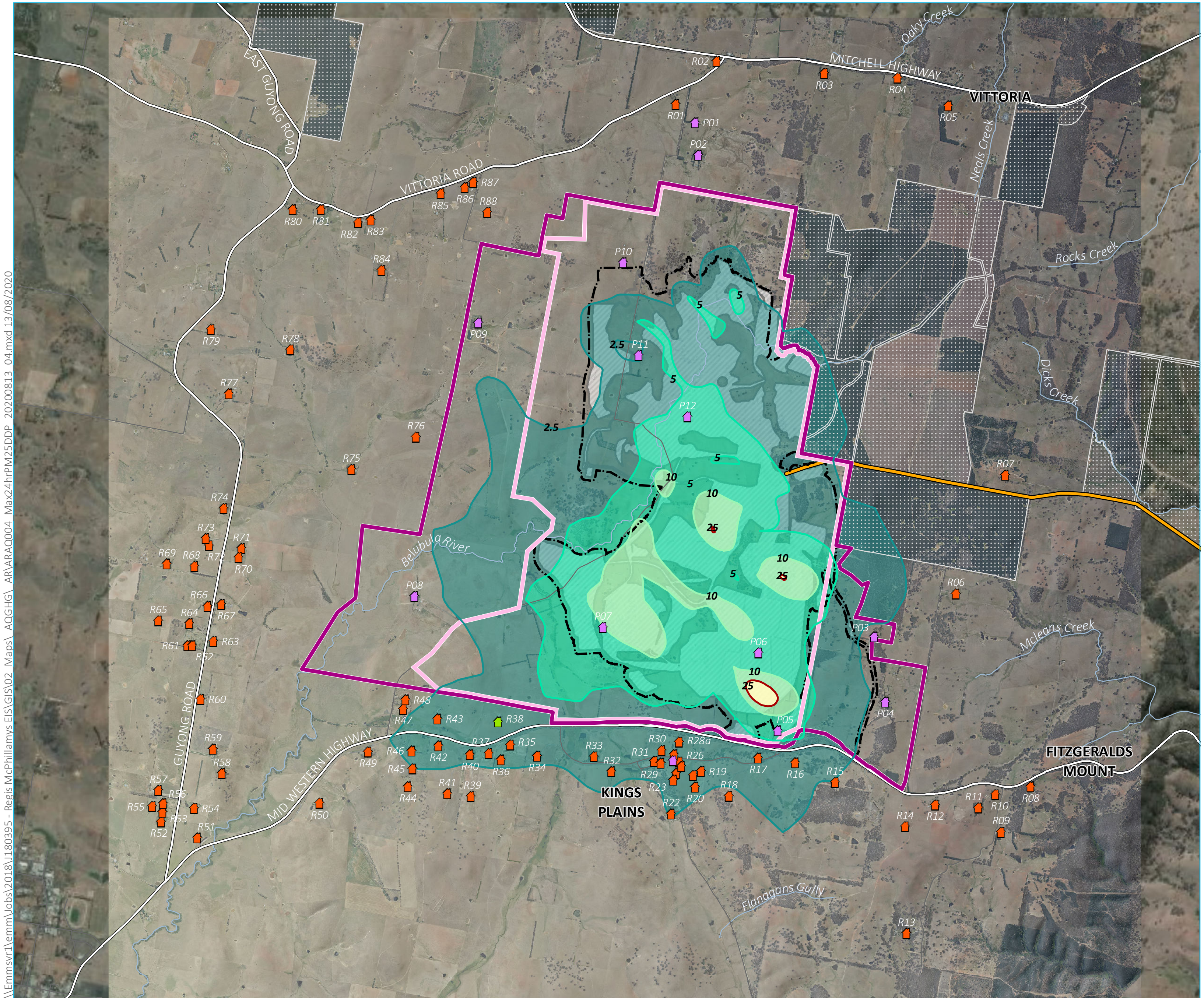
McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.9

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ003_MaxAnnualPM10DDP_20200813_04.mxd 13/08/2020

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average $PM_{2.5}$ concentrations
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³ (incremental VLAMP mitigation criteria)

Maximum 24-hour average $PM_{2.5}$ concentration range
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- > 25 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

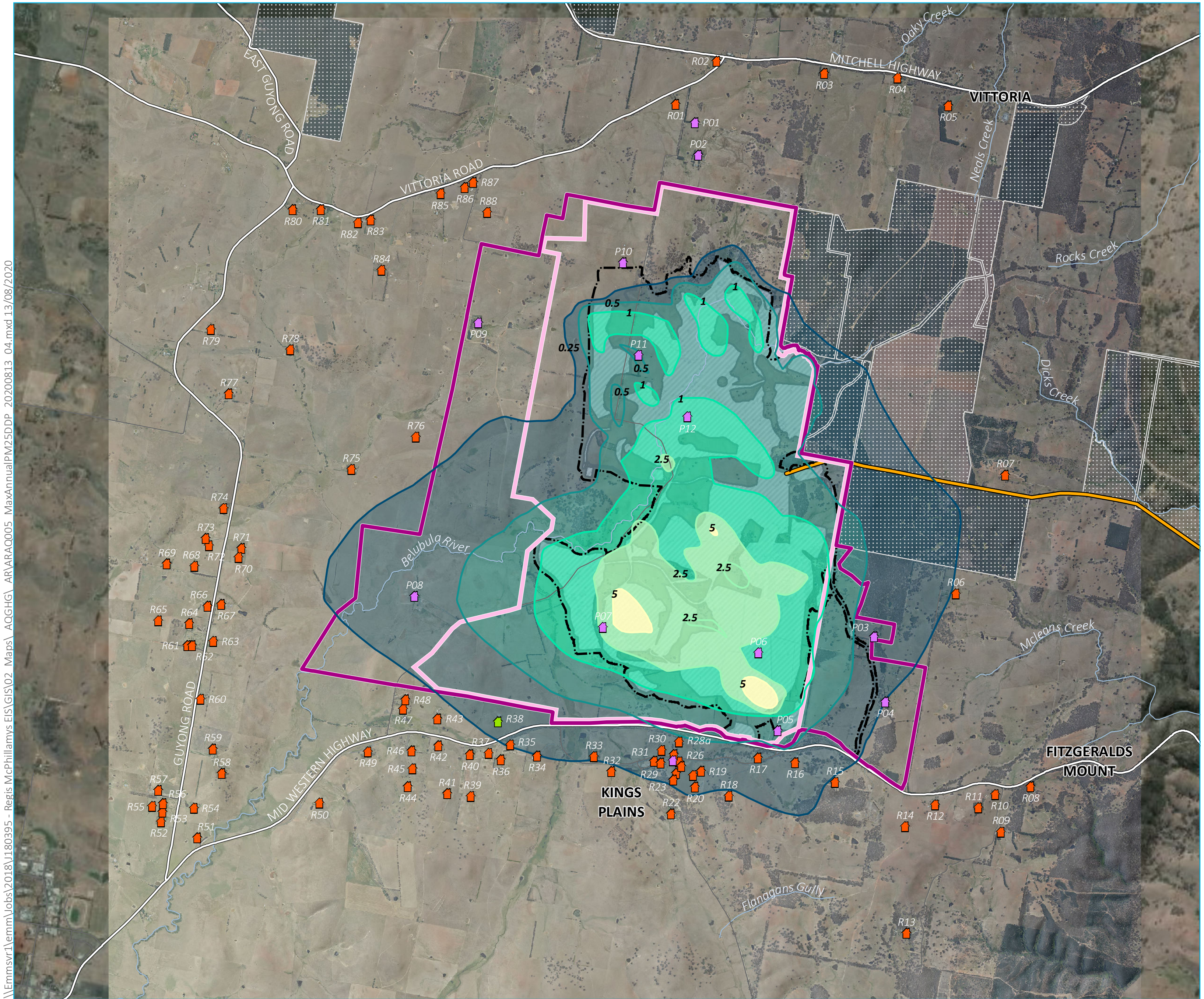
GDA 1994 MGA Zone 55

N

Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m³) – Year 2 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.10

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average $PM_{2.5}$ concentrations

- 0.25 µg/m^3
- 0.5 µg/m^3
- 1 µg/m^3
- 2.5 µg/m^3
- 5 µg/m^3

Annual average $PM_{2.5}$ concentration range

- 0.25 - 0.5 µg/m^3
- 0.5 - 1 µg/m^3
- 1 - 2.5 µg/m^3
- 2.5 - 5 µg/m^3
- > 5 µg/m^3

Existing environment

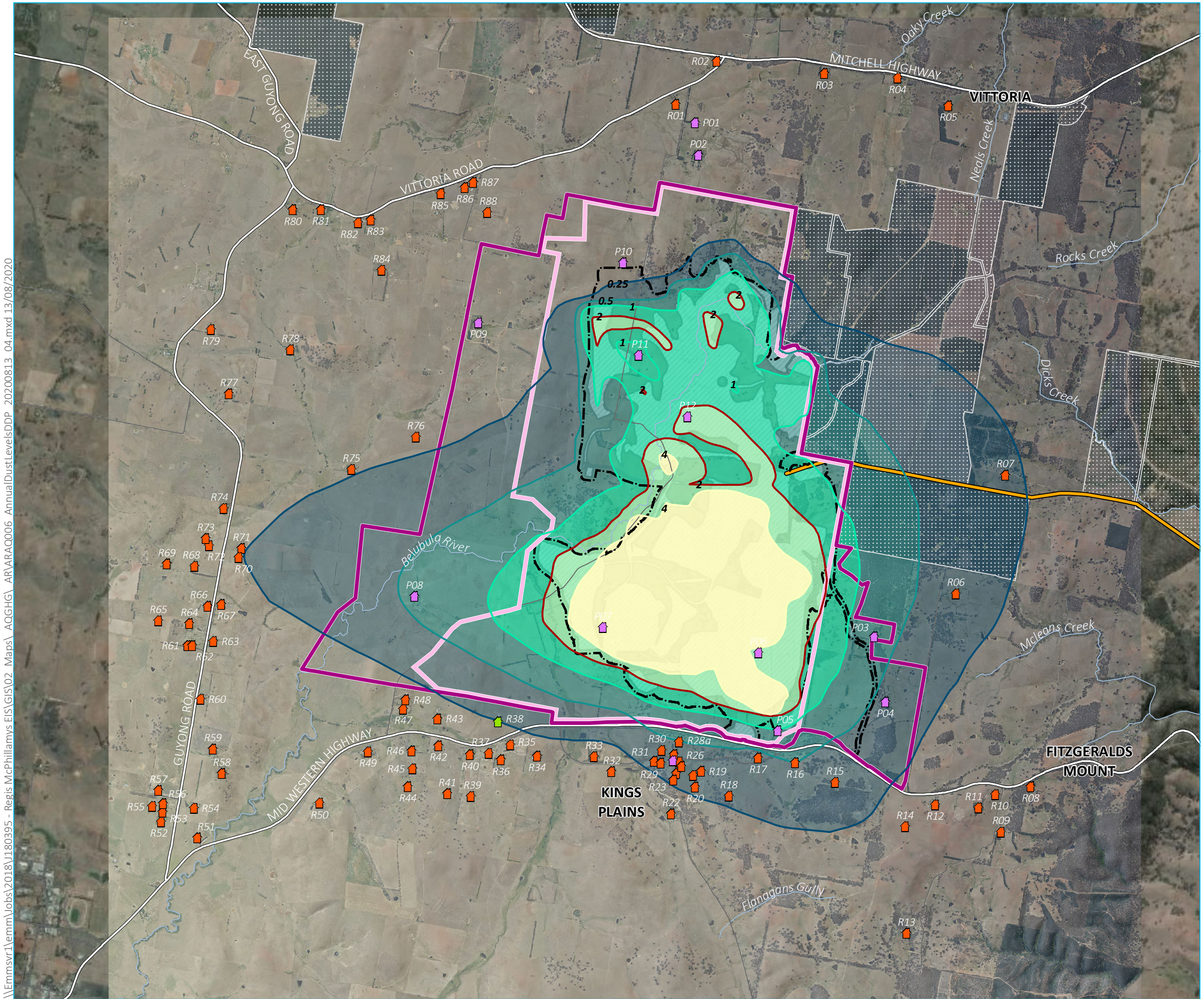
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

Predicted annual average $PM_{2.5}$ concentrations (µg/m^3) – Year 2 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.11

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ005_MaxAnnualPM25DDP_20200813_04.mxd 13/08/2020



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average dust deposition levels
- 0.25 g/m²/month
- 0.5 g/m²/month
- 1 g/m²/month
- 2 g/m²/month (incremental VLAMP mitigation criteria)
- 4 g/m²/month

Annual average dust deposition level range
- 0.25 - 0.5 g/m²/month
- 0.5 - 1 g/m²/month
- 1 - 2 g/m²/month
- 2 - 4 g/m²/month
- > 4 g/m²/month

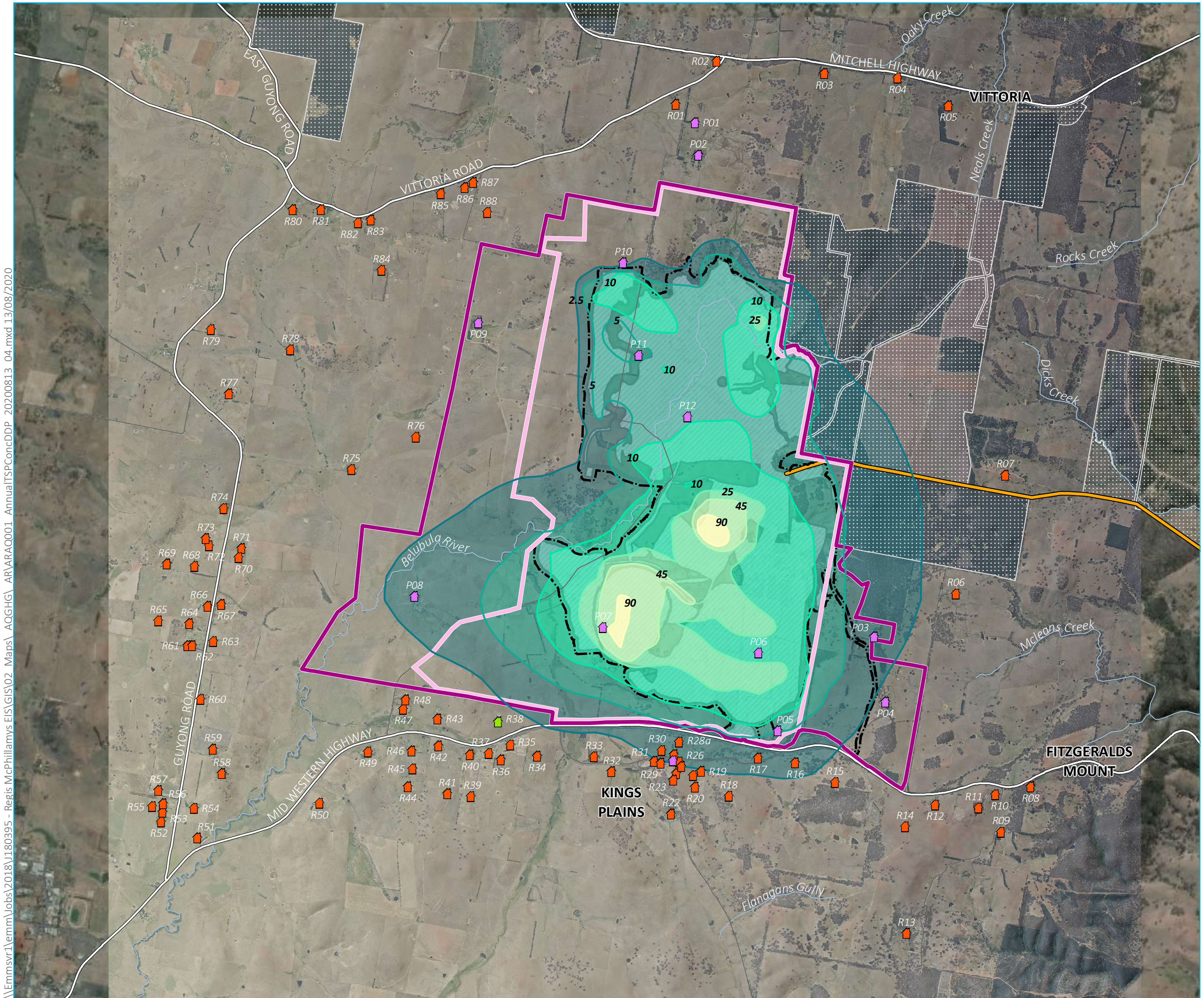
Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average dust deposition levels (g/m²/month) – Year 2 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.12

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ006_AnnualDustLevelsDDP_20200813_04.mxd 13/08/2020



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ001_AnnualTSPConcDDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

N

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average TSP concentrations

- 2.5 μg/m³
- 5 μg/m³
- 10 μg/m³
- 25 μg/m³
- 45 μg/m³
- 90 μg/m³

Annual average TSP concentration range

- 2.5 - 5 μg/m³
- 5 - 10 μg/m³
- 10 - 25 μg/m³
- 25 - 45 μg/m³
- 45 - 90 μg/m³
- > 90 μg/m³

Existing environment

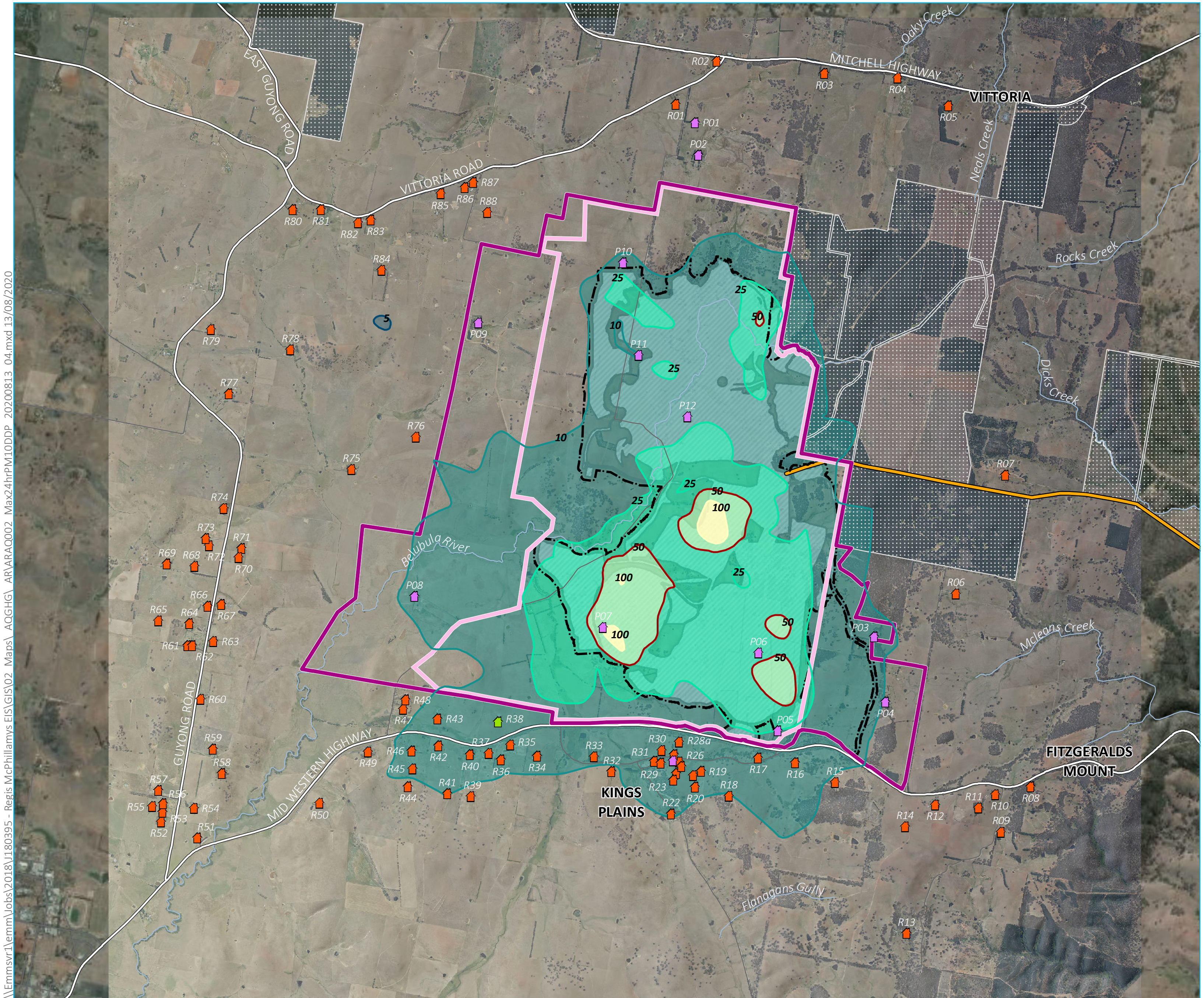
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average TSP concentrations (μg/m³) – Year 4 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.13

REGIS RESOURCES LTD

EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

N

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average PM_{10} concentrations

- 5 µg/m³
- 10 µg/m³
- 25 µg/m³
- 50 µg/m³ (incremental VLAMP mitigation criteria)
- 100 µg/m³

Maximum 24-hour average PM_{10} concentration range

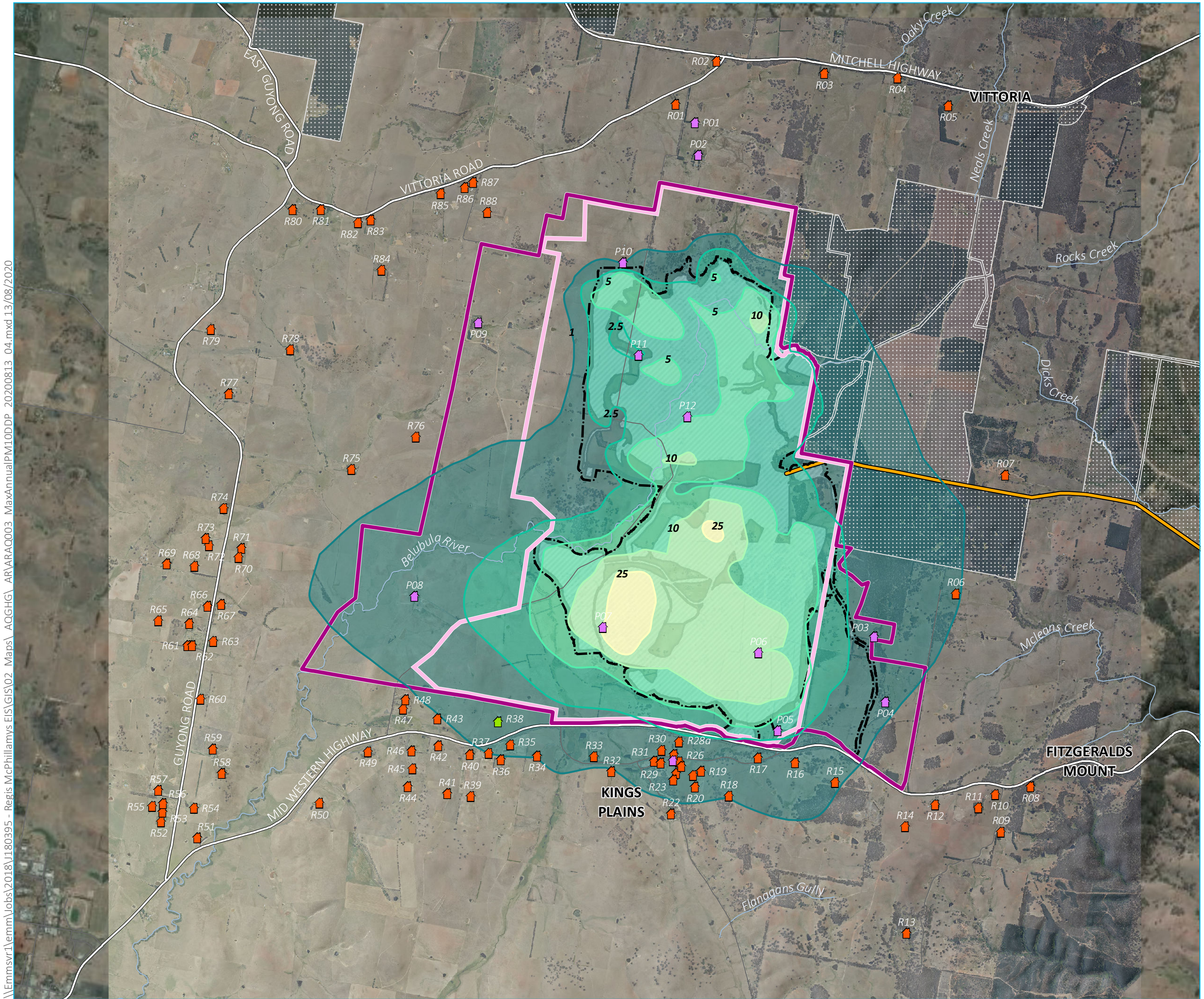
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 50 µg/m³
- 50 - 100 µg/m³
- > 100 µg/m³

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Maximum predicted 24-hour average PM_{10} concentrations (µg/m³) – Year 4 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.14



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ003_MaxAnnualPM10DDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average PM_{10} concentrations
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³

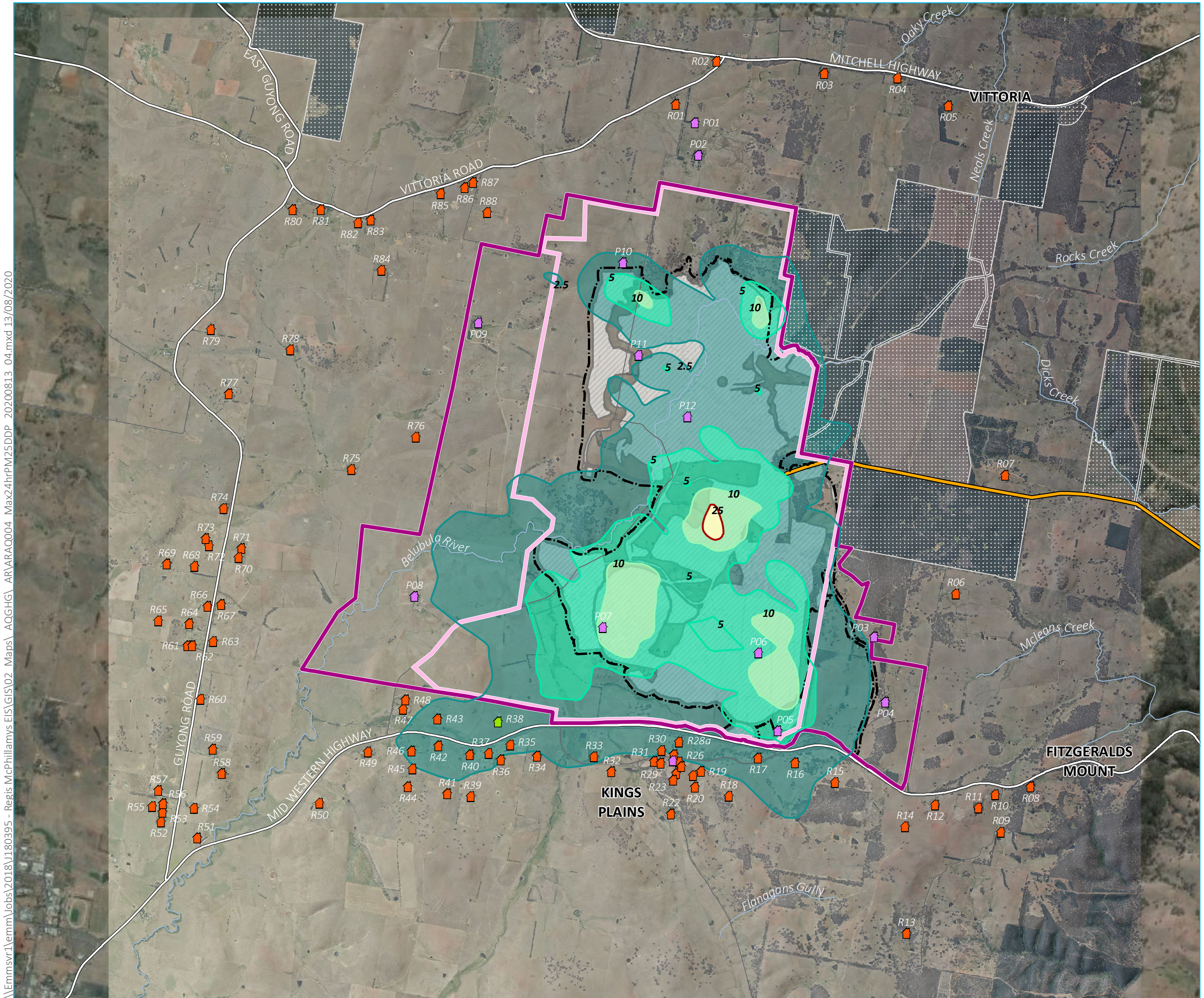
Annual average PM_{10} concentration range
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- > 25 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average PM_{10} concentrations (µg/m³) – Year 4 operations only

McPhillamys Gold Project
Amendment report – revised air quality and greenhouse gas assessment
Figure D.15

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average $PM_{2.5}$ concentrations

- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³ (incremental VLAMP mitigation criteria)

Maximum 24-hour average $PM_{2.5}$ concentration range

- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- > 25 µg/m³

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m³) – Year 4 operations only

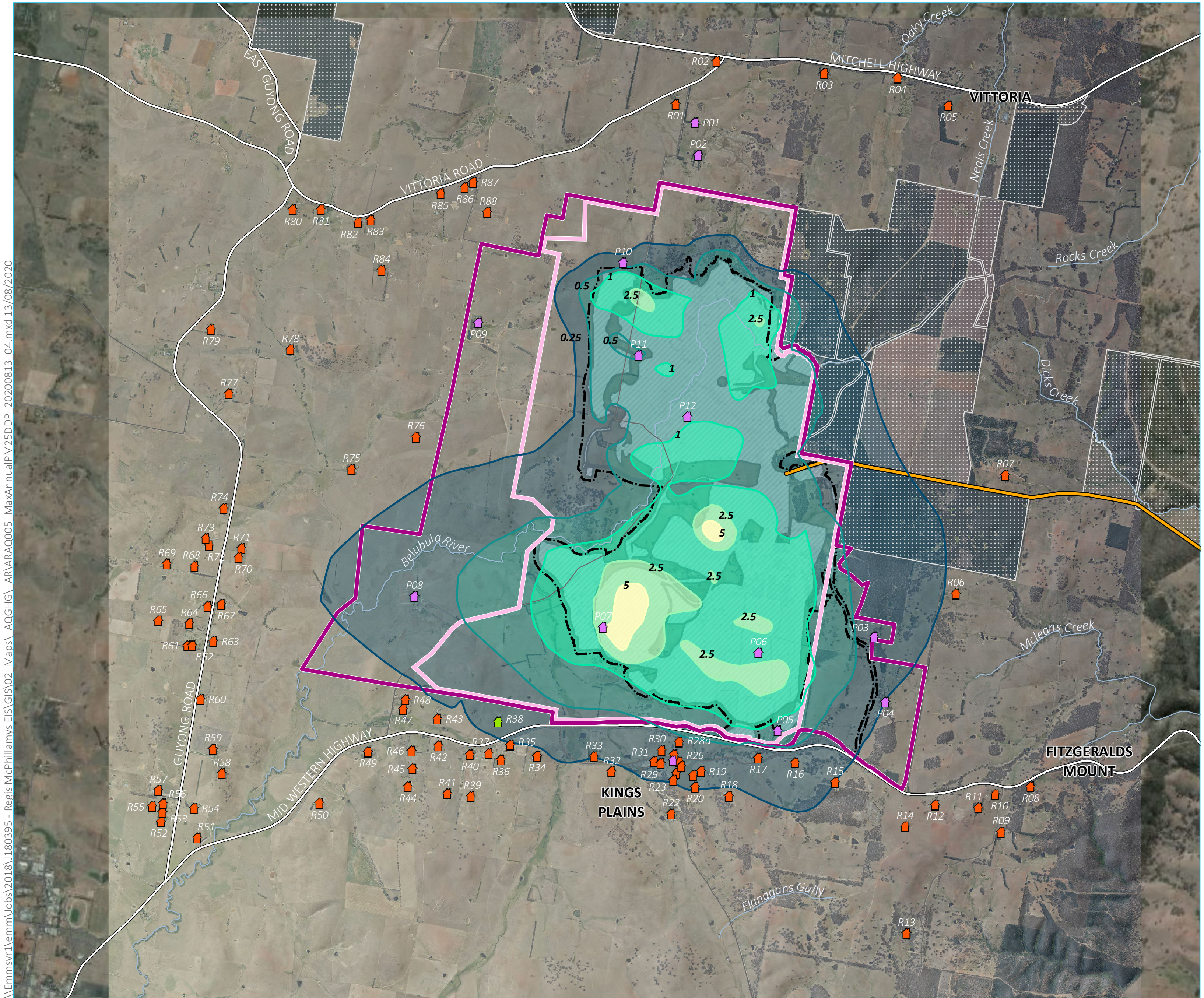
McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.16

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55
N

REGIS RESOURCES LTD
EMM creating opportunities

\\Emmsvr1\emm\Jobs\2018\180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ004_Max24hrPM25DDP_20200813_04.mxd 13/08/2020



KEY

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Disturbance footprint

Pipeline

Mine development general arrangement - Year 4

Sensitive receptor

Private

Residences under option

Project related (Regis-owned)

Annual average $PM_{2.5}$ concentrations

0.25 µg/m³

0.5 µg/m³

1 µg/m³

2.5 µg/m³

5 µg/m³

Annual average $PM_{2.5}$ concentration range

0.25 - 0.5 µg/m³

0.5 - 1 µg/m³

1 - 2.5 µg/m³

2.5 - 5 µg/m³

> 5 µg/m³

Existing environment

Major road

Minor road

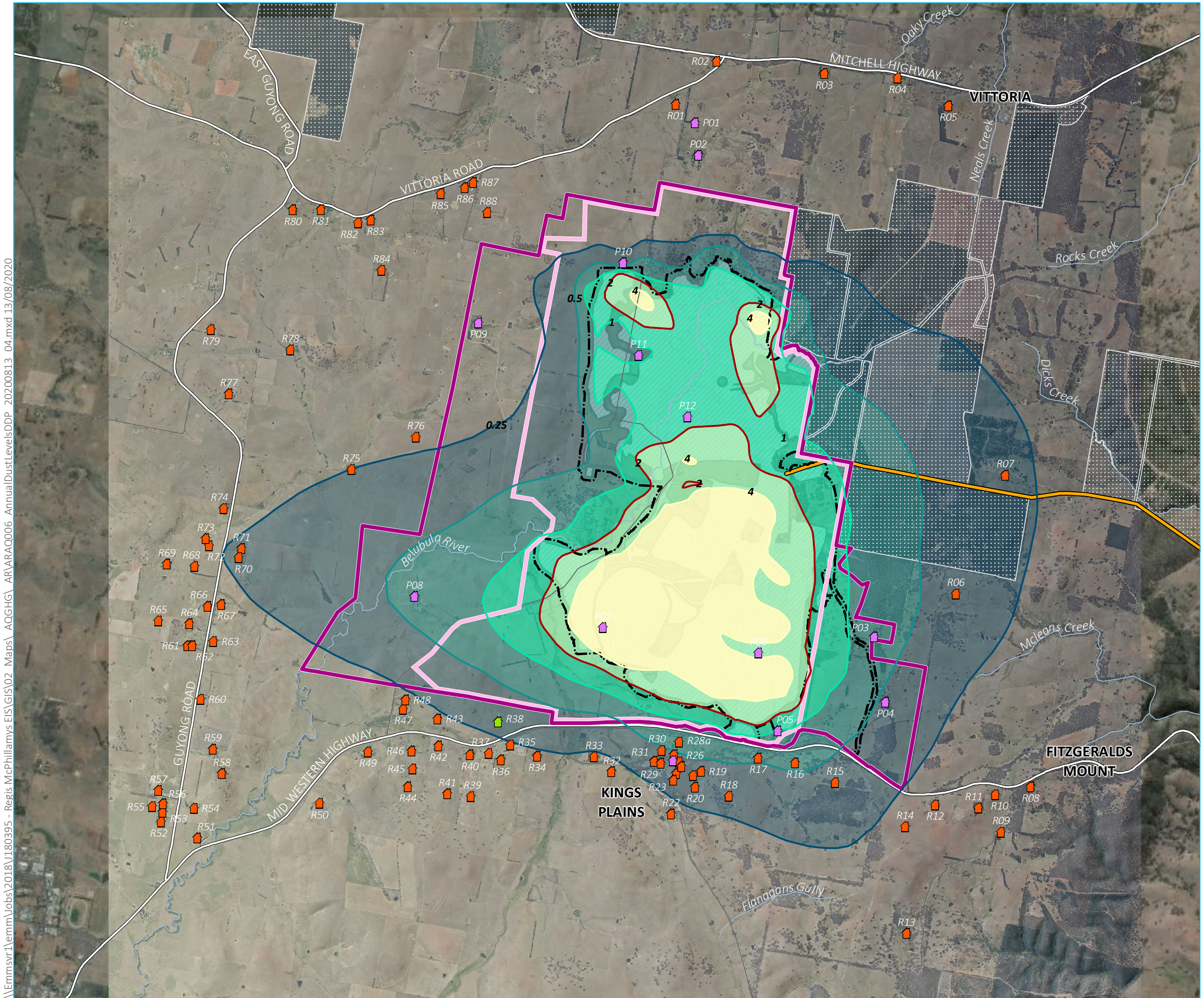
Named watercourse

Vittoria State Forest

Predicted annual average $PM_{2.5}$ concentrations (µg/m³) – Year 4 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.17

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ006_AnnualDustLevelsDDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average dust deposition levels
- 0.25 g/m²/month
- 0.5 g/m²/month
- 1 g/m²/month
- 2 g/m²/month (incremental VLAMP mitigation criteria)
- 4 g/m²/month

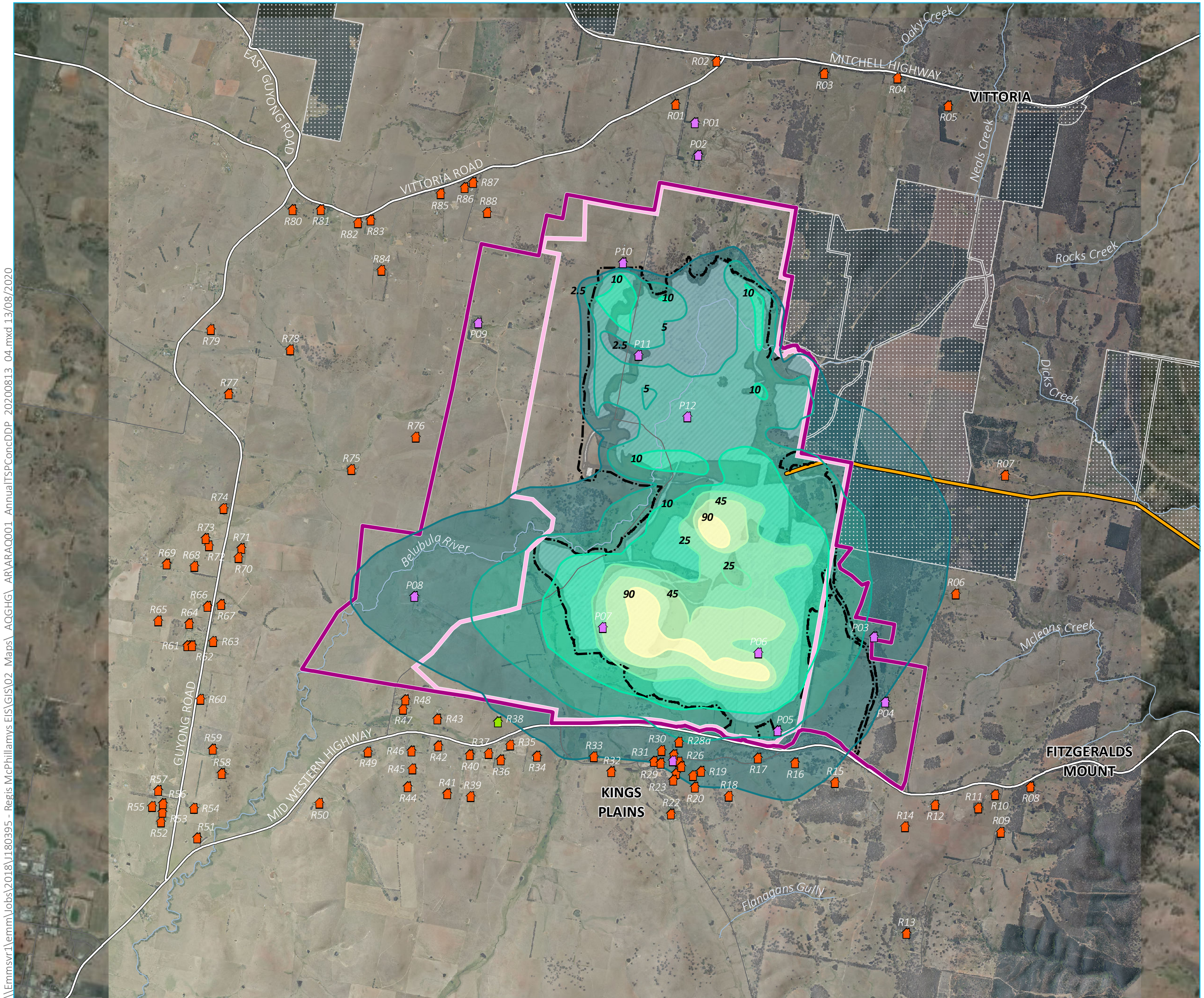
Annual average dust deposition level range
- 0.25 - 0.5 g/m²/month
- 0.5 - 1 g/m²/month
- 1 - 2 g/m²/month
- 2 - 4 g/m²/month
- > 4 g/m²/month

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average dust deposition levels (g/m²/month) – Year 4 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.18

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average TSP concentrations

- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³
- 45 µg/m³
- 90 µg/m³

Annual average TSP concentration range

- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 45 µg/m³
- 45 - 90 µg/m³
- > 90 µg/m³

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

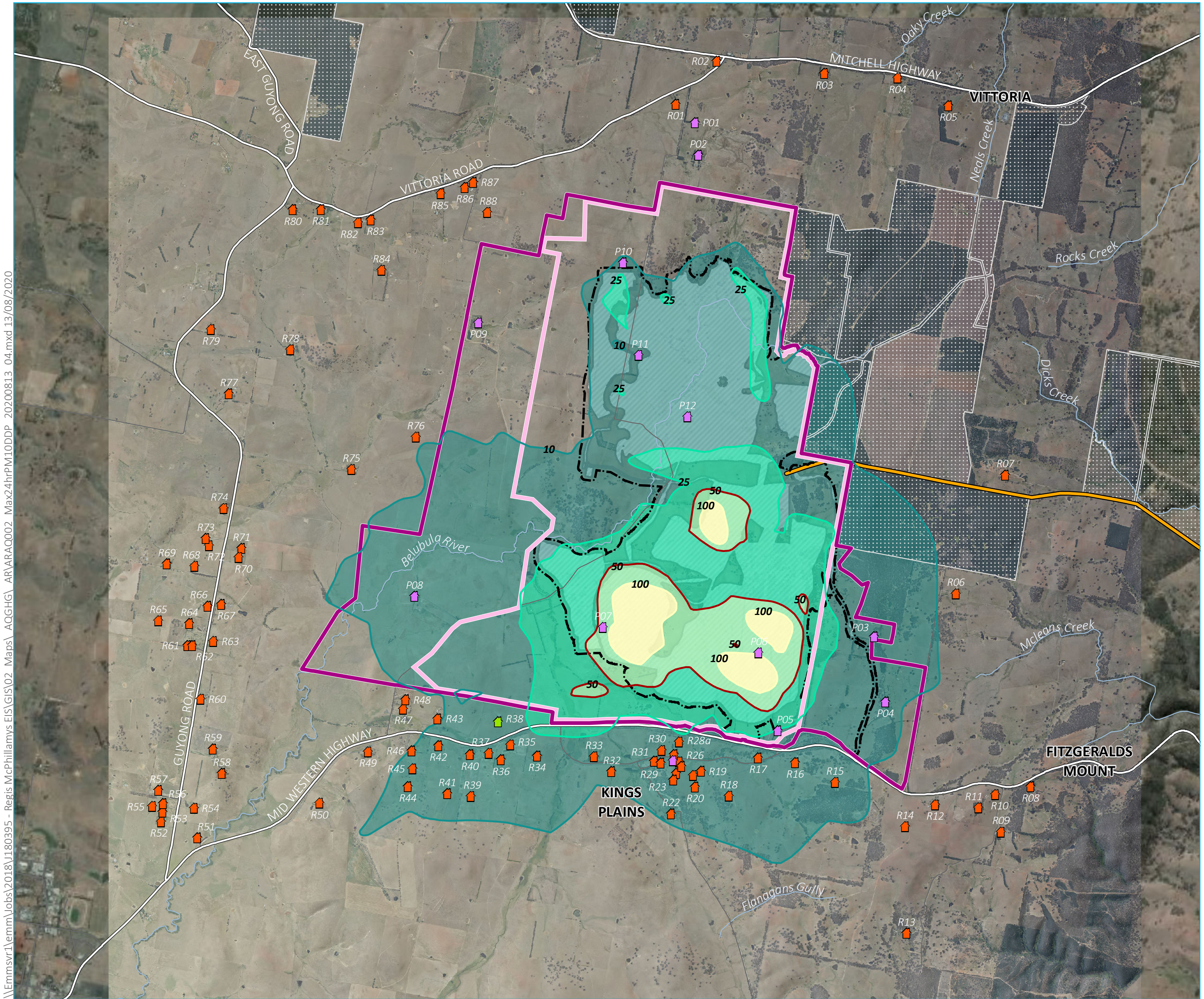
Predicted annual average TSP concentrations (µg/m³) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.19

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

REGIS RESOURCES LTD
EMM creating opportunities

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\AQ001_AnnualTSPConcDDP_20200813_04.mxd 13/08/2020



KEY

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Disturbance footprint

Pipeline

Mine development general arrangement - Year 6

Sensitive receptor

Private

Residences under option

Project related (Regis-owned)

Maximum 24-hour average PM_{10} concentrations

10 µg/m³

25 µg/m³

50 µg/m³ (incremental VLAMP mitigation criteria)

100 µg/m³

Maximum 24-hour average PM_{10} concentration range

10 - 25 µg/m³

25 - 50 µg/m³

50 - 100 µg/m³

> 100 µg/m³

Existing environment

Major road

Minor road

Named watercourse

Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

Maximum predicted 24-hour average PM_{10} concentrations (µg/m³) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.20

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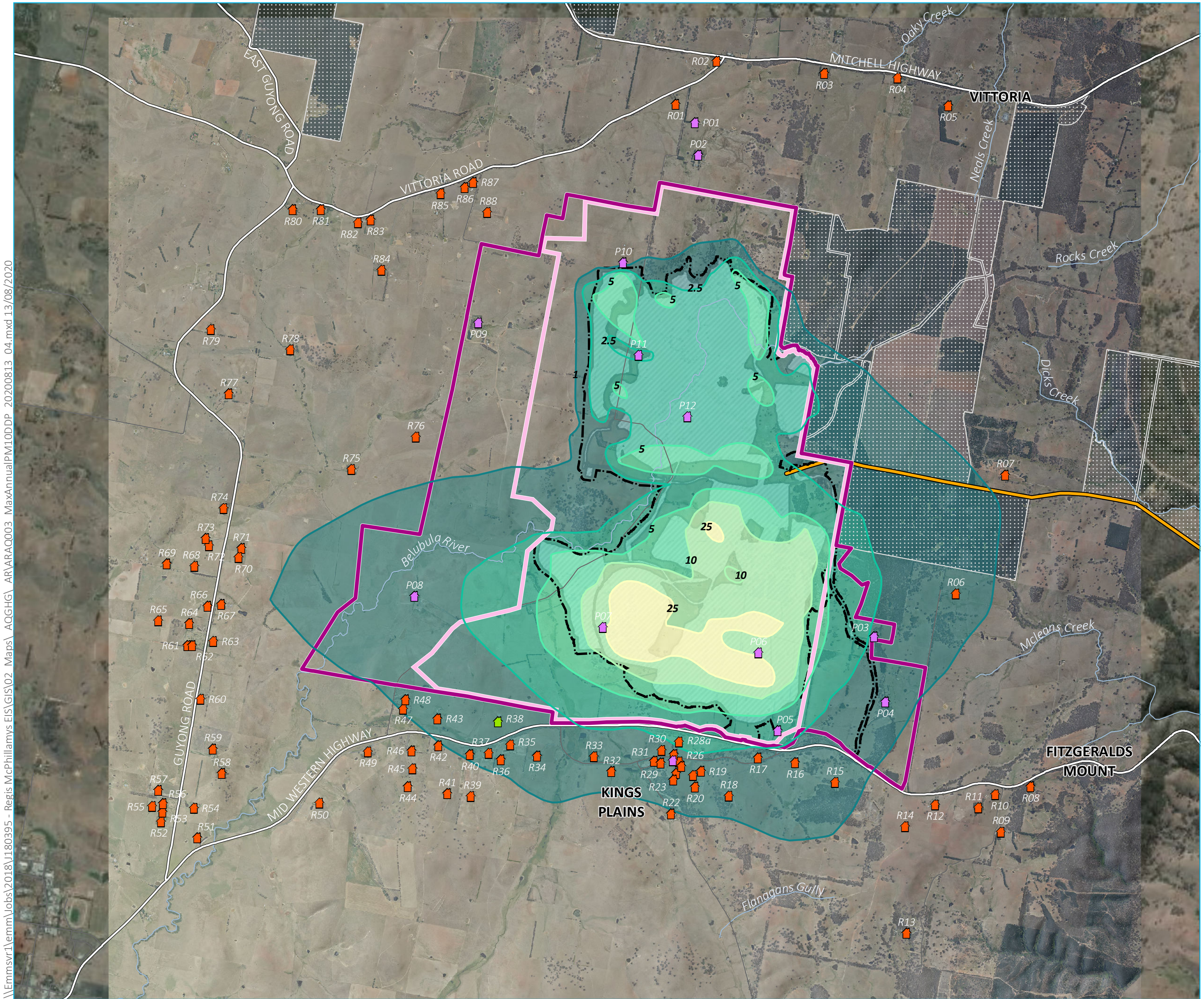


KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average PM_{10} concentrations
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³
- 10 µg/m³
- 25 µg/m³

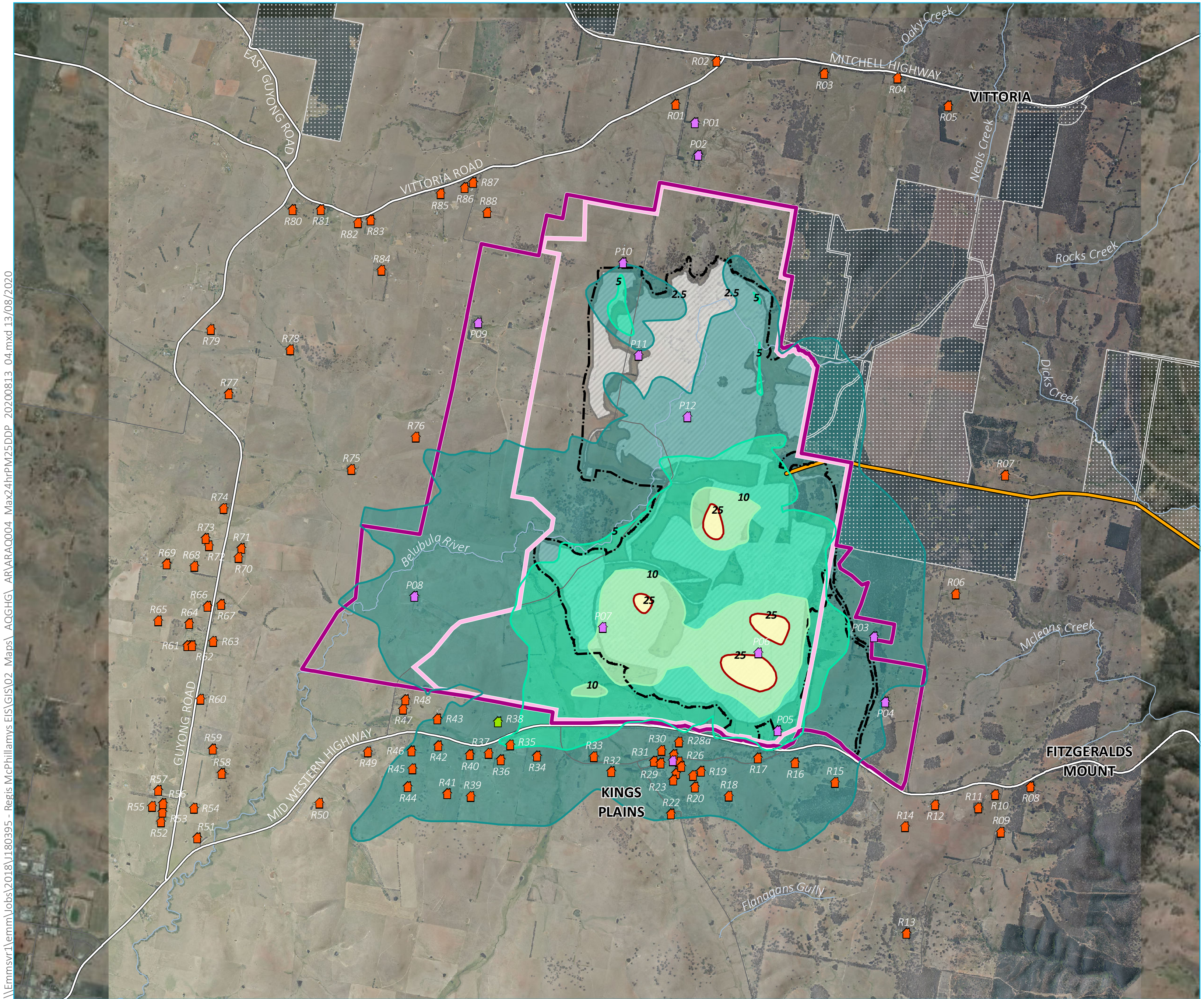
Annual average PM_{10} concentration range
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- 5 - 10 µg/m³
- 10 - 25 µg/m³
- > 25 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average PM_{10} concentrations (µg/m³) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.21

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

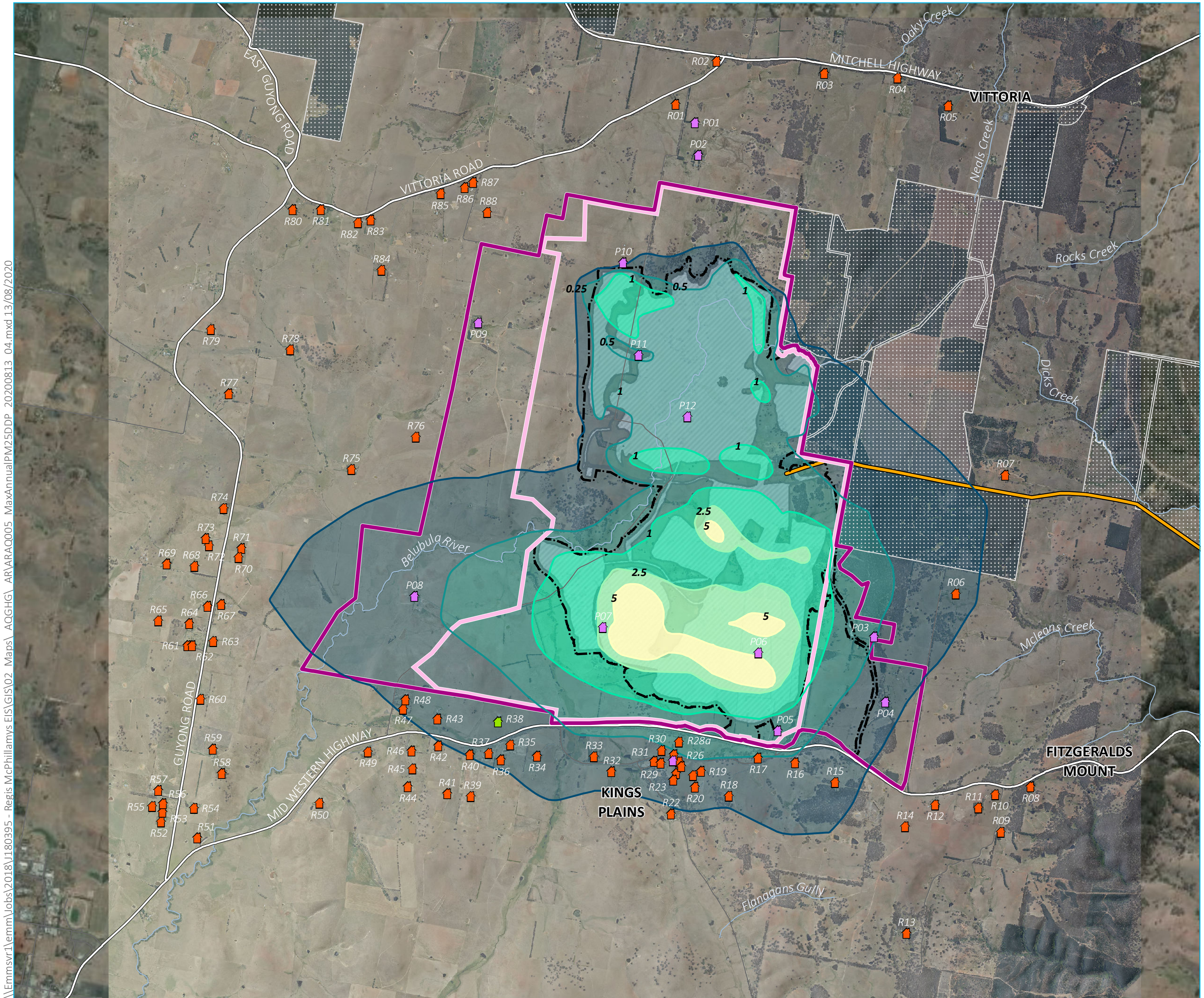


Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m³) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.22

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\AR_AQ004_Max24hrPM25DDP_20200813_04.mxd 13/08/2020



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average $PM_{2.5}$ concentrations

- 0.25 µg/m³
- 0.5 µg/m³
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³

Annual average $PM_{2.5}$ concentration range

- 0.25 - 0.5 µg/m³
- 0.5 - 1 µg/m³
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- > 5 µg/m³

Existing environment

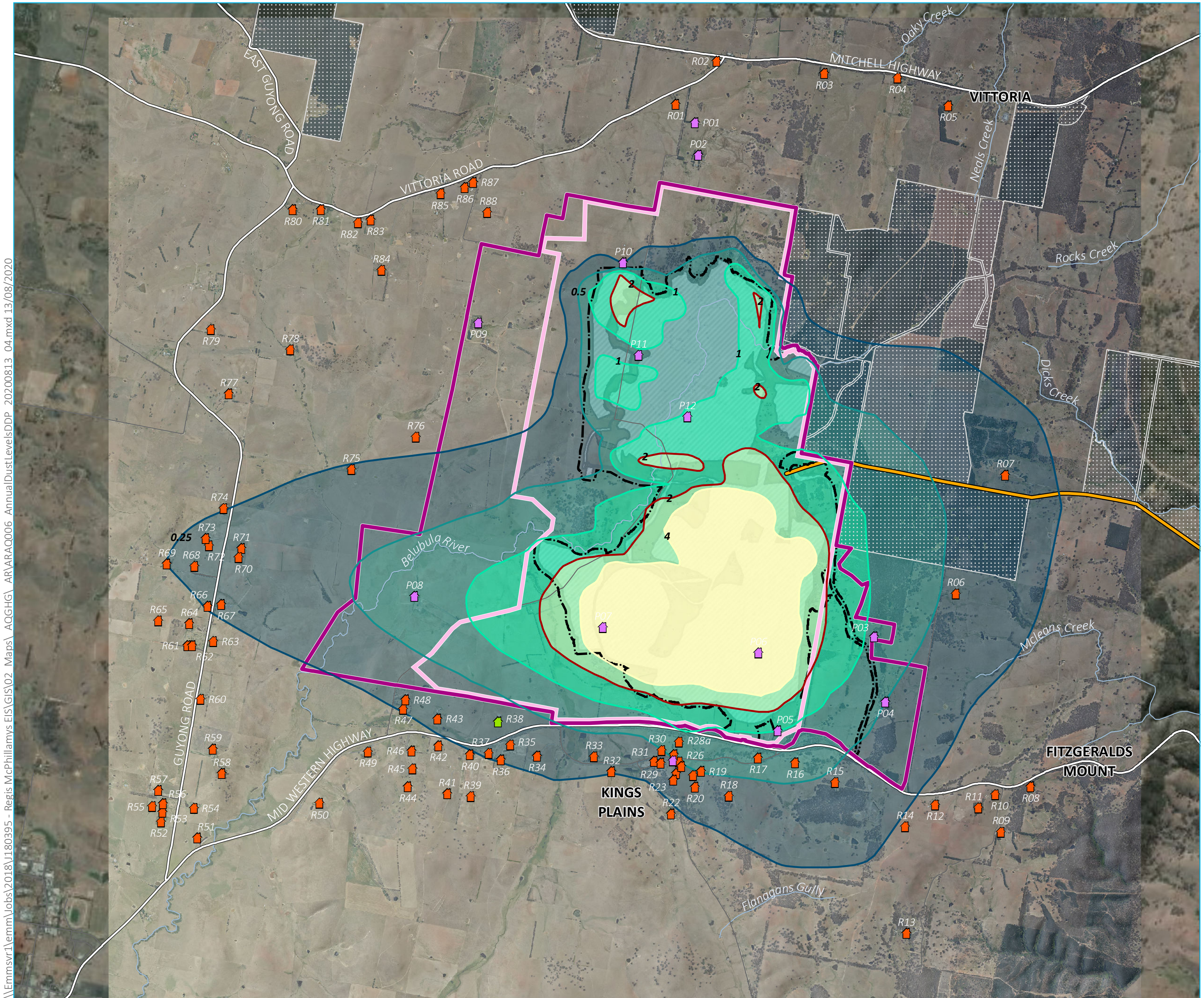
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average $PM_{2.5}$ concentrations (µg/m³) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.23

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ005_MaxAnnualPM25DDP_20200813_04.mxd 13/08/2020



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average dust deposition levels

- 0.25 g/m²/month
- 0.5 g/m²/month
- 1 g/m²/month
- 2 g/m²/month (incremental VLAMP mitigation criteria)
- 4 g/m²/month

Annual average dust deposition level range

- 0.25 - 0.5 g/m²/month
- 0.5 - 1 g/m²/month
- 1 - 2 g/m²/month
- 2 - 4 g/m²/month
- > 4 g/m²/month

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average dust deposition levels (g/m²/month) – Year 6 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.24

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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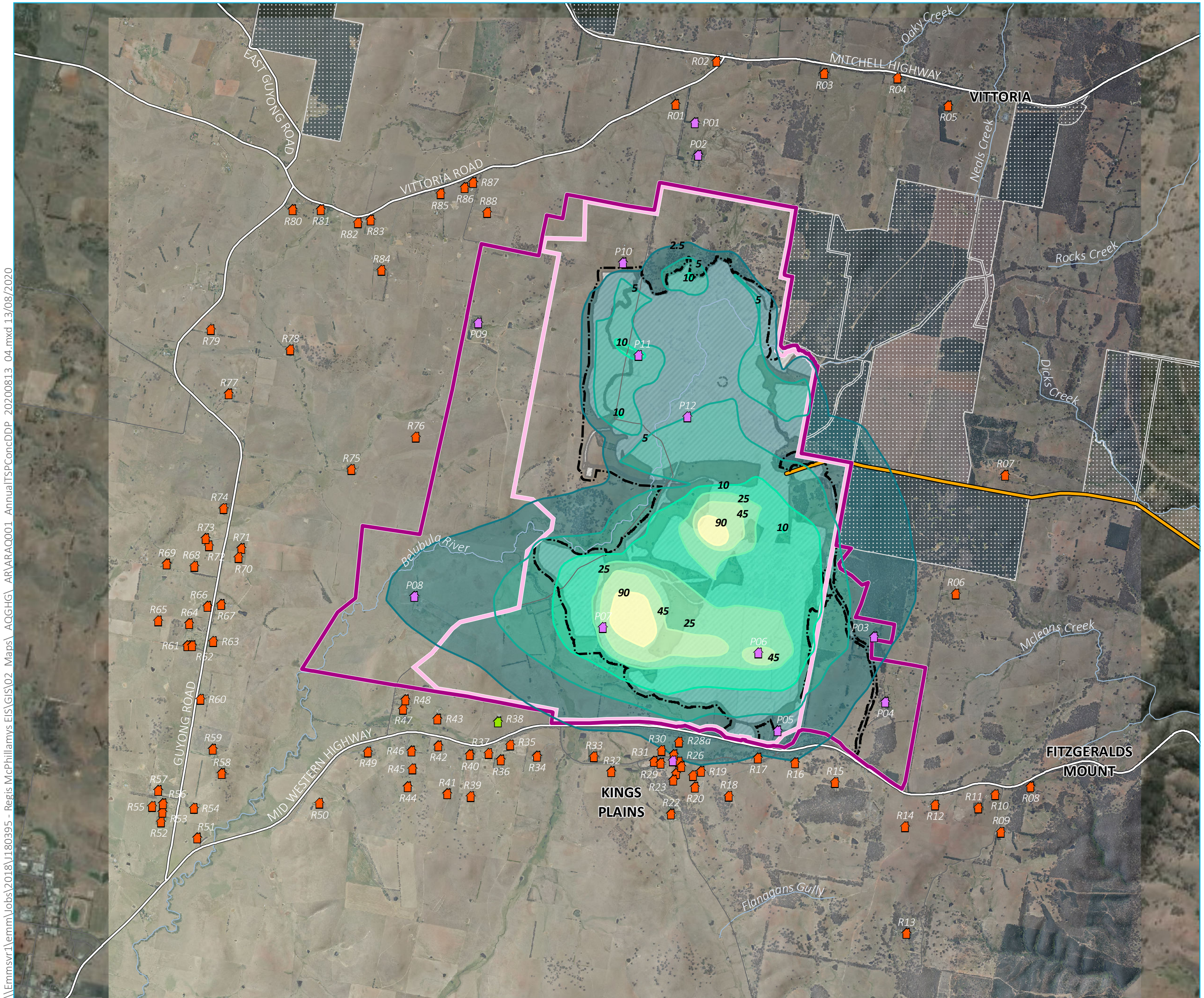

KEY
Project application area
Mine development project area
Mining lease application area (Note: boundary offset for clarity)
Disturbance footprint
Pipeline
Mine development general arrangement - Year 8
Sensitive receptor
Private
Residences under option
Project related (Regis-owned)
Annual average TSP concentrations
2.5 µg/m³
5 µg/m³
10 µg/m³
25 µg/m³
45 µg/m³
90 µg/m³
Annual average TSP concentration range
2.5 - 5 µg/m³
5 - 10 µg/m³
10 - 25 µg/m³
25 - 45 µg/m³
45 - 90 µg/m³
> 90 µg/m³
Existing environment
Major road
Minor road
Named watercourse
Vittoria State Forest

Predicted annual average TSP concentrations (µg/m³) – Year 8 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.25

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

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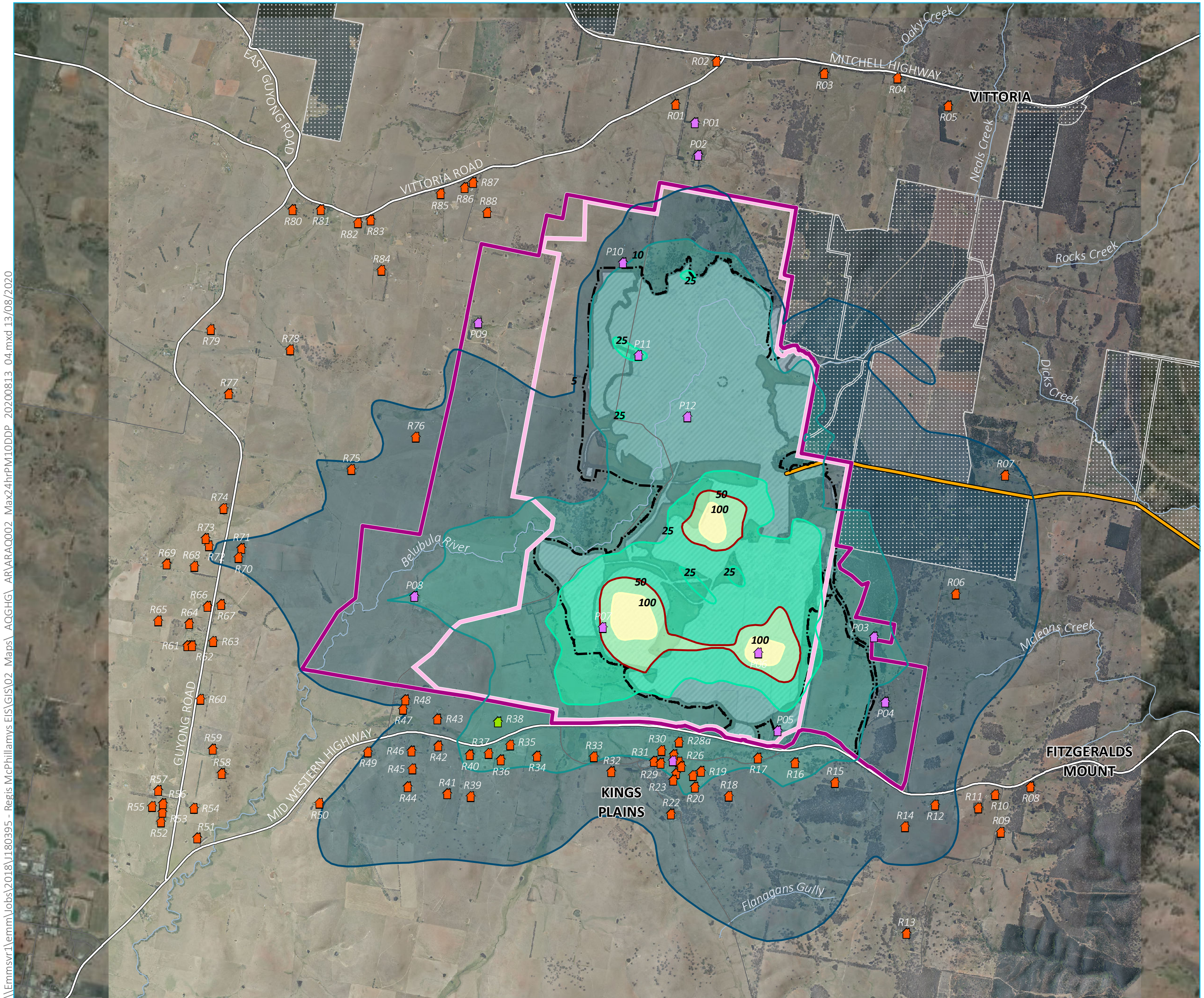
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\AQ001_AnnualTSPConcDDP_20200813_04.mxd 13/08/2020



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Maximum 24-hour average PM_{10} concentrations

- 5 µg/m³
- 10 µg/m³
- 25 µg/m³
- 50 µg/m³ (incremental VLAMP mitigation criteria)
- 100 µg/m³

Maximum 24-hour average PM_{10} concentration range

- 5 - 10 µg/m³
- 10 - 25 µg/m³
- 25 - 50 µg/m³
- 50 - 100 µg/m³
- > 100 µg/m³

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Maximum predicted 24-hour average PM_{10} concentrations (µg/m³) – Year 8 operations only

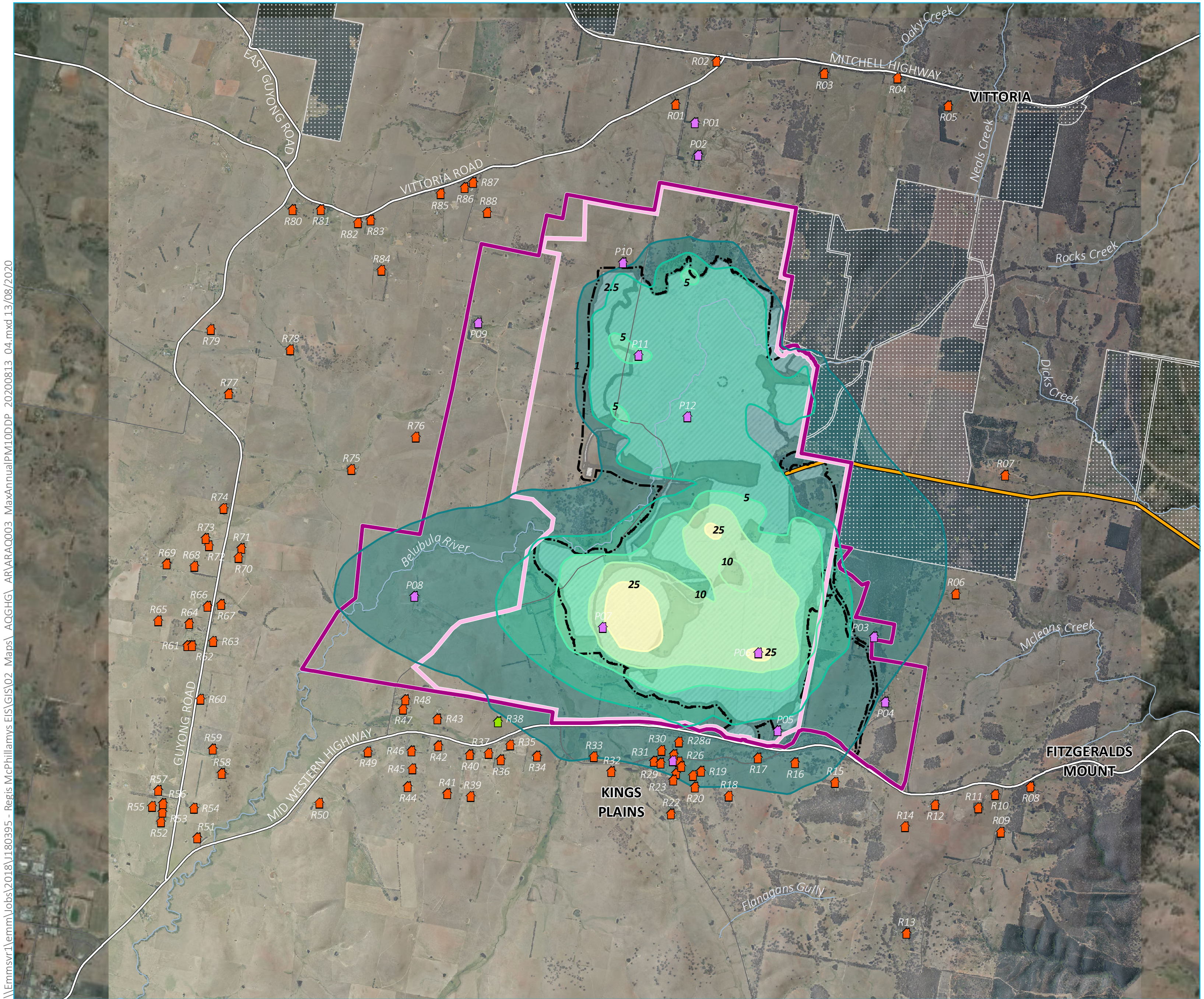
McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.26

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

REGIS RESOURCES LTD EMM creating opportunities

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ002_Max24hrPM10DDP_20200813_04.mxd 13/08/2020



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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Annual average PM_{10} concentrations

- 1 μg/m³
- 2.5 μg/m³
- 5 μg/m³
- 10 μg/m³
- 25 μg/m³

Annual average PM_{10} concentration range

- 1 - 2.5 μg/m³
- 2.5 - 5 μg/m³
- 5 - 10 μg/m³
- 10 - 25 μg/m³
- > 25 μg/m³

Existing environment

- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average PM_{10} concentrations (μg/m³) – Year 8 operations only

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Amendment report –
revised air quality and greenhouse gas assessment
Figure D.27

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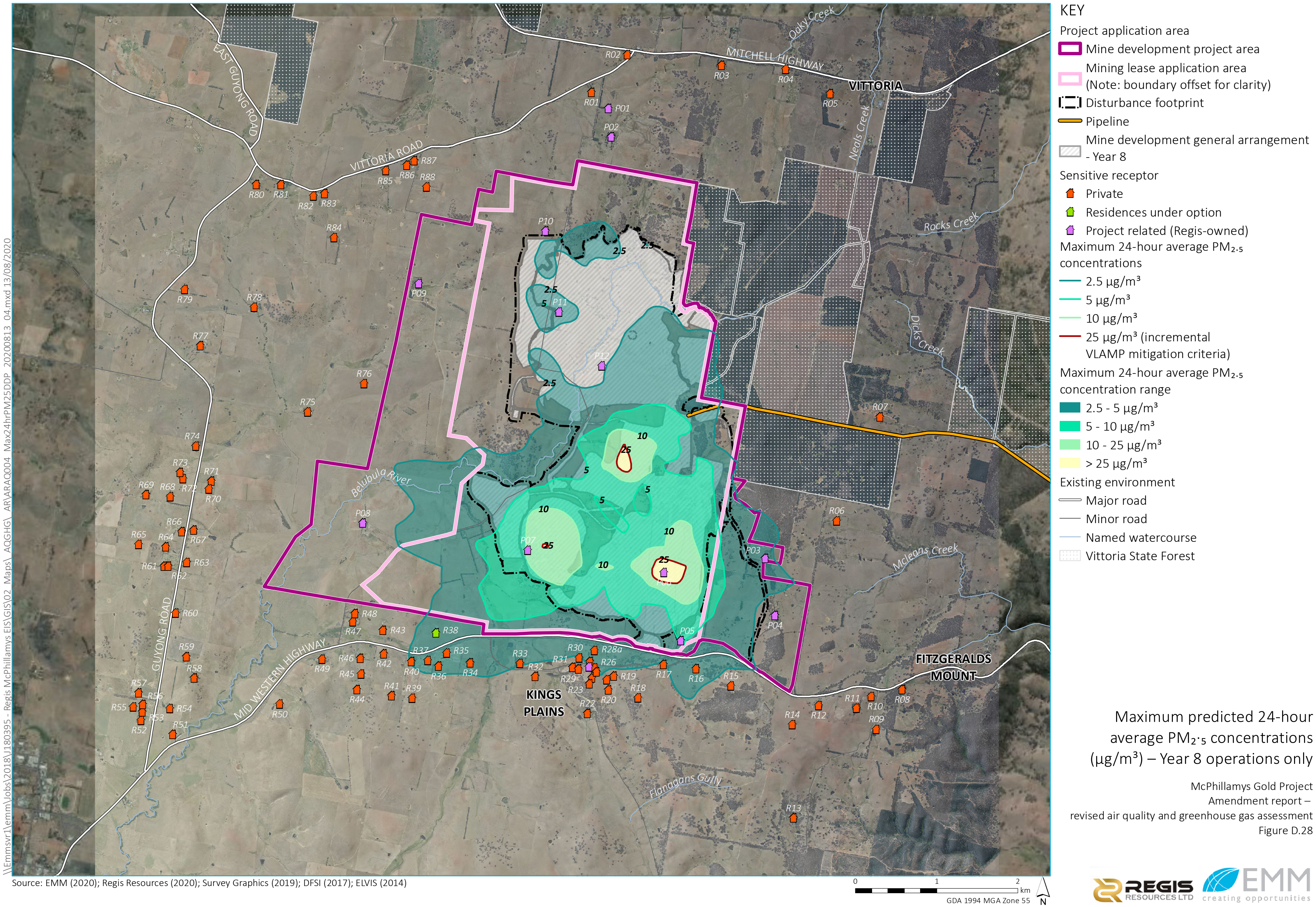

Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m³) – Year 8 operations only

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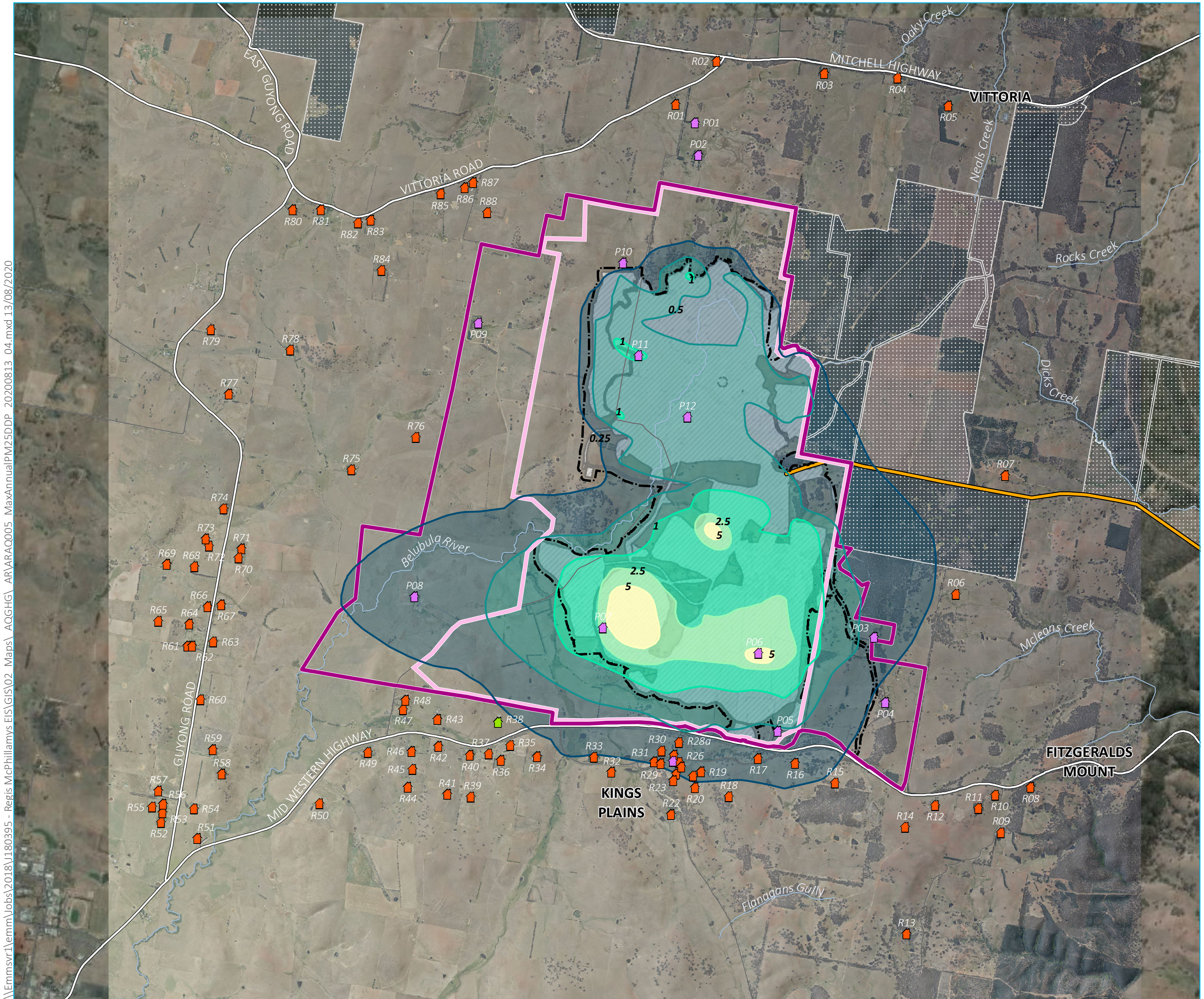
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.28



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average $PM_{2.5}$ concentrations
- 0.25 µg/m³
- 0.5 µg/m³
- 1 µg/m³
- 2.5 µg/m³
- 5 µg/m³

Annual average $PM_{2.5}$ concentration range
- 0.25 - 0.5 µg/m³
- 0.5 - 1 µg/m³
- 1 - 2.5 µg/m³
- 2.5 - 5 µg/m³
- > 5 µg/m³

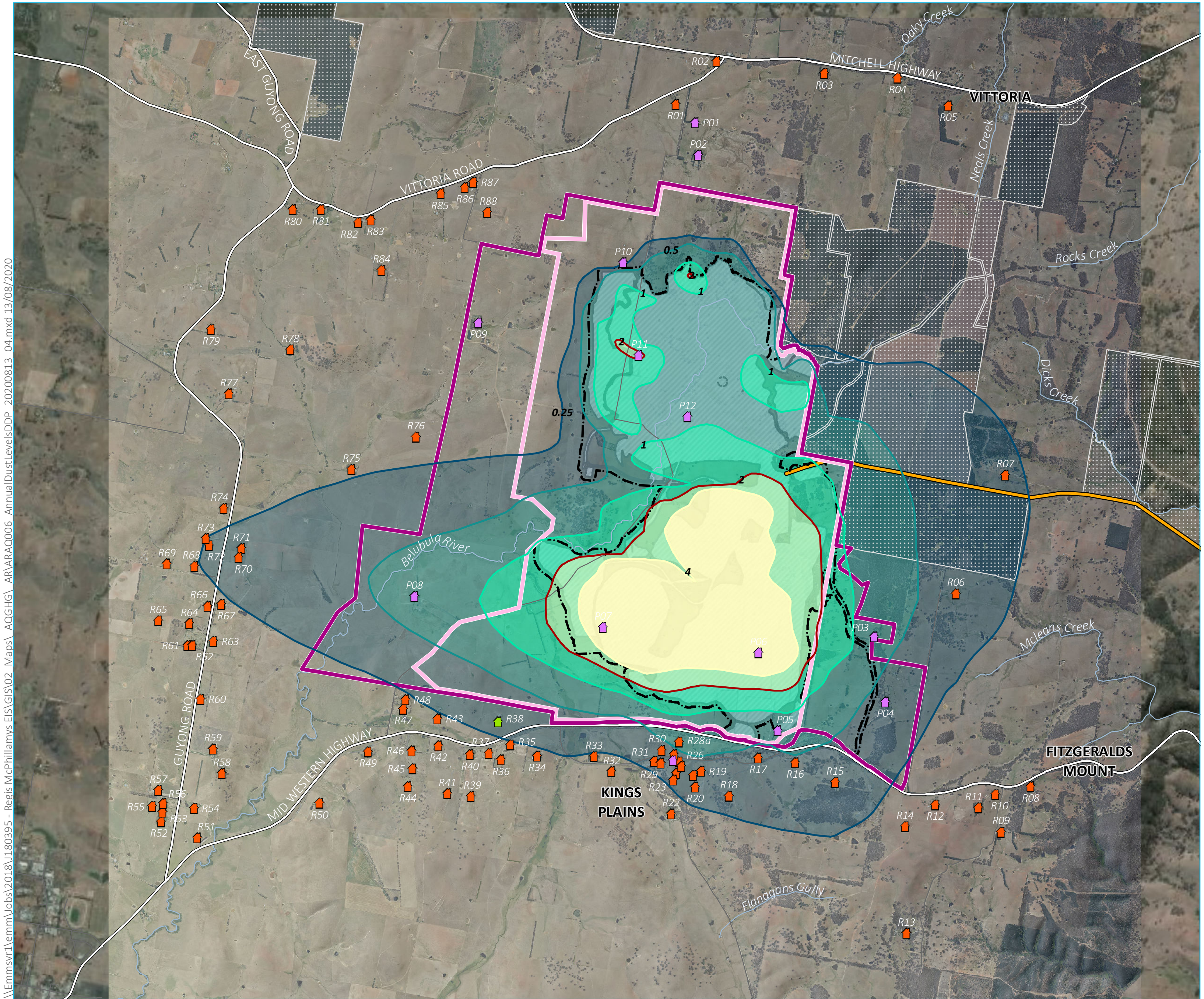
Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

Predicted annual average $PM_{2.5}$ concentrations (µg/m³) – Year 8 operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.29

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ005_MaxAnnualPM25DDP_20200813_04.mxd 13/08/2020



\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps\AQGHG\AR\AQ006_AnnualDustLevelsDDP_20200813_04.mxd 13/08/2020

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Annual average dust deposition levels
- 0.25 g/m²/month
- 0.5 g/m²/month
- 1 g/m²/month
- 2 g/m²/month (incremental VLAMP mitigation criteria)
- 4 g/m²/month

Annual average dust deposition level range
- 0.25 - 0.5 g/m²/month
- 0.5 - 1 g/m²/month
- 1 - 2 g/m²/month
- 2 - 4 g/m²/month
- > 4 g/m²/month

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Predicted annual average dust deposition levels (g/m²/month) – Year 8 operations only

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Figure D.30

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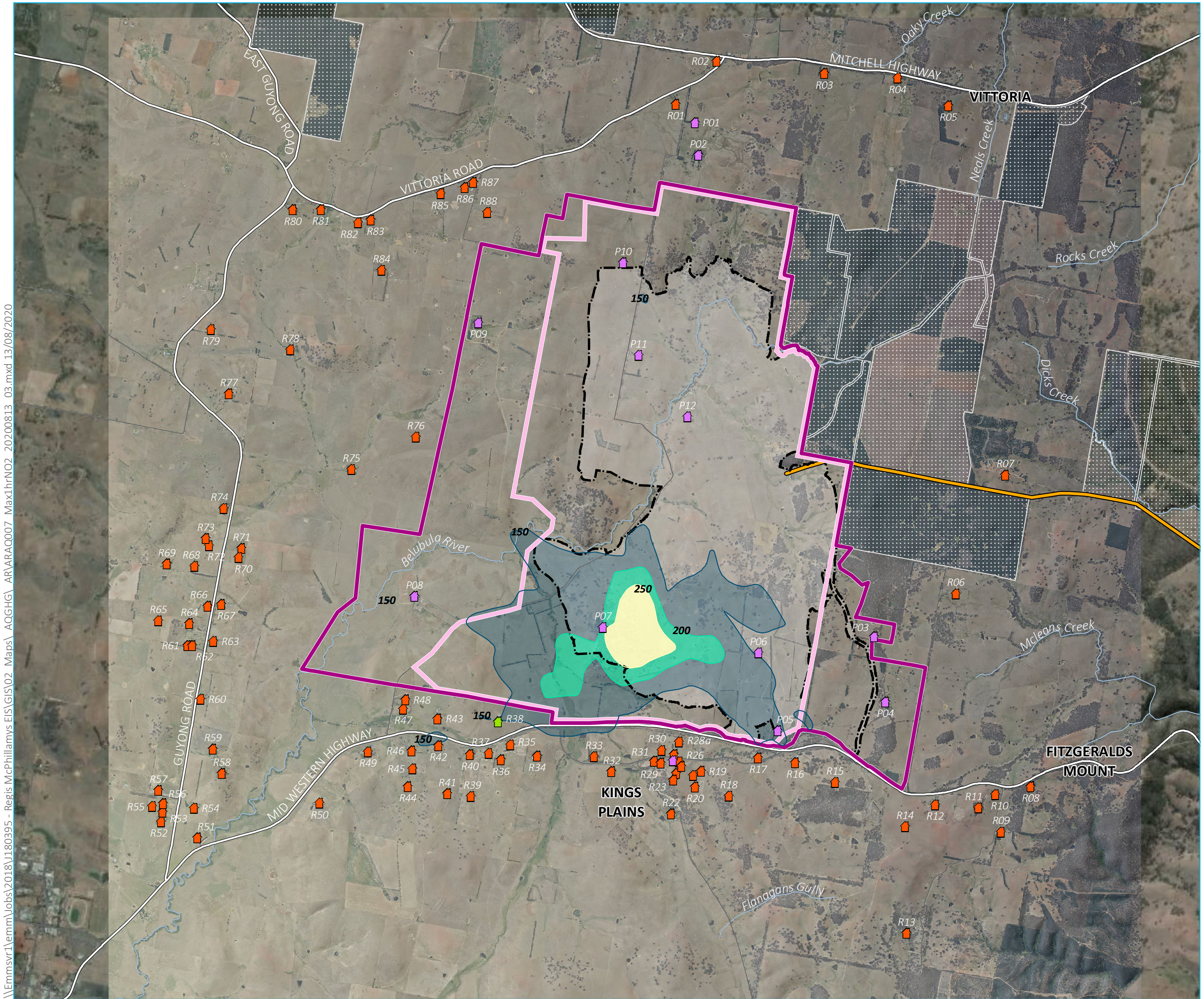

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Maximum 1-hour average NO_2 concentrations
- 150 µg/m³
- 200 µg/m³
- 250 µg/m³

Maximum 1-hour average NO_2 concentration range
- 150 - 200 µg/m³
- 200 - 250 µg/m³
- > 250 µg/m³

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AQGHG_AR\ARAQ007_Max1hrNO2_20200813_03.mxd 13/08/2020

Maximum predicted 1-hour average NO_2 concentrations (µg/m³) – maximum diesel combustion operations only

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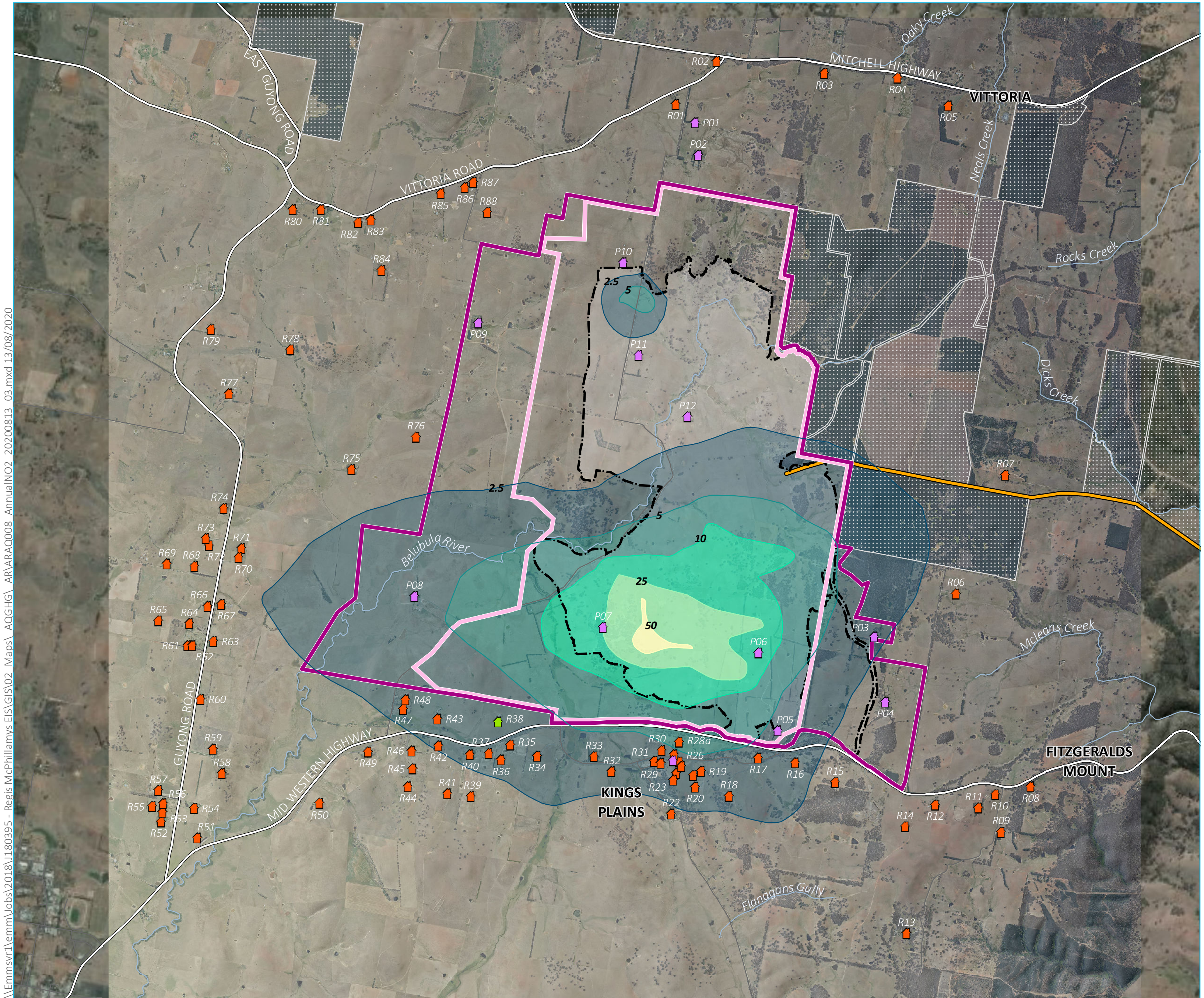
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.31



KEY

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Disturbance footprint

Pipeline

Sensitive receptor

Private

Residences under option

Project related (Regis-owned)

Annual average NO_2 concentrations

2.5 µg/m³

5 µg/m³

10 µg/m³

25 µg/m³

50 µg/m³

Annual average NO_2 concentration range

2.5 - 5 µg/m³

5 - 10 µg/m³

10 - 25 µg/m³

25 - 50 µg/m³

> 50 µg/m³

Existing environment

Major road

Minor road

Named watercourse

Vittoria State Forest

Predicted annual average NO_2 concentrations (µg/m³) – maximum diesel combustion operations only

McPhillamys Gold Project
Amendment report –
revised air quality and greenhouse gas assessment
Figure D.32

0 1 2 km
GDA 1994 MGA Zone 55
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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

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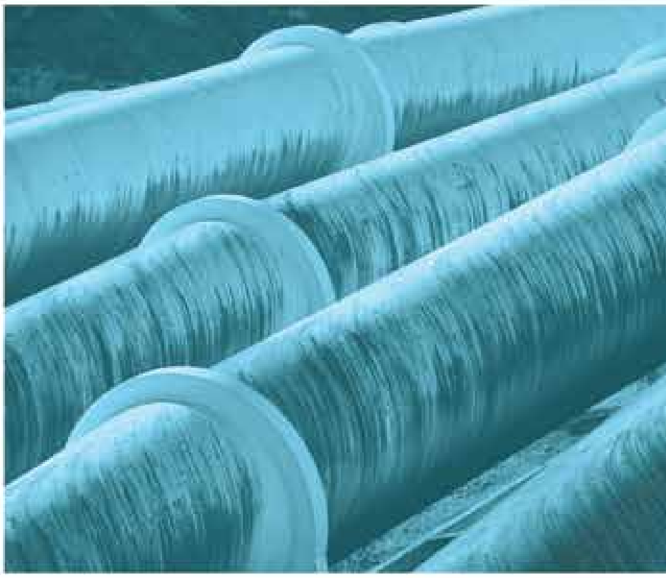

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